PN-AAM-287
ISN:15720

167

IN-SERVICE WORKSHOP ON FOOD PRODUCTION/CONSUMPTION LINKAGES

Manual for Workshop Members

August, 1982

Training materials prepared for the United States Department of Agriculture, Office of International Cooperation and Development, Technical Assistance Division, Nutrition Economics Group under PASA STB-0000-P-AG-2103, Nutrition Strategies Training Program, and RSSA 3-77, Economic Analysis of Agricultural Policies, under agreement with the Agency for International Development's Training Division (Personnel Management) and the Office of Nutrition (Bureau for Science and Technology)

ACKNOWLEDGEMENTS

The draft materials and initial design of this workshop were prepared under an agreement between the Agency for International Development (AID) and the Department of Agriculture (USDA). AID project monitors were Nicolaas Luykx (S&T/N) and Diane Leach (M/PM/TD/CD). Charlotte Miller of the Nutrition Economics Group (USDA/OICD/NEG) served as the project manager for workshop design, materials development and participant identification, with the able assistance of Jeffrey Merriam. Roberta van Haeften, Leader of the Nutrition Economics Group, provided review input and critques of the draft materials as they were developed.

The following people participated in various stages of the materials development:

Brenda Gardner, Training Materials Consultant
William LeClere, Training Consultant
Gary Smith, Economist, USDA/OICD/NEG
Marguerite Burk, Consumption Economist, Consultant
Marito Garcia, Development Economist, Consultant
Hector Martinez, Socio-Cultural Anthropologist, Consultant (Puno case)
James Roush, Management Consultant
J. Douglas Uzzell, Socio-Cultural Anthropologist, Consultant (Methods)
Patricia Rader, Political Economist, USDA/OICD/NEG
Kathy Alison, Audio-Visual Specialist, USDA/OICD/International Training
Margaret Hively, International Training Administrator, USDA/OICD/ITD
Robert Werge, Economic Anthropologist, USDA/OICD/ITD
Bonni van Blarcom, Economist, Consultant
Judith McGuire, Nutritionist, AID/PPC/PDPR/HR
Eleanor Pao, Nutiritionist, USDA/SEA
Laura Jane Harper, Home Economist, Virginia Polytechnic Institute and State University

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

September 12, 1982

Dear Colleague:

Welcome to the In-Service Workshop on Food Production/Consumption Linkages for A.I.D. Agricultural and Rural Development Officers, sponsored by the Training Division of Personnel Management (M/PM/TD/CD) and the Office of Nutrition of the Bureau for Science and Technology (S&T/N).

We hope you find the facilities adequate and comfortable, here at the Tidewater Inn. Dinner this evening will be at 6:300 in the main dining room. You will find a name tag in this folder which would assist us all in getting to know one another. Please feel free to wear it to workshop meetings and meals. While you are here, your room and scheduled meals have been prepaid by the Agency. You should pay any other expenses you incur here before check-out time, twelve noon, Friday, September 17. Dress at all times will be informal.

This package contains materials for the workshop which you should review before tomorrow's opening session. You will be provided with other materials as the workshop proceeds. Please share your reactions and comments about the workshop's design and materials openly with the trainers and workshop designers. This is a pilot, and we are expecting that your input will make the subsequent offerings of this workshop substantially better.

We hope you enjoy you stay here and find the workshop stimulating and useful.

Sincerely,

Bill LeClere

Bill LeClere

FOR THE TRAINING TEAM

Marguerite Burk
Jim Roush

AND FOR THE WORKSHOP DESIGN TEAM

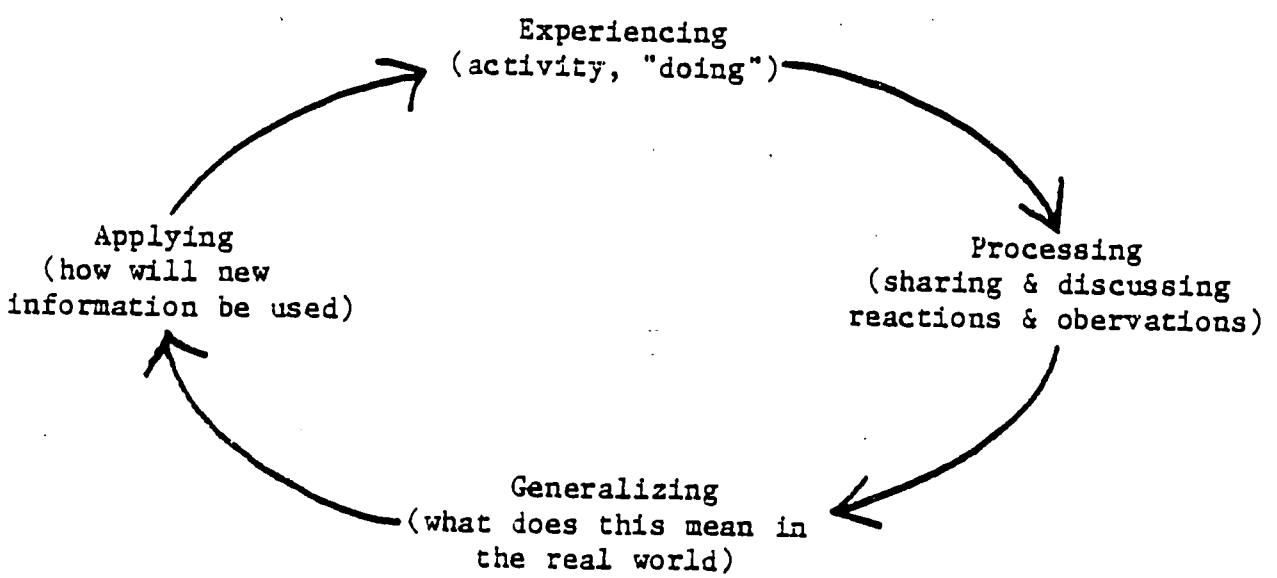
Charlotte Miller
Diane Leach
Nicolaas Luykx
Roberta van Haeften
Jeff Merriam

EXPERIENTIAL LEARNING CYCLE

The Experiential Learning Cycle is a way of learning by doing. Experiential Learning happens when individuals participate in or observe an activity. They then look back at the activity critically, list and discuss useful ideas gained from the analysis of the activity and finally try to put these new iedas into practice. Learning occurs because of participation and observation, rather than from reading or studying a theory.

There are certain stages in the Experiential Learning Cycle that are followed in order for the experience to have an impact. Trainers design a structured experience that provides a framework for this learning to take place. The experience itself is important, but even more important is how the trainer possesses the information generated by the experience. This depends on the questions asked by the trainer.

The stages of the experiential cycle are called by various names, depending on the trainer, but regardless of the terms, the experiential cycle follows a certain format. A simple model of the cycle looks like this:



In the Experiential Cycle, the experience comes first. This stage is often associated with a game of having fun. The experience is used to generate data which will be used throughout the rest of the learning cycle. If the cycle stops at this stage, all learning is left to chance, and the trainer has not completed the task.

The videotape shows an example of the Experiential Cycle in which participants are involved in a role-play, but they could be solving a problem, analysing a case study, planning a project, building a tower, or any number of other activities that i olve some type of interpersonal or self-assessment skills.

Whatever happens during the activity becomes the basis for critical analysis. The videotape looks at how trainers use questions to move the group from this experience to the application of new learnings.

A trainer begins any experiential session by setting a climate. This means the trainer starts the participants thinking about the subject at hand by providing a rationale for the training session. This is also a way of linking previous training sessions to this one and places it into an overall framework.

Then the trainer shares the goal of the session and explains the situation. Both obsevers and those participating in the session are coached about their roles. Then the experience begins.

Immediately after the experience, participants are asked to share their observations. Everyone has experienced an activity and now they

share what they saw or how they felt during the event. Participants talk through the activity, describing what happened. This awareness and discussion of what happened is critical for learning about human behavior outside of the classroom setting. Questions like "What was this person's plan for dealing with the problem?", "How did it work?", and "What did you see this person doing?", are asked of the observers and role-players.

It is important that participants are aware of what happened during the experience before moving on to the next stage. It is also important for those acting out roles to separate themselves from the role and look at what happened. This is called de-roling.

The next stage moves the group from the specific experience to a real life situation. The key question here is "So what does this mean in the real world?" Trainers use such questions as "What would you do now if you were in this situation at home?", or "What have you learned from this situation?"

Trainers are looking for principles that can be applied outside of the course situation. This step is what makes the structured experiences practical.

Finally, trainers and participants move into the last stage of the experiential learning cycle. Here the central question is "Now what?" This stage gives participants a chance to think about specific strategies and then to design ways of using the learning when they return home.

Brainstorming is an effective method of looking at possible applications, but these applications can be generated in small groups or group presentations. Individuals are more likely to try their planned applications if they share them with others.

Before the session ends, the trainer will check with the group to make sure the goal has been met. This is a way of bringing closure to the cycle and helping the group focus on what they were trying to do during the session.

The Experiential Learning Cycle is learner-centered and allows adults to manage and assume responsibility for their own learning. Trainers facilitate this learning, rather than provide all the answers. The trainer's primary goal is to create a learning environment that is stimulating and relevant to the needs of the learner. This approach to adult learning helps individuals develop new skills and techniques for dealing with real life situations and makes theories come alive.

INFORMATION ON TRAINING TEAM

BILL LECLERE is a Washington-based Management Training Consultant. He has broad experience in development related training programs in Jamaica, Bangladesh, Iran and the Tanzanian Training for Rural Development Project. Among the private companies that have used his talents are AT&T, General Motors and the Bundy Corporation. He has served as lead trainer and worked on materials development for many overseas workshops for AID-assisted host country nationals through USDA's International Training Division.

DR. MARGUERITE C. BURK was head of the food consumption section of the U.S. Department of Agriculture's BAE/ERS from 1944-1961; she later held the positions of joint professor of agricultural economics/home economics at the University of Minnesota 1961-1969; leader of food consumption research group USDA/ARS 1970-1975; chairman of the Program of International Studies, School of Human Ecology at Howard University 1975-1980. Her recent bulletins are two manuals for FAO; Analysis of Food Consumption Survey Data for Developing Countires (Food and Nutrition paper 16, 1980) and Nutritior Consideration in Agriculture and Rural Develorment in Developing Program (in press).

JAMES L. ROUSH served with AID for 25 years, with assignments in Ethiopia, Cameroon, Vietnam, Guatemala and Chile. Jobs generally were in program planning/budgeting, program management (Deputy Director, ROCAP; Director, Chile) and programming systems (Chairman of PBAR Task Force). Since retirement in 1978 he has done extensive consulting directly and indirectly for AID, primarily in or related to Africa and Latin America, including preparation of scopes of work for studies in four Latin American countries on the impact of agricultural policies on food consumption. Educational background includes Masters Degrees in Economics and International Relations and attendance at the Army War College and the Federal Executive Institute.

DIANE LEACH is an Employee Development Specialist with AID's Bureau for Management, Office of Personnel Management, Training and Development Division, Career Development Branch (M/PM/TD/CD). She first came to AID as a specialist in writer training and other topics related related to English language use. More recently, she coordinated the Regional Overseas Management Seminar for Foreign Service Nationals in Nairobi, Kenya. In addition to backstopping the In-Service Workshop on Food Production/Consumption Linkages she also has major responsibilities for AID's Foreign National Employee Training Program.

CHARLOTTE I. MILLER has been Social Science Analyst with the U.S. Department of Agriculture in the Nutrition Economics Group since January 1981. Prior to that she was consultant in the area of social analysis, project design and evaluation to USAID/Lima, the National Council of La Raza, the International Potato Center, AID/PPC/Office of Evaluation, and Amaru IV Cooperative. She taught anthropology at Texas Christian University (1974-1976) and Georgia State University (1979-1980), and served as trainer in the USDA International Training Division's Agricultural Capital Projects course and Agricultural Policy Seminar. She holds a PhD in Anthropology (with a certificate in Latin American Studies) from the University of Florida. She lived in Ecuador, Mexico, Uruguay, Brazil and Peru.

ROBERTA VAN HAEFTEN is an economist with the U.S. Department of Agriculture on loan to AID's Office of Nutrition, a leader of the Nutrition Economics Group. She has worked for the Department of Agriculture and AID in Latin America, Asia and Africa on problems of agricultural and rural development, agricultural planning, impact of agricultural policies and programs on food consumption and nutrition. She served as trainer in USDA's Agricultural Policy Seminar and Agricultural Projects Analysis Course. She has degrees in History, Public Administration and Economics.

People Going to the Workshop

Richard Nishihara
USAID/Kathmandu
(Nepal)

Abdul Wahab
USAID/Port-au-Prince
(Haiti)

James W. Bonner
USAID/Colombo
(Sri Lanka)

William F. Litwiller
USAID/Yaounde
(Cameroon)

Robert E. Navin
USAID/Kinshasa
(Zaire)

Thomas D. Hobgood
USAID/Manila
(Philippines)

Timothy J. O'Hare
USAID/San Salvador
(El Salvador)

Kenneth S. Johnson
USAID/Dar-es-Salaam
(Tanzania)

Gordon Straub
USAID/Tegucigalpa
(Honduras)

James Gingerich
USAID/Jakarta
(Indonesia)

James B. Lowenthal
USAID/Niamey
(Niger)

James Dunn
USAID/Maseru
(Lesotho)

Douglas W. Butchard
S&T/AG
(AID/W)

Andra J. Herriott
M/PM/TD

Loren L. Schulze
S&T/AG
(AID/W)

Alexander Shapleigh
ASIA/PD
(AID/W)

George W. Miller
NE/TECH/AD
(AID/W)

Dwight Steen
LAC/DR/RD
(AID/W)

Thomas Wilson
ASIA/TR
(AID/W)

Arthur Britton
S&T/MD
(AID/W)

Donald Wadley
S&T/FA
(AID/W)

Nicolaas Luykx
S&T/N
(AID/W)

Maarten Immink
University of Texas School of
Health, FAO representative

Diane Leach
M/PM/TD/CD
(AID/W)

Charlotte I. Miller
USDA/OICD
Nutrition Economics Group

Roberta van Haeften
USDA/OICD
Nutrition Economics Group

Jeffrey Merriam
USDA/OICD
Nutrition Economics Group

Kathy Alison, Audio-visual Specialist
USDA/OICD/International Training

List of Mission and Washington Office Nominees

Richard Nishihara USAID/Kathmandu Nepal	Agricultural Development Officer has back-stopped courses for participants and is familiar with experiential training
Alexander Shapleigh Asia Bureau Program Office	Project Development Officer (Foreign Service) Has worked on design of two food production/consumption projects: Indonesian Secondary Crops & Burma Maize and Oilseeds Production.

Education: M.A. Johns Hopkins School of International Studies (1969) (economics, foreign policy and Latin America)
Has worked for Peace Corps, Partners of the Americas, and the Organization of American States
Years of Service: 1 year, 6 months

Loren L. Schulze Bureau for Science and Technology, Office of Agriculture	Agricultural Development Officer (Grain-Legume Agronomist) Foreign Service (recently returned from Peru)

Education: Ph.D. Crop Physiology U. of Georgia (1978)
Years of Service: 4 years, 4 months

George W. Miller Bureau for the Near East, Office of Technical Support, Agricultural Development	Agricultural Advisor: Project Manager (Foreign Service)

Education: Ph.D. candidate Purdue University in Agricultural Education, minor in Agricultural Engineering, International Agriculture and Educational Administration
Worked a lot in property management, and agricultural education
Years of service: 21 years, 10 months

James Bonner USAID/Colombo Sri Lanka	Agricultural Development Officer (Foreign Service) Chief of Research and Reforestation Division Project Manager for Rice Research, Agricultural Education Development, Reforestation and Watershed Management Projects

Education: Ph.D. Plant Physiology
M.S. Tropical Horticulture
B.S. Resource Development and Certified Vocational Education Teacher
Worked for AID since 1976, Afghanistan & Sri Lanka

Dwight Steen
Bureau for Latin America and the Caribbean (AID/W)

Douglas W. Butchart — Senior Livestock Production Officer (Foreign Service)
Bureau for Science and Technology, Office of Agriculture

Education: is vetenarian
Years of Service: 16 years, 0 months

Timothy F. O'Hare — Project Manager (Land Reform) (Foreign Service)
USAID/San Salvador
El Salvador

Kenneth S. Johnson
USAID/Dar-es-Salaam
Tanzania

William F. Litwiller — Agricultural Devleopment Officer USDA/PASA employee
USAID/Younde
Cameroon

Education: Agricultural Economist M.S. Maryland
Overseas experience, Laos, Kenya, Tunesia in Agricultural extension and project management

---

James B. Lowenthal — Project Manager, Rural Development
USAID/Niamey
Niger
Contractual Employee: Ph.D. Social Scientist

James Dunn — Deputy Agricultural Development Officer
USAID/Maseru — Project Officer for Land Conservation, and Range and Farming Systems Research
Lesotho
Experience in Lesotho, Ethopia and Botswana
works on strategy setting in mission
Positive experience with participant training programs
Years of service: 6 years

Robert E. Navin — Agricultural Economist, Project Officer for Agricultural Sector Studies,
USAID/Kinshasa
Zaire
Experience: 2 yrs. Zaire, (one of which as IDI)
Peace Corps in Senegal, Food for Peace Monitor in Mali

Education: Masters in Agricultural Economics, U. Michigan

Thomas D. Hobgood USAID/Manila Philippines	Agricultural Development Officer

Education: M.S. in Agricultural Economics, U. of Maryland

James Gingerich USAID/Jakarta Indonesia	Agricultural Development Officer

Education: Agricultural Economics

Abdul Wahab USAID/Port-au-Prince Haiti	Assistant Agricultural Development Officer Foreign National Employee

---

Gordon Straub USAID/Tegucigalpa Honduras	

Donald Wadley Bureau for Science and Tech nology, Food and Agriculture Directorate	Deputy to Director for Food and Agriculture (Foreign Service) Recently returned from Agricultural Officer Assignment in Manila

---

Arthur Britton Bureau for Science and Technology, Office of MultiSectorial Development	Agricultural Development Officer (Foreign Service)

Thomas Wilson
Bureau for Asia,m
Office of Technical
Resources, Agricultural
Development Division

Educational background in Agriculture

Maarten D.C. Immink
University of Texas
School of Public Health
P.O. Box 20186
Houston, TX 77225

telephone: (713) 792-4431

Representing FAO

Ph.D. Economics
M.P.S. International Development (International Nutrition)
Cornell University, 1979

Dutch citizen
U.S. resident

WORKSHOP DESIGN

Day One
Sunday, September 12, 1982

4:30 Arrival and Registration, Lobby of Tidewater Inn
(Miller and Merriam, responsible)

Workshop Members receive Notebook, folder, questionnaire, Glossary, two AID policy papers, and Berg book.

4:30 to 6:30 Informal Social Gathering (prior to dinner)

6:30 Dinner
Welcoming Remarks

Activity 1: Independent Readings (instructions given in writing)

Day Two
Monday, September 13, 1982

	Activity	Team Members
8:30	Brief Welcome with introduction of staff	
8:45	Orientation to Workshop: clarification of learning objectives and expectations; review of evaluation tools	Le Clere
	Pairs/interview exercise	
9:00	Brief introduction of partners	
9:30	Expectations exercise -Individual tasks -Small group discussion (prepare flip charts)	
10:00	Present group reports with flip charts	
10:15	Compare with Workshop Goals (Handout)	
10:45	Coffee/juice break	
10:45	Activity 2: Small group discussion on AID policy papers	Roush
11:45	Report out on small group discussion	

12:15	Activity 3: "Tanzania: Choices and Dilemmas concerning National Policy" Distribute Case study —Set up for Policy Case discussion on Tanzania	LeClere
12:30	Lunch	
2:00	Small Group Task: Tanzania Case Study (A)	
3:00	Report out on Case Study (A)	
3:30	Break for coffee/juice	
4:00	Individual Preparation: Tanzania Case Study (B)	
4:15	Small Group Task: Tanzania Case Study (B) (closely tied to glossary of concepts)	
5:00	Report out on Case Study (B)	
5:45	Activity 3: Individual Reading (instruction on sheet)	

Day Three
Tuesday, September 14, 1982

8:30	Objectives for the day and Administrative matters	
8:45	Activity 4: Small Group Discussion on the readings from Berg, Fleuret and Burk flow chart -classification of terms -general information questions Small Group Task: Identification of Key problems in food and nutrition with respect to development	Burk Roush
9:30	Report out on Small Groups	
9:45	Activity 5: 24 hour recall exercise and discussion	
10:15	Activity 6: Lecturette: How well-Fed are People? (Handout on Food Balance Sheet Data compared with Food Survey Data)	
10:30	Activity 7: Small Group Task: Comparison and Discussion of data presented on Handout. Preprare to report out conclusions.	
10:45	Break for coffee/juice	
11:00	Group presentations on small group tasks, followed by discussion.	

11:30 Activity 8: Lecturette: National Trends and Micro-Survey

12:30 Lunch

1:30 Activity 9: Micro Survey Case Study

1:45 Small Group Task: Design Key questions you would ask to design a project for this area

2:15 Reports out. Discussion and Handout of Burk "Key Questions"

3:15 Break for coffee/juice

3:30 Activity 10: Quick and Dirty Sample Selection Problem
- -set up
- -total group orientation
- -form small groups, 3-4 each
- -walk through step 1 (discuss)
- -walk through steps 2 to 5 (discuss)
- -walk through step 6 (discuss)
  (discussion of each point along the way)

5:30 Activity 11: Independent Reading: Written Feedback on Questionnaire on own country situations and Lower Volta Case (see written instructions)

7:30 Interim Course Evaluation

Day 4
Wednesday, September 15, 1982

8:30 Objectives for the day and Administrative matters

8:45 Activity 12: Questionnaire Feedback
Small Group Discussion Roush

10:15 Break for coffee/juice

10:30 Activity 13: Total Group Discussion on Lower Volta Case Study

10:45	Small Group Tasks (Lower Volta Case)
11:30	Group presentations on small group tasks, followed b discussion.
12:15	Handout critique and "What happened"
12:30	Lunch
1:30	Total Group Discussion of Handout
2:00	Activity 14: Training Case Studies on Project Desigr and Implementation, Puno (Peru) and Palawan (Philippines)
	Videotapes (introduction)
	Tasks
5:00	Break

Day Five
Thursday, September 16, 1982

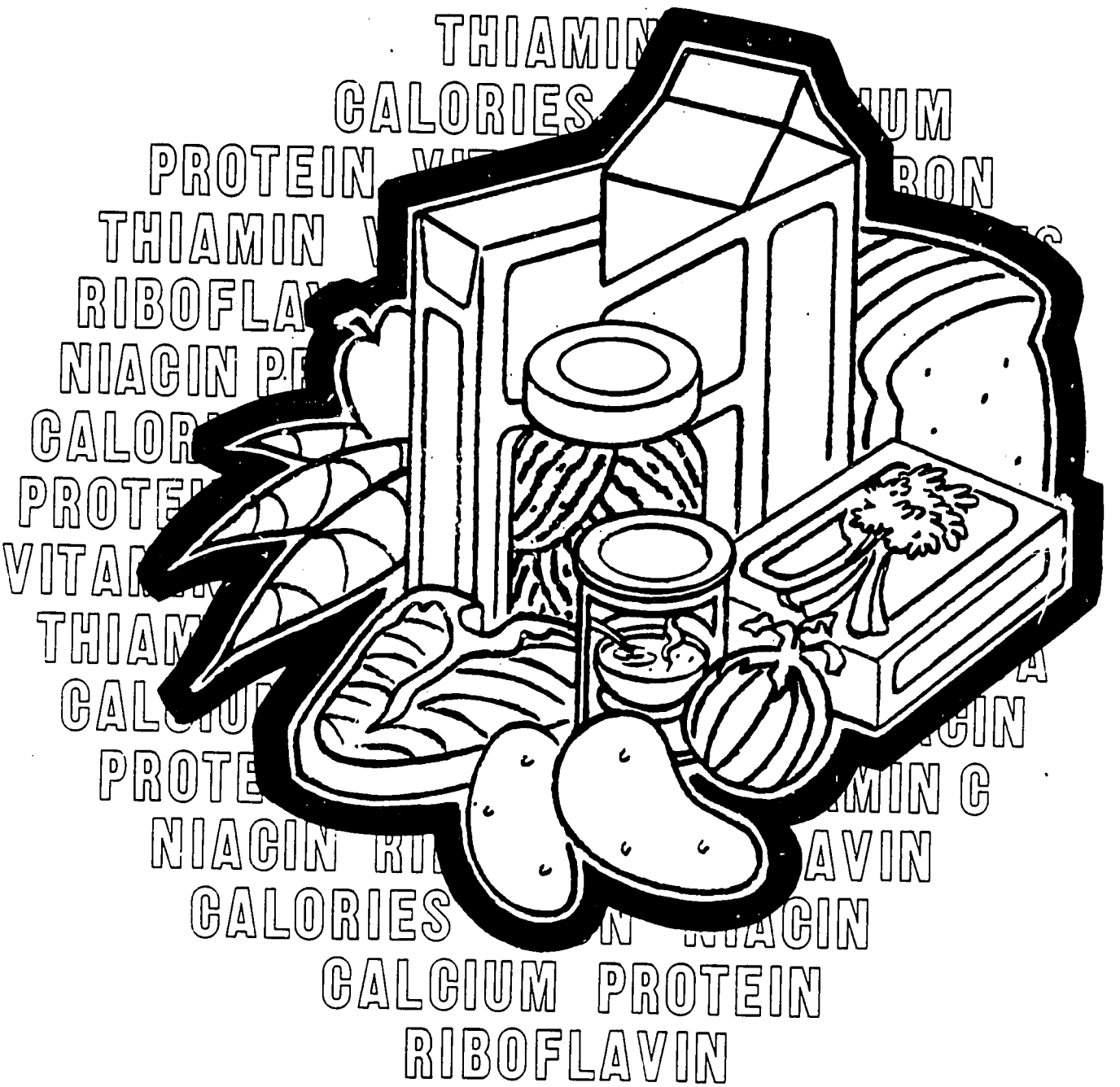
8:30	Objectives for the day and Administrative matters
8:45	Training Case Studies (cont.)
10:30	Break for coffee/juice
10:45	Training Case Studies (cont.)
12:30	Lunch
1:30	Training Case Studies (cont.)
3:00	Integration of Policy and Project Case Studies *Comparison, Contrast of two Projects *How policy issues are similar and different
4:30	Interim Course Evaluation
5:00	Break

Day Six
Friday, September 17, 1982

8:30	Objectives for the day and administrative matters	
8:45	Activity 15: AID Programming and Implementation Issues	
12:30	Lunch	
1:30	Conclusions & Applications *Integrating nutrition/consumption concerns in mission/bureau activities *Re-entry into one's job *Training of trainers—how to convince others	Roush
3:00	Course Evaluation & Re-Design	
4:00	Concluding Remarks and Awarding of Certificates	
4:30	Bus scheduled to leave for Washington	

nutrition labeling

tools for its use



U.S. DEPARTMENT OF AGRICULTURE · AGRICULTURE INFORMATION BULLETIN NO.382

NUTRITION LABELING—TOOLS FOR ITS USE is designed to help people use the nutrition information on food labels to check and improve their diets. It contains information that supplements the information on food labels, including:

- A table showing amounts of food energy (calories), protein, vitamins, and minerals supplied by 900 foods. The table includes foods that are not labeled—fruits and vegetables, for example.
- A table showing the amounts of nutrients recommended for men, women, and children of different ages.
- Lists of foods that are important sources of specific nutrients.

Selecting a good diet using nutrition information on labels and in this publication is not an easy task. A simpler approach is described in another USDA publication, "Family Fare: A Guide to Good Nutrition" (see p. 56). This guide suggests the minimum amounts of foods to eat daily from each of four food groups.

Nutrition Labeling—Tools for its Use deals only with nutrients that manufacturers must show on a nutrition information panel. You may also find information on some labels about different types of fat, cholesterol, and 13 additional vitamins and minerals, including sodium.

The nutrition labeling program is administered by the Food and Drug Administration of the Department of Health, Education, and Welfare, and the Animal and Plant Health Inspection Service of the Department of Agriculture.

CONTENTS

	Page
The label—whats on it	1
The label information—what to do with it	1
Learn about foods . . . the nutrients they supply	1
Check your diet	6
Count calories	8
Evaluate new foods	8
Explanation of table 1	8
Table 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by specified amounts of various foods	10
Explanation of table 2	47
Table 2.—Allowances for food energy and percentages of the U.S. Recommended Daily Allowances needed to meet the Recommended Dietary Allowances for children, men, and women of different ages	47
Lists of foods that are important sources of nutrients	48
More information from the U.S. Department of Agriculture	56
Information from the U.S. Department of Health, Education, and Welfare	57

By Betty Peterkin, Jennie Nichols,
and Cynthia Cromwell
Consumer and Food Economics Institute
Agricultural Research Service

Washington, D.C. Issued April 1975

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price $1.15
Stock Number 001-000-03385

NUTRITION LABELING Tools For Its Use

Many foods now have nutrition information panels on their labels. The facts shown there can help you to select a good diet for yourself and your family.

THE LABEL—WHAT'S ON IT

A sample of a nutrition information panel with explanations of some of the terms on the panel is shown on pages 2 to 5.

Every nutrition panel must show certain information:

- Serving (portion) size—the amount of food for which nutrition information is given, such as one slice, 1 cup, or 3 ounces. It might not be the same as the amount you eat.

- The amount of food energy (in calories) and the amounts of protein, fat, and carbohydrate (in grams) furnished by a serving of the food as it comes from the container.

- The percentage of the U.S. Recommended Daily Allowance (U.S. RDA) for protein, vitamin A, vitamin C, three of the B-vitamins (thiamin, riboflavin, and niacin), calcium, and iron furnished by a serving of the food as it comes from the container.

Additional information may also be on the label:

- The percentage of the U.S. RDA for any of 12 additional vitamins and minerals furnished by a serving.
- The percentage of calories that comes from fat and the amounts of polyunsaturated fat, saturated fat, and cholesterol furnished by a serving of the specified size. This information is intended to help persons who are limiting the amount of fat and cholesterol in their diets on the advice of a physician.
- The amount of sodium furnished by a serving of the food. This information is intended for persons who are limiting the amount of salt in their diets on the advice of a physician.
- Nutrition information for a serving of the food cooked or prepared in combination with other foods according to directions given on the label.

THE LABEL INFORMATION—WHAT TO DO WITH IT

Learn About Foods . . . The Nutrients They Supply

Nutrition labeling acknowledges the shopper's right to know about the nutritional quality of foods. Look at the nutrition facts on the labels of foods you buy. You will see that—

- Foods differ in the number of calories they provide.
- Foods also differ in the kinds and amounts of nutrients they contain.
- With the exception of a few foods that have vitamins and minerals added, no food provides recommended amounts of all nutrients listed on the label.
- A variety of foods of different types, such as listed below, is usually needed to supply recommended amounts of nutrients

Calories

A calorie is a unit of measurement that tells you how much energy you get from food. The body needs energy for activity and even at rest. Eating foods day after day that have fewer total calories than you use up will help you lose weight. If you eat foods that have more total calories than you need, the extra energy is stored as fat and you can gain weight. All foods provide calories.

On labels, the calorie content is shown to the nearest 2 calories (2, 4, 6, etc.) up to 20 calories; to the nearest 5 calories (20, 25, 30, etc.) up to 50 calories; and to the nearest 10 calories (50, 60, 70, etc.) above 50 calories.

Protein

Protein is the basic part of every cell in your body. The kind of protein that best meets the body's needs comes from animal foods—meat, fish, poultry, eggs, and milk. Protein from legumes, especially soybeans and chickpeas, is almost as good. Protein from cereals and vegetables performs best when these foods are used with a little meat, egg, milk, or cheese in the meal.

Carbohydrate

Foods contain three types of carbohydrate—starch, sugar, and cellulose. Starch and sugar give energy. You get starch from grain products (cereal, flour, breads, pastas), potatoes, and dry beans and peas. Concentrated sugar comes from such sources as cane and beet sugar, jellies, candy, honey, molasses, and syrup. Cellulose, important for bulk or roughage in the diet, is found in fruits, vegetables, and whole-grain cereals.

Fat

Fat is a concentrated source of energy. (A gram of fat provides roughly twice as much energy as a gram of protein or carbohydrate.) Fat in food digests slowly and helps keep you from feeling hungry. Fat carries the fat-soluble vitamins—A, D, E, and K.

Some foods are high in fat; for example, butter, margarine, shortening, cooking and salad oils, cream, nuts, and bacon. Meat, whole milk, and eggs also have some fat. Many popular snacks, baked goods, pastries, and desserts contain substantial amounts of fat.

Nutrition Information

Information must be given for a specified serving of the product as found in the container. This label shows information for a serving of potato flakes. Additional information may be listed for the product in combination with other ingredients—flakes prepared with butter, milk, salt, and water, for example.

Serving (portion) size

The amount of food for which nutrition information is given. It might not be the same as the amount you eat.

NUTRITION INFORMATION

(PER SERVING)

SERVING SIZE=1 CUP*

SERVINGS PER CONTAINER=24

	FLAKES	FLAKES+BUTTER, MILK, WATER, SALT*
CALORIES	140	280
PROTEIN, GRAMS	4	6
CARBOHYDRATE, GRAMS	30	32
FAT, GRAMS	0	14

PERCENTAGE OF U.S. RECOMMENDED DAILY ALLOWANCES (U.S. RDA)

PROTEIN	4	8
VITAMIN A	2	10
VITAMIN C	80	80
THIAMIN	10	15
RIBOFLAVIN	2	8
NIACIN	10	10
CALCIUM	2	4
IRON	4	4

*PREPARED ACCORDING TO RECIPE ON BACK OF PACKAGE.

Grams

Grams are units of weight. They are used on the label to express amounts of protein, fat and carbohydrate. A gram is a much smaller unit of weight than an ounce (1 ounce = 28 grams). A paper clip weighs about 1 gram.

Servings per container

The number of servings of the size shown that are in the container. This number may help you visualize the size of the serving. For example, if there are four servings in the container, you know that one serving is equal to one-fourth of the amount in the container.

To find the cost of a serving, divide the price for the container by the number of servings per container.

US. Recommended Daily Allowances

The U.S. Recommended Daily Allowances (U.S. RDA's) are the amounts of protein, vitamins, and minerals used as standards in nutrition labeling.

These allowances were derived from the Recommended Dietary Allowances (RDA's) set by the Food and Nutrition Board of the National Research Council. The RDA's are judged by the National Research Council to be adequate for nearly all healthy persons and generous for most persons.

The U.S. RDA for most nutrients is the highest RDA of all sex-age categories. Therefore, a diet that furnishes the U.S. RDA for a nutrient will furnish the RDA for most people and more than the RDA for many.

Special U.S. RDA's for infants and young children may be used for baby and junior-type food.

Vitamin A

Vitamin A is needed for normal growth and for normal vision in dim light. It also helps maintain the skin and the inner linings of the body. Some foods you can get it from are liver, eggs, butter, margarine, whole milk, and some kinds of cheese. You get carotene, which the body can change to vitamin A, from some vegetables and fruits, particularly dark-green and deep-yellow vegetables and some deep-yellow fruits.

Vitamin C

Vitamin C, or ascorbic acid, helps to keep blood vessels strong and to develop connective tissues. It has a number of other roles, from tooth and bone formation to wound healing. You can get the amount of vitamin C you need in a day from a serving of a rich food source such as citrus fruit or juice, or strawberries. Other important sources include melons, tomatoes, cabbage, certain dark-green leafy vegetables, and potatoes and sweetpotatoes, especially when cooked in the jacket.

Calcium

Calcium is the most abundant mineral element in the body. Teamed up with phosphorus, it is largely responsible for the hardness of bones and teeth. Milk is an outstanding source of calcium. Cheese, ice cream, and certain dark-green leafy vegetables also contribute valuable amounts of calcium to the diet.

Percentage

The amounts of protein, vitamins, and minerals in a serving are shown on the nutrition information panel as percentages of the U.S. Recommended Dietary Allowances (U.S. RDA's).

Percentages of the U.S. RDA are given in increments of 2 percent (2, 4, 6, etc.) up to 10 percent; of 5 percent (10, 15, 20, etc.) up to 50 percent; and of 10 percent (50, 60, 70, etc.) above 50 percent.

NUTRITION INFORMATION

(PER SERVING)

SERVING SIZE=1 CUP*

SERVINGS PER CONTAINER=24

	FLAKES	FLAKES+BUTTER, MILK, WATER, SALT*
CALORIES	140	280
PROTEIN, GRAMS	4	6
CARBOHYDRATE, GRAMS	30	32
FAT, GRAMS	0	14
PERCENTAGE OF U.S. RECOMMENDED DAILY ALLOWANCES (U.S. RDA)		
PROTEIN	4	8
VITAMIN A	2	10
VITAMIN C	80	80
THIAMIN	10	15
RIBOFLAVIN	2	8
NIACIN	10	10
CALCIUM	2	4
IRON	4	4

*PREPARED ACCORDING TO RECIPE ON BACK OF PACKAGE.

Iron

The body requires iron for making hemoglobin, the red part of blood that carries oxygen to the cells and carbon dioxide away from them. Iron also helps the cells get energy from food. Only a few foods are good sources of iron: lean meats, liver, and other organ meats, shellfish, dry beans and peas, dark-green vegetables, dried fruit, egg yolk, and molasses are some of them. Whole-grain and enriched breads and cereals contain small amounts, but are important sources when eaten frequently.

Thiamin, riboflavin, niacin

These B vitamins play a central role in the release of energy from food. They also help with proper functioning of nerves, normal appetite, good digestion, and healthy skin. Generally, foods in the meat group are leading sources of these vitamins. Whole-grain and enriched breads and cereals supply smaller, but important, amounts. A few foods are outstanding sources—milk for riboflavin, lean pork for thiamin, and organ meats for all three.

shown on the label. Eating a variety of foods will also assure that your diet supplies important nutrients not listed on labels.

- Certain foods are noteworthy sources of specific nutrients.

Milk and milk products such as cheese and ice cream are leading sources of calcium. They provide protein, riboflavin, vitamin A, and other nutrients.

Fruits and vegetables furnish some minerals and vitamins. Citrus fruits are especially valued for their vitamin C; dark-green and deep-yellow vegetables for their vitamin A.

Meat, poultry, fish, and eggs are valued for their protein. They also provide iron, thiamin, riboflavin, niacin, and other nutrients. Dry beans and peas, nuts, and peanut butter are other good sources of most of these nutrients.

Breads and cereals, especially those that are whole grain or enriched, furnish worthwhile amounts of iron, thiamin, riboflavin, and niacin. Breads and cereals are also important for the protein and energy they provide.

See also "Lists of Foods That Are Important Sources of Nutrients," page 48.

In addition to their nutritive value, fruits and vegetables and whole-grain breads and cereals are important sources of roughage needed for normal functioning of the intestinal tract.

Check Your Diet

Do the foods you now eat supply nutrients in recommended amounts? You may want to check your diet for a few days to find out. One way to do this is described here.

By using this check you will find which, if any, of eight nutrients are in short supply in your diet. It is important that you know this before you make major changes in your food selections. Otherwise, you may modify your diet unnecessarily or in ways that do not lead to better nutrition.

A food that supplies a high percentage of the U.S. RDA for a nutrient improves your diet *only* if your diet is short in that nutrient.

Here are seven steps you can follow to compare the amounts of food energy and nutrients in your diet with recommended amounts for people of your sex and age.

Step 1

List the foods and the amount of each that you ate yesterday. Use a worksheet like the one on page 7.

Step 2

For each food on your list, look for the nutrition information on the label or in table 1 of this publication (see p. 10).

If the nutritive values for a food are not shown on the label or in table 1, estimate them from values given for a similar food on a label or in table 1. For home recipes not listed in the table, estimate values using information for ingredients.

Figure the number of calories and the percentages of the U.S. RDA's for a serving of the size you ate, if it differs from the size shown on the label or in table 1. For example, if the nutritive value of a 1-cup serving is shown on the label and you ate only ½ cup of the food, divide the number of calories and the percentage of the U.S. RDA for each nutrient by 2.

For each food, record the calories and the percentage of the U.S. RDA for each of the eight nutrients, as on the sample worksheet.

Step 3

Total each column to find the number of calories and the percentages of the U.S. RDA's provided by the day's food.[1]

Step 4

Compare your totals with the number of calories and the percentage of the U.S. RDA for each nutrient recommended for a person of your sex and age. This information is in table 2, page 47.

For most people, the U.S. RDA's are higher than the amounts of nutrients recommended by the National Research Council for people of their sex and age. Therefore, you can evaluate your diet more accurately by using the goals

[1] The NUTRIMETER, a device composed of calibrated bars with sliding arrows for calories and nutrients, can be used to total the number of calories and percentages of the U.S. RDA's for a day (see p. 56).

Sample Worksheet

Food for a day, woman, 25 years old

Food	Amount eaten	Calories	Percentage of U.S. RDA							
			Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
Ready-to-eat cereal	1 ounce	110	4	20	20	25	25	20	—	20
Milk	½ cup	80	10	3	2	2	12	—	15	—
Orange juice	½ cup	60	1	5	100	8	1	2	1	1
Peanut butter	2 tbsp.	180	16	—	—	4	1	2	1	1
Bread	2 slices	160	8	—	—	8	8	8	4	8
Jelly	1 tbsp.	50	—	—	2	—	—	—	—	2
Margarine	1 pat	35	—	4	—	—	—	—	—	—
Banana	1	100	2	4	20	4	4	4	—	4
Milk	1 cup	160	20	6	4	4	25	—	30	—
Ham	1 ounce	180	60	—	—	35	15	25	2	20
Mashed potatoes	¾ cup	150	4	6	22	9	4	8	3	3
Spinach	½ cup	20	4	145	40	4	8	2	8	10
Applesauce	½ cup	115	—	1	2	2	1	—	—	4
Brownie	1	100	2	—	—	2	2	—	—	2
Ice tea	1 glass	—	—	—	—	—	—	—	—	—
Ice cream	½ cup	130	8	6	1	2	8	—	10	—
Total:		1630	139	200	213	109	114	71	74	75
Goal for a 25-year-old woman (from table 2, page 47)		2000	75	80	75	70	75	30	80	100

Evaluation: The day's food provided less calcium and iron than recommended for a 25-year-old woman. The food provided fewer calories than many women need to maintain their weight, but may have provided enough for this woman.

shown in table 2 rather than 100 percent of each U.S. RDA.

Step 5

Repeat steps 1 through 4 each day for a week, if possible, to find the day-to-day variations in your nutrient intake.

After you have checked your diet for a week, only occasional further checking is needed if the way you eat from week to week is about the same.

Don't worry if your diet provides less than the appropriate percentage of the U.S. RDA for a nutrient on one day and then makes it up the next. However, if your diet is short in a nutrient day after day, you may want to make some changes in the foods you eat.

Step 6

Check to see that you eat a variety of foods. Your diet should include some foods from each of these four groups: Milk and milk products; vegetables and fruit; meat and meat alternates (poultry, fish, eggs, dry legumes, nuts, peanut butter); and whole-grain and enriched breads and cereals.

This helps assure that some of the many nutrients not shown on labels, or in tables 1 and 2 of this publication, are a part of each day's intake.

Step 7

Look on labels or at the lists of foods beginning on page 48 to find foods that are good sources of the nutrients your diet is

short in. Try to add some of these foods or use more of them in your meals and snacks.

To learn what kinds of changes would be needed to provide recommended amounts of the eight nutrients, try substituting—on paper—different food choices for the ones you have already recorded and checked.

Count Calories

If you are trying to lose or gain a few pounds,[2] the calories per serving on the food label will be helpful. In a reducing diet, choose foods in amounts that give you fewer calories each day than you have been getting. In a diet to gain weight, choose foods that give you more calories. Whether on a reducing diet, a diet to gain weight, or a normal diet, be sure to include a variety of foods that provide needed protein, vitamins, and minerals.

Check your diet for its nutritional quality in one of these ways:

- By the seven-step method described on pages 6 to 8.
- By a simple food guide which is presented, along with other information on controlling your weight, in Home and Garden Bulletin 74, "Food and Your Weight" (see p. 56).

Evaluate New Foods

Many new types of food appear in stores each year. These may be especially convenient to prepare and use, appealing because of their texture or taste, or relatively inexpensive.

Nutrition information on the labels can help you to know how these foods would affect the calorie and nutrient content of your diet. Compare the number of calories and the percentage of the U.S. RDA for the nutrients in a serving of the new food with those for the food or foods the new food will replace in your diet.

If a new food you like provides as much as or more of the nutrients than foods it replaces and can be used with other foods to meet but not exceed your calorie needs, it may be a good substitute. Use it in a varied diet to help assure that all nutrients, including those not shown on labels, are provided.

Explanation of Table 1

Table 1 shows the amount of food energy (calories) and the percentages of the U.S. Recommended Daily Allowances provided by specified amounts of about 900 foods.

The U.S. Recommended Daily Allowance

The U.S. RDA's[3] used as a basis for developing percentages for this table, and for those shown on most labels, are as follows:

Protein	65 grams[4]
Vitamin A	5000 International Units
Vitamin C	60 milligrams
Thiamin	1.5 milligrams
Riboflavin	1.7 milligrams
Niacin	20 milligrams
Calcium	1.0 milligrams
Iron	18 milligrams

[2] Check with your doctor before going on a special diet to lose or gain more than a few pounds.

[3] Special U.S. RDA's have been developed for infants and for children less than 4 years old. These may be used as the basis for percentages shown on labels of strained infant foods and junior-type foods.

[4] 45 grams for foods with high-quality protein, generally those of animal origin—meat, fish, poultry, eggs, and milk.

Foods Listed

Most of the foods listed in table 1 are in their ready-to-eat form—cooked meat and vegetables, for example. Foods are grouped under five main headings:

- Milk and milk products.
- Meat and meat alternates.
- Vegetables and fruits.
- Cereals and bakery products.
- Miscellaneous items.

Amount of Food

Amounts of foods in table 1 are given in cups, ounces, or some other easily understood unit, such as a slice, a fruit, or a piece of a certain size.

The cup measure used in the table is the standard measuring cup of 8 fluid ounces or ½ pint.

The ounce used in the table is a measure of weight equal to $^{1}/_{16}$ of a pound or 28.35 grams, unless fluid ounce (fl oz) is specified. One fluid ounce equals ⅛ cup or 2 tablespoons. The weight of a fluid ounce varies with the food measured.

A cup, rather than a smaller amount, is used for chopped and diced meat and poultry and for vegetables. This makes it easier to estimate values for part of a cup. Chopped and diced meat and poultry were not packed into the cup for measuring.

Nutritive values for many cuts of meat and poultry are shown for 3 ounces of cooked meat. Some servings of meat and poultry that weigh 3 ounces are:

- One piece, 2½ inches long, 2½ inches wide, and ¾ inch thick.
- Two pieces, each 4 inches long, 2¼ inches wide, and ¼ inch thick.
- Three pieces, each 2½ inches long, 2½ inches wide, and ¼ inch thick.

The weight of each amount of food is shown in grams. If inedible parts are included in the description of the food, the weight includes these parts. For example, the weight of a banana includes the weight of the peel.

Nutritive Values of Certain Foods

The amount of food energy provided by each food is shown in calories. Percentages of the U.S. RDA are shown for protein, five vitamins—vitamin A, vitamin C, thiamin, riboflavin, and niacin—and two minerals—calcium and iron.

Percentages of the U.S. RDA are given to the nearest 2 percent (2, 4, 6, etc.) up to 10 percent; to the nearest 5 percent (10, 15, 20, etc.) up to 50 percent; and to the nearest 10 percent (50, 60, 70, etc.) above 50 percent. An asterisk (*) in table 1 indicates that the food provides none or less than 1 percent of the U.S. RDA for the nutrient.

The nutritive values are based on those in Agriculture Handbook 8, "Composition of Foods . . . Raw, Processed, Prepared," and Agriculture Handbook 456, "Nutritive Value of American Foods . . . In Common Units".[5]

The values in table 1 are the amounts present only in the part of the item that is customarily eaten—for example, corn without the cob and meat without bone.

For many of the prepared items, values have been calculated from the ingredients in typical recipes. Examples of such items are: Biscuits, corn muffins, oyster stew, macaroni and cheese, and a number of desserts, such as custard.

For cooked foods, the nutritive values take into account vitamin losses that occur during cooking.

Nutritive values for vegetables do not include butter, margarine, or other fat that may be added during preparation or at the table.

For many cuts of meat, two sets of values are shown: Cooked meat with the outer layer of fat, as purchased, and cooked meat from which the fat has been trimmed in the kitchen or at the table.

Nutritive values in table 1 may differ somewhat from values on labels for several reasons:

- Values in the table, as much as possible, represent the average nutritive values for the food as it is marketed throughout the year.
- Some values in the table are based on values for products from several manufacturers.
- Manufacturers may slightly understate amounts of nutrients and overstate the number of calories in the food. In this way manufacturers can be reasonably sure that their labeling meets regulations, which require that the food provide at least the amounts of nutrients stated on the label and no additional calories.
- Most values in the table are for food in ready-to-eat form. Although values for the food ready to eat may be shown on the label, the only values required for most foods are those for the food as it comes from the container.

[5] In preparation.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	MILK AND MILK PRODUCTS											
	Milk:											
	Fluid:											
1	Whole, 3.5% fat	1 cup	244	160	20	6	4	4	25	*	30	*
2	Nonfat (skim)	1 cup	245	90	20	*	4	6	25	*	30	*
3	Partially skimmed, 2% nonfat milk solids added	1 cup	246	150	25	4	4	6	30	*	35	*
	Canned, concentrated, undiluted:											
4	Evaporated, unsweetened	1 cup	252	350	40	15	4	6	50	2	60	2
5		1 fl oz	32	45	4	2	*	*	6	*	8	*
6	Condensed, sweetened	1 cup	306	980	60	20	4	15	70	4	80	2
7	Dry, nonfat instant, reconstituted (1⅓ cups needed for reconstitution to 1 qt).	1 cup	242	80	20	*[1]	4	6	25	*	30	*
8	Buttermilk, fluid, cultured, made from skim milk	1 cup	245	90	20	*	4	6	25	*	30	*
	Milk beverages:											
	Chocolate drink, fluid, commercial (approx. 90% milk):											
9	Made with whole (3.5% fat) milk	1 cup	250	210	20	6	4	4	25	2	30	2
10	Made with skim milk (2 % butterfat added)	1 cup	250	190	20	4	4	6	25	2	25	2
11	Cocoa, hot, homemade with whole milk	1 cup	250	240	20	8	4	6	25	2	30	6
	Malted:											
12	Beverage	1 cup	235	240	25	10	4	10	30	*	30	4
13	Dry powder, approx. 3 heaping teaspoons per oz	1 oz	28	120	10	6	*	6	8	*	8	4
14	Milk, human, U.S. samples	1 cup	246	190	6	10	20	2	6	2	8	*
	Cheese:											
	Natural:											
15	Blue or Roquefort type	1 oz	28	110	15	8	*	*	10	2	8	*
16	Camembert (domestic), packaged in 4-oz pkg with 3 wedges per pkg.	1 wedge	38	110	15	8	*	2	15	2	4	2
	Cheddar (domestic):											
17	Ounce	1 oz	28	110	15	8	*	*	8	*	20	2
18	Shredded	1 cup	113	450	60	30	*	2	30	*	80	6
	Cottage, large or small curd:											
19	Creamed	1 cup (pressed down).	245	260	70	8	*	4	35	*	25	4
20	Uncreamed	1 cup (pressed down).	200	170	80	*	*	4	35	*	20	4
21	Cream, regular and whipped	1 oz	28	110	6	8	*	*	4	*	2	*

22	Limburger	1 oz	28	100	15	6	*	2	8	*	15	2
23	Parmesan, grated	1 oz	28	130	25	8	*	*	15	*	40	*
24		1 tbsp	5	25	4	2	*	*	2	*	6	*
25	Swiss (domestic)	1 oz	28	110	15	6	*	*	6	*	25	2
	Pasteurized process cheese:											
	American:											
26	Diced, not packed	1 cup	140	520	70	35	*	2	35	*	100	8
27	Slice, approx. 3½ x 3⅜ x ⅛ inch	1 oz	28	110	15	6	*	*	8	*	20	2
28	Swiss	1 oz	28	100	15	6	*	*	6	*	25	2
29	Pasteurized process cheese food, American	1 oz	28	90	10	6	*	*	10	*	15	2
30	Pasteurized process cheese spread, American	1 oz	28	80	10	4	*	*	8	*	15	2
	Cream:											
31	Half-and-half (cream and milk)	1 cup	242	320	15	25	4	4	25	*	25	*
32		1 tbsp	15	20	2	2	*	*	2	*	2	*
33	Light, coffee or table	1 cup	240	510	15	40	4	4	20	*	25	*
34		1 tbsp	15	30	*	2	*	*	2	*	2	*
35	Sour	1 cup	230	485	15	40	4	4	20	*	25	*
36		1 tbsp	12	25	*	2	*	*	*	*	*	*
	Whipping, unwhipped (volume about double when whipped):											
37	Light	1 cup	239	720	15	60	4	4	15	*	20	*
38		1 tbsp	15	45	*	4	*	*	2	*	2	*
39	Heavy	1 cup	238	840	10	70	4	4	15	*	20	*
40		1 tbsp	15	60	*	4	*	*	2	*	2	*
	Imitation cream products (made with vegetable fat):											
	Creamers:											
41	Powdered	1 cup	94	505	6	4[3]	*	*	*	*	2	4
42		1 tsp	2	10	*	*	*	*	*	*	*	*
43	Liquid (frozen)	1 cup	245	345	4	2[3]	*	*	*	*	2	*
44		1 tbsp	15	20	*	*	*	*	*	*	*	*
45	Sour dressing (imitation sour cream) made with nonfat dry milk.	1 cup	235	440	15	*	2	4	20	*	30	*
46		1 tbsp	12	20	*	*	*	*	*	*	2	*
	Whipped topping:											
47	Pressurized	1 cup	70	190	2	6[3]	*	*	*	*	*	*
48		1 tbsp	4	10	*	*	*	*	*	*	*	*
49	Frozen	1 cup	75	230	2	10[3]	*	*	*	*	*	*
50		1 tbsp	4	10	*	*	*	*	*	*	*	*
51	Powdered, made with whole milk	1 cup	75	175	4	6[3]	*	*	*	*	6	*
52		1 tbsp	4	10	*	*	*	*	*	*	*	*
	Desserts (made with milk):											
53	Custard, baked	1 cup	265	310	30	20	*	8	30	2	30	6

*None or less than 1 percent.
See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	MILK AND MILK PRODUCTS—Continued											
	Ice cream:											
	Regular (approx. 10% fat):											
54	Hardened	1 cup	133	260	15	10	2	4	15	*	20	*
55	Soft-serve	1 cup	173	330	15	15	4	4	20	*	25	2
56	Rich (approx. 16% fat), hardened	1 cup	148	330	8	20	2	2	10	*	10	*
	Ice milk:											
57	Hardened	1 cup	131	200	15	6	2	4	15	*	20	*
58	Soft-serve	1 cup	175	270	20	8	4	6	25	*	25	2
	Puddings with starch base, prepared from home recipes:											
59	Chocolate	1 cup	260	390	20	8	*	4	20	2	25	8
60	Vanilla	1 cup	255	280	20	8	4	6	25	2	30	*
	Puddings made from mixes:											
61	Made with milk, cooked	1 cup	260	320	20	6	*	4	25	2	25	4
62	Made with milk, without cooking	1 cup	260	330	15	6	*	6	25	2	35	8
63	Rennin desserts, made from mix, with milk	1 cup	250[3]	240	20	8	4	4	25	2	30	*
	Tapioca desserts:											
64	Apple tapioca	1 cup	250	290	2	*	*	*	*	*	*	2
65	Tapioca cream pudding	1 cup	165	220	20	10	4	4	20	*	15	4
	Yogurt (plain):											
66	Made from partially skim milk	1 cup	245	120	20	4	4	6	25	*	30	*
67	Made from whole milk	1 cup	245	150	15	6	4	4	25	*	25	*
	MEAT AND MEAT ALTERNATES											
	Meat:											
68	Bacon (approx. 20 slices per lb raw), broiled or fried crisp.	2 slices	15	90	10	*	*	6	2	4	*	2
69	Bacon, Canadian style, slice, 3⅜ x 3/16 inch raw, broiled or fried, drained.	1 slice	21	60	15	*	*	15	2	4	*	4
	Beef,[4] cooked:											
	Chuck, braised, simmered or pot-roasted:											
70	Piece, lean and fat	3 oz	85	250	50	*	*	2	10	20	*	15
71	Lean only	3 oz	85	160	60	*	*	4	10	20	2	20
72	Chopped or diced, lean and fat	1 cup	140	410	80	*	*	4	15	30	2	25
73	Lean only	1 cup	140	270	90	*	*	6	20	30	2	30
74	Ground, lean only	1 cup	110	210	70	*	*	4	15	25	2	25

	Corned, boneless:											
75	Fresh cooked	3 oz	85	320	45	*	*	2	8	6	*	15
76	Canned, slice, approx. 3 x 2 x ⅜ inch	1 slice	40	90	20	*	*	*	6	6	*	10
77	Flank steak	3 oz	85	170	60	*	*	4	10	20	2	20
	Ground beef, broiled to well-done stage:											
78	Regular	3 oz	85	270	50	*	*	4	10	25	*	15
79	Lean	3 oz	85	190	50	*	*	6	10	25	*	15
	Plate beef, simmered:											
80	Lean and fat	3 oz	85	370	40	2	*	2	8	15	*	15
81	Lean only	3 oz	85	170	60	*	*	2	10	20	2	20
	Roasts, roasted:											
	Rib:											
82	Sliced, lean and fat	3 oz	85	370	40	2	*	2	8	15	*	10
83	Lean only	3 oz	85	210	60	*	*	4	10	20	*	15
	Rump:											
84	Sliced, lean and fat	3 oz	85	300	45	*	*	4	8	20	*	15
85	Lean only	3 oz	85	180	60	*	*	4	10	20	*	15
86	Chopped or diced, lean and fat	1 cup	140	490	70	2	*	6	15	30	2	25
87	Lean only	1 cup	140	290	90	*	*	6	20	35	2	30
88	Ground, lean only	1 cup	110	230	70	*	*	6	15	30	2	25
	Steaks, braised, broiled or sauteed:											
	Round:											
89	Lean and fat	3 oz	85	220	60	*	*	4	10	25	*	15
90	Lean only	3 oz	85	160	60	*	*	4	10	25	2	15
	Steaks, broiled:											
	Club, porterhouse, or T-bone:											
91	Lean and fat	3 oz	85	400	35	2	*	4	8	20	*	10
92	Lean only	3 oz	85	190	60	*	*	4	10	25	*	15
	Sirloin:											
93	Lean and fat	3 oz	85	330	45	*	*	4	8	20	*	15
94	Lean only	3 oz	85	180	60	*	*	6	10	25	2	20
95	Beef, dried or chipped	1 oz	28	60	20	*	*	2	6	6	*	8
	Lamb,[4] cooked:											
	Chops (3 per lb), broiled:											
	Loin:											
96	Lean and fat	3.5 oz	99	360	50	*	*	8	8	15	*	6
97	Lean only	2.3 oz	65	120	40	*	*	6	10	20	*	6
	Rib:											
98	Lean and fat	3.2 oz	92	370	40	*	*	8	15	25	*	8
99	Lean only	2 oz	57	120	35	*	*	6	10	20	*	8

*None or less than 1 percent.

See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	MEAT AND MEAT ALTERNATES—Continued											
	Roasts, roasted:											
	Leg:											
100	Sliced, lean and fat	3 oz	85	240	50	*	*	8	15	25	*	8
101	Lean only	3 oz	85	160	60	*	*	10	15	25	2	10
102	Chopped or diced, lean and fat	1 cup	140	390	80	*	*	15	20	40	2	15
103	Lean only	1 cup	140	260	90	*	*	15	25	45	2	15
	Shoulder:											
104	Sliced, lean and fat	3 oz	85	290	40	*	*	8	10	20	*	6
105	Lean only	3 oz	85	170	50	*	*	8	15	25	*	8
106	Chopped or diced, lean and fat	1 cup	140	470	70	*	*	10	20	35	2	10
107	Lean only	1 cup	140	290	80	*	*	15	25	40	2	15
	Pork,[4] cured, cooked:											
	Ham, light cure, roasted:											
108	Sliced, lean and fat	3 oz	85	250	40	*	*	25	8	15	*	10
109	Lean only	3 oz	85	160	50	*	*	35	10	20	*	15
110	Chopped or diced, lean and fat	1 cup	140	410	70	*	*	45	15	25	2	20
111	Lean only	1 cup	140	260	80	*	*	60	20	30	2	25
112	Ground, lean only	1 cup	110	210	60	*	*	45	15	25	2	20
	Shoulder cuts (Boston butt or picnic), roasted:											
113	Sliced, lean and fat	3 oz	85	280	45	*	*	30	10	20	*	15
114	Lean only	3 oz	85	210	50	*	*	35	10	20	*	15
115	Chopped or diced, lean only	1 cup	140	340	90	*	*	60	20	35	2	30
116	Ground, lean only	1 cup	110	270	70	*	*	45	15	30	2	20
	Pork,[4] fresh, cooked:											
	Ham, roasted:											
117	Sliced, lean and fat	3 oz	85	320	45	*	*	30	10	20	*	15
118	Lean only	3 oz	85	180	60	*	*	35	15	25	2	20
119	Chopped or diced, lean and fat	1 cup	140	520	70	*	*	45	20	30	2	25
120	Lean only	1 cup	140	300	90	*	*	60	25	40	2	30
121	Ground, lean only	1 cup	110	240	70	*	*	45	20	30	2	25
	Loin, baked or roasted:											
122	Sliced, lean and fat	3 oz	85	310	45	*	*	50	15	25	*	15
123	Lean only	3 oz	85	220	60	*	*	60	15	30	2	20
124	Chopped or diced, lean and fat	1 cup	140	510	80	*	*	90	20	40	2	25
125	Lean only	1 cup	140	360	90	*	*	100	25	45	2	30

	Loin chops (3 per lb), broiled:											
126	Lean and fat	2.7 oz	78	310	45	*	*	50	15	25	*	15
127	Lean only	2 oz	56	150	40	*	*	40	10	20	*	10
128	Spareribs, braised, lean and fat	3 oz	85	370	40	*	*	25	10	15	*	10
	Shoulder cuts (Boston butt or picnic), roasted:											
129	Sliced, lean and fat	3 oz	85	300	40	*	*	30	10	20	*	15
130	Lean only	3 oz	85	210	50	*	*	35	15	20	*	15
131	Chopped or diced, lean and fat	1 cup	140	490	70	*	*	45	20	30	2	25
132	Lean only	1 cup	140	340	80	*	*	60	20	35	2	25
133	Ground, lean only	1 cup	110	270	70	*	*	45	20	30	2	20
134	Rabbit, domesticated, stewed	3 oz	85	180	60	*	*	2	4	50	2	8
	Veal, medium fat, cooked:											
	Boneless cuts, braised, pot-roasted or stewed:											
135	Sliced	3 oz	85	200	60	*	*	6	15	25	*	15
136	Chopped or diced	1 cup	140	330	90	*	*	8	25	45	2	25
137	Cutlet, braised or broiled	3 oz	85	180	50	*	*	4	10	25	*	15
	Loin, braised or broiled:											
138	Piece	3 oz	85	200	50	*	*	4	10	25	*	15
139	Chopped or diced	1 cup	140	330	80	*	*	6	20	40	2	25
	Rib, roasted:											
140	Sliced	3 oz	85	230	50	*	*	8	15	35	*	15
141	Chopped or diced	1 cup	140	380	80	*	*	10	25	60	2	25
142	Ground	1 cup	110	300	70	*	*	10	20	45	2	20
	Poultry:											
143	Chicken, canned, meat only, boned	1 cup	205	410	100	10	15	6	15	45	4	15
	Chicken, cooked (from 2½-lb fryer, ready-to-cook):											
144	Flesh only, broiled	3 oz	85	120	45	2	*	2	10	40	*	8
145	Breast, fried, with bone	½ breast	94	160	60	2	*	2	10	60	*	8
146	Drumstick, fried, with bone	1 drumstick	56	90	25	2	*	2	8	15	*	4
147	Thigh, fried, with bone	1 thigh	65	120	35	2	*	2	15	20	*	6
	Chicken, hens or cocks, stewed:											
	Light meat without skin:											
148	Sliced	3 oz	85	150	60	2	*	2	4	45	*	6
149	Chopped or diced	1 cup	140	250	100	4	*	2	8	80	2	10
	Dark meat without skin:											
150	Sliced	3 oz	85	180	60	4	*	4	10	35	2	8
151	Chopped or diced	1 cup	140	290	90	8	*	6	15	60	2	15
	Chicken, roasters, roasted:											
	Light meat without skin:											
152	Sliced	3 oz	85	160	60	2	*	4	4	50	*	6
153	Chopped or diced	1 cup	140	260	100	4	*	8	8	80	2	10

*None or less than 1 percent.

See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	MEAT AND MEAT ALTERNATES—Continued											
	Dark meat without skin:											
154	Sliced	3 oz	85	160	60	2	*	6	10	25	2	8
155	Chopped or diced	1 cup	140	260	90	4	*	10	15	35	2	15
156	Goose, domesticated, roasted	3 oz	85	200	60	8	*	6	8	40	2	8
157	Turkey, canned, boneless	1 cup	205	410	100	6	*	2	15	50	2	15
	Turkey, roasted:											
	Light meat without skin:											
158	Sliced	3 oz	85	150	60	2	*	2	8	45	*	6
159	Chopped or diced	1 cup	140	250	100	2	*	4	10	80	2	10
	Dark meat without skin:											
160	Sliced	3 oz	85	170	60	4	*	2	10	20	2	10
161	Chopped or diced	1 cup	140	280	90	6	*	4	20	30	2	20
	Variety meats:											
	Heart, beef, lean, braised:											
162	Sliced	3 oz	85	160	60	*	2	15	60	35	*	30
163	Chopped or diced	1 cup	145	270	100	*	2	25	100	60	*	50
164	Kidney, beef, braised	3 oz	85	210	60	20	*	30	240	45	2	60
	Liver:											
165	Beef, fried	3 oz	85	200	50	910	40	15	210	70	*	40
166	Calf, fried	3 oz	85	220	60	560	50	15	210	70	2	70
	Chicken, simmered:											
167	Whole, approx. 2 x 2 x ⅝ inch	1 liver	25	40	15	60	6	2	40	15	*	10
168	Chopped	1 cup	140	230	80	340	35	15	220	80	2	70
169	Hog, fried	3 oz	85	210	60	250	30	20	220	100	2	140
170	Roe, herring, canned	3 oz	85	100	40	*	4	6	40	6	2	6
	Sausage, cold cuts, and luncheon meat:											
171	Bologna, slice, 4½ x ⅛ inch	1 oz	28	80	8	*	*	4	4	4	*	2
172	Braunschweiger, slice, 3⅛ x ¼ inch	1 oz	28	90	10	35	*	4	25	10	*	10
173	Deviled ham, canned	1 tbsp	13	45	4	*	*	2	*	*	*	2
174	Frankfurter, heated (8 per lb)	1 frank	56	170	15	*	*	6	6	6	*	4
175	Ham, boiled	1 oz	28	70	10	*	*	8	2	4	*	4
176	Knockwurst, link approx. 4 x 1⅛ inches	1 link	68	190	20	*	*	8	8	8	*	8
177	Polish sausage, link, approx. 5⅜ x 1 inch	1 link	76	230	25	*	*	15	8	10	*	10
	Pork sausage, cooked:											
178	Pattie, approx. 3⅞ x ¼ inch raw, or link, approx. 4 x ⅞ inch raw.	1 pattie or 2 links.	27	130	10	*	*	15	6	4	*	4

179	Salami, dry type	1 oz	28	130	15	*	*	8	4	8	*	6
180	Cooked	1 oz	28	90	10	*	*	4	4	6	*	4
181	Vienna sausage, canned, approx. 2 x ⅞ inch	1 sausage	16	40	4	*	*	*	2	2	*	2
182	Sweetbreads (thymus), beef, braised	3 oz	85	270	50	*	*	4	8	15	*	8
183	Tongue, beef, medium fat, braised	1 oz	28	70	15	*	*	*	4	4	*	4
	Fish and shellfish:											
184	Anchovy, pickled, not heavily salted, flat or rolled, canned.	5 anchovies	20	35	8	*	*	*	2	6	4	4
185	Bass, black sea, baked, stuffed[5]	3 oz	85	220	30	*	*	6	4	8	2	4
186	Bass, striped, oven-fried	3 oz	85	170	40	*	*	6	2	8	2	4
	Bluefish:											
187	Baked or broiled with butter or margarine	3 oz	85	140	50	*	*	6	4	8	2	4
188	Fried[6]	3 oz	85	170	45	2	*	6	6	8	2	4
	Clams:											
189	Canned, drained solids (chopped or minced)	1 cup	160	160	60	4	*	2	10	8	8	35
190	Raw, meat only, 4 cherrystones or 5 little necks.	4 or 5 clams	70	60	15	2	10	4	6	4	4	30
191	Cod, broiled with butter or margarine	3 oz	85	140	60	4	*	4	6	15	2	4
	Crabmeat, including blue, rock, and king:											
192	Canned, drained solids	3 oz	85	90	35	20	*	4	4	8	4	4
193	Cooked, steamed	3 oz	85	80	35	35	4	10	4	10	4	4
194	Fish stick, frozen, breaded, cooked, stick, 4 x 1 x ½ inch.	1 fish stick	28	50	10	*	*	*	2	2	*	*
195	Flounder, baked with butter or margarine	3 oz	85	170	60	*	4	4	4	10	2	6
196	Haddock, pan-fried or oven-fried	3 oz	85	140	35	*	4	2	4	15	4	6
197	Halibut, Atlantic and Pacific, broiled with butter or margarine.	3 oz	85	150	50	10	*	2	4	35	2	4
198	Herring, canned, smoked, kippered, fillet, 4⅝ x1¾ x ¼ inch.	1 fillet	40	80	20	*	*	*	6	6	2	4
199	Lobster, northern, cooked	3 oz	85	80	35	*	*	6	4	6	6	4
200	Mackerel, Atlantic, broiled with butter or margarine.	3 oz	85	200	40	8	*	8	15	35	*	6
	Ocean perch, Atlantic (redfish):											
201	Fried[6]	3 oz	85	190	35	*	*	6	6	8	2	6
202	Frozen, breaded, fried, reheated fillet	3.1 oz	88	280	35	*	*	6	6	8	2	6
	Oysters:											
203	Eastern, raw, meat only, approx. 13–19 selects (medium) or 19–31 standards (small).	1 cup	240	160	45	15	120	25	25	30	25	70

*None or less than 1 percent.

See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	MEAT AND MEAT ALTERNATES—Continued											
204	Pacific, raw, meat only, approx. 4–6 medium	1 cup	240	220	60	15	120	20	25	15	20	100
205	Fried, approx. 4 select (medium) oysters[6]	1.6 oz	45	110	8	4	20	6	8	6	6	20
206	Rockfish, oven-steamed	3 oz	85	90	35	10	2	2	6	35	2	4
	Salmon:											
	Canned, drained:											
207	Pink	3 oz	85	100	30	*	*	2	8	30	15[7]	4
208	Sockeye (red)	3 oz	85	120	30	4	*	2	6	25	20[7]	4
209	Steak, broiled or baked with butter or margarine	3 oz	85	160	50	2	*	10	2	40	10	6
210	Smoked	1 oz	28	50	15	*	*	*	4	4	*	2
211	Sardines, Atlantic, canned in oil, drained solids	3 oz	85	170	45	4	*	2	10	25	35	15
212	Scallops, frozen, breaded, reheated (15–20 per lb)	1 scallop	25	50	10	*	*	*	2	*	2	4
213	Shad, baked with butter or margarine and bacon slices.	3 oz	85	170	45	*	*	8	15	35	2	2
	Shrimp:											
214	Canned, meat	3 oz	85	100	45	2	*	*	2	8	10	15
215	French-fried[8]	3 oz	85	190	40	*	*	2	4	10	6	10
216	Swordfish, broiled with butter or margarine	3 oz	85	140	50	35	*	2	2	45	2	6
	Tuna:											
217	Canned in oil, drained solids	3 oz	85	170	60	2	*	2	6	50	*	8
218	Canned in water, solids and liquid	3 oz	85	110	50	*	*	*	6	60	*	8
	Eggs, large (24 ounces per dozen):											
	Raw or cooked in shell or with nothing added:											
219	Whole, without shell	1 egg	50	80	15	10	*	2	8	*	2	6
220	White of egg	1 white	33	18	8	*	*	*	6	*	*	*
221	Yolk of egg	1 yolk	17	60	6	10	*	2	4	*	2	4
222	Fried	1 egg	46	100	15	15	*	4	8	*	2	6
223	Scrambled, with milk and table fat	1 egg	64	110	15	15	*	4	10	*	6	6
	Dry legumes and nuts:											
	Almonds:											
224	In shell	10 nuts	25	60	4	*	*	2	6	2	2	2
225	Shelled, whole	1 cup	142	850	60	*	*	25	80	25	35	35
226	Sliced	1 cup	95	570	40	*	*	15	50	15	20	25
	Beans, dry:											
	Common varieties as Great Northern, navy, and others:											
	Cooked, drained:											
227	Great Northern	1 cup	180	210	30	*	*	15	8	6	8	25
228	Navy (pea)	1 cup	190	220	35	*	*	20	8	6	10	30

229	Lima	1 cup	190	260	35	*	*	15	6	6	6	35
230	Red kidney	1 cup	185	220	30	*	*	15	6	6	6	25
	Canned, solids and liquid:											
231	Red kidney	1 cup	255	230	30	*	*	8	6	8	8	25
232	White	1 cup	255	310	35	4	8	10	6	8	15	30
233	Brazilnuts, shelled (approx. 32 large kernels)	1 cup	140	920	45	*	*	90	10	10	25	25
234	Cashew nuts, roasted in oil, whole kernels	1 cup	140	790	60	2	*	40	20	15	6	30
235	Chestnuts, fresh, shelled	1 cup	160	310	10	*	*	25	20	4	4	15
	Coconut, fresh, meat only:											
236	Piece, approx. 2 x 2 x ½ inch	1 piece	45	160	4	*	2	2	*	*	*	4
237	Shredded or grated, firmly packed	1 cup	130	450	10	*	6	4	2	4	2	10
	Coconut, dried:											
238	Unsweetened	1 oz	28	190	4	*	*	2	*	*	*	4
239	Cowpeas, including blackeye peas, dry, cooked, drained.	1 cup	250	190	30	*	*	25	6	4	4	20
240	Filberts (hazelnuts), shelled, whole kernels	1 cup	135	860	40	*	*	40	*	6	30	25
241	Lentils, whole, dry, cooked	1 cup	200	210	35	*	*	10	8	6	4	25
	Peanuts, roasted:											
242	Whole, in shell	10 jumbo nuts.	27	110	10	*	*	4	2	15	2	2
243	Salted, whole or halves	1 cup	144	840	80	*	*	30	10	120	10	15
244	Peanut butter	1 tbsp	16	90	8	*	*	2	2	10	*	2
245	Peas, split, dry, cooked	1 cup	200	230	35	2	*	20	10	8	2	20
246	Pecans, halves	1 cup	108	740	20	2	4	60	8	4	8	15
247	Pumpkin and squash seed kernels, dry, hulled	1 cup	140	770	90	2	*	25	15	15	8	90
248	Soybeans, dry, cooked	1 cup	180	230	45	2	*	25	10	6	15	25
249	Sunflower seed kernels, dry, hulled	1 cup	145	810	80	2	*	190	20	40	15	60
	Walnuts:											
250	Black, chopped or broken kernels	1 cup	125	790	60	8	*	20	8	4		40
	Persian or English:											
251	Halves (approx. 50)	1 cup	100	650	35	*	4	20	8	4	10	15
252	Chopped pieces or chips	1 cup	120	780	40	*	4	25	10	6	10	20
	Main dish mixtures:											
253	Beef, dried, chipped, creamed	1 cup	245	380	45	20	*	10	30	8	25	10
254	Cheese souffle, from home recipe (collapsed)	1 cup	95	210	20	15	*	4	15	*	20	4
255	Clam fritter,[9] 2 x 1¾ inches	1 fritter	40	120	10	*	*	*	2	2	2	8
256	Crab, deviled[10]	1 cup	240	450	60	50	25	15	15	20	10	15
257	Crab imperial[11]	1 cup	220	320	70	50	20	8	15	10	15	10
258	Ham croquette, pan-fried; 1-inch diameter, 3 inches long.	1 croquette	65	160	25	4	*	10	8	8	4	8
259	Lobster Newburg[12]	1 cup	250	490	100	*	*	10	15	20	20	12

*None or less than 1 percent.
See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	MEAT AND MEAT ALTERNATES—Continued											
	Macaroni (enriched) and cheese:											
260	Baked from home recipe	1 cup	200	430	35	15	*	15	25	8	35	10
261	Canned	1 cup	240	230	20	6	*	8	15	4	20	6
262	Salmon-rice loaf,[13] slice, 3¾ x 2½ x 1½ inches	1 slice	174	210	45	2	*	10	6	25	10	8
263	Welsh rarebit	1 cup	232	420	40	25	*	6	30	*	60	4
	Salads:											
264	Lobster salad[14]	1 salad	260	290	60	*	80	15	10	20	10	15
265	Tuna salad[15]	1 cup	205	350	70	10	4	6	15	50	4	15
	Stews and other combinations:											
	Beans, canned, solids and liquid:											
	White with:											
266	Frankfurters (sliced)	1 cup	255	370	45	6	*	10	8	15	10	25
267	Pork and tomato sauce	1 cup	255	310	35	6	8	15	4	8	15	25
268	Pork and sweet sauce	1 cup	255	380	35	6	8	10	6	6	15	35
	Beef and vegetable stew:											
269	Home recipe (with lean beef chuck)	1 cup	245	220	35	50	30	10	10	25	2	15
270	Canned	1 cup	245	190	30	50	10	4	8	10	2	10
271	Beef potpie, home-prepared from enriched flour,[16] baked; piece, ⅓ of 9-inch pie.	1 piece	210	520	45	35	10	20	15	30	2	30
272	Corned beef hash (canned with potato)	1 cup	220	400	45	*	*	2	10	25	2	25
273	Chicken a la king, cooked, from home recipe	1 cup	245	470	60	25	20	6	25	25	15	15
274	Chicken fricassee, cooked, from home recipe	1 cup	240	390	80	4	*	4	10	30	2	10
275	Chicken potpie, home-prepared from enriched flour,[16] baked; piece, ⅓ of 9-inch pie.	1 piece	232	550	50	60	8	20	20	25	6	25
276	Chicken and noodles, cooked, from home recipe	1 cup	240	370	50	8	*	4	10	20	2	10
277	Chile con carne, with beans, canned	1 cup	255	340	40	4	*	6	10	15	8	25
278	Chop suey with beef and pork (without noodles), cooked, from home recipe.	1 cup	250	300	60	10	60	20	20	25	6	25
	Chow mein, chicken (without noodles):											
279	Cooked from home recipe	1 cup	250	260	70	6	15	4	15	20	6	15
280	Canned	1 cup	250	100	15	2	20	4	6	4	4	8
281	Fish loaf,[17] slice, 4⅛ x 2½ x 1 inch	1 slice	150	190	45	*	*	6	60	15	2	4
282	Peppers, immature, green, stuffed with beef and crumbs (pepper, 2¾ x 2½ inches with 1⅛ cups of stuffing).	1 pepper	185	310	60	10	120	10	20	25	8	20
	Pizza:											
	From home recipe,[18] baked (in 14-inch-diam. pan); sector, ⅛ of pizza:											

283	With cheese topping	1 sector	65	150	15	8	8	2	8	4	15	4
284	With sausage topping (no cheese)	1 sector	67	160	10	8	10	4	4	4	2	4
285	Chilled, with cheese, commercial, baked; sector, ⅛ of 12-inch-diam. pizza.	1 sector	60	150	10	4	6	2	6	4	8	2
286	Frozen, with cheese, commercial, baked; sector, ⅐ of 10-inch-diam. pizza.	1 sector	57	140	10	6	4	2	6	4	8	2
287	Potatoes au gratin	1 cup	245	360	30	15	40	10	15	10	30	6
	Spaghetti (enriched) in tomato sauce with cheese:											
288	From home recipe	1 cup	250	260	20	20	20	15	10	10	8	10
289	Canned	1 cup	250	190	10	20	15	25	15	25	4	15
	Spaghetti (enriched) in tomato sauce with meatballs:											
290	From home recipe	1 cup	250	330	40	30	35	15	20	20	10	20
291	Canned	1 cup	250	260	25	20	8	10	10	10	6	20
292	Turkey potpie, home-prepared from enriched flour,* baked; piece, ⅓ of 9-inch pie.	1 piece	232	550	60	60	8	20	20	40	6	25

VEGETABLES AND FRUIT

	Vegetables:											
	Asparagus, green:											
	Cooked, drained:											
293	Spears, ½-inch diam. at base	4 spears	60	10	2	10	25	6	6	4	2	2
294	Pieces, 1½ to 2 inches long	1 cup	145	30	4	25	60	15	15	10	2	4
	Canned, drained:											
295	Spears, ½-inch diam. at base	4 spears	80	18	2	15	20	4	4	4	2	8
296	Pieces	1 cup	235	50	8	40	60	10	15	10	4	25
	Beans:											
	Lima, immature seeds:											
297	Cooked, drained	1 cup	170	190	20	10	50	20	10	10	8	25
	Frozen, cooked, drained:											
298	Baby limas	1 cup	180	210	20	8	35	10	6	10	6	25
299	Fordhook	1 cup	170	170	15	8	50	8	4	8	4	15
300	Canned, drained	1 cup	170	160	15	6	15	4	4	4	4	25
	Snap:											
	Green:											
301	Cooked, drained	1 cup	125	30	4	15	25	6	6	4	6	4
302	Canned, drained	1 cup	135	30	2	15	8	2	4	2	6	10
	Yellow or wax:											
303	Cooked, drained	1 cup	125	30	2	6	25	6	6	4	6	4
304	Canned, drained	1 cup	135	30	2	2	10	2	4	2	6	10
	Bean sprouts (sprouted mung seeds):											
305	Raw	1 cup	105	35	6	*	35	10	8	4	2	8

*None or less than 1 percent.

See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	VEGETABLES AND FRUIT—Continued											
306	Cooked, drained	1 cup	125	35	6	*	15	8	8	4	2	6
	Beets:											
	Cooked, drained, peeled:											
307	Whole beets, 2-inch diameter	2 beets	100	30	2	*	10	2	2	2	2	2
308	Diced or sliced	1 cup	170	60	2	*	15	4	4	2	2	4
	Canned, drained:											
309	Whole beets, small	1 cup	160	60	2	*	8	2	2	*	2	6
310	Diced or sliced	1 cup	170	60	2	*	8	2	2	*	4	6
311	Beet greens, leaves and stems, cooked, drained	1 cup	145	25	4	150	35	6	15	2	15	15
	Broccoli, cooked, drained:											
312	Whole stalks, medium size	1 stalk	180	45	8	90	270	10	20	6	15	8
313	Stalks cut into ½-inch pieces	1 cup	155	40	8	80	230	10	20	6	15	6
314	Chopped, frozen	1 cup	185	50	8	100	180	8	15	4	10	8
315	Brussels sprouts, 7–8 sprouts (1¼- to 1½-inch diam.) per cup, cooked, drained.	1 cup	155	60	10	15	230	8	15	6	4	10
	Cabbage:											
	Common varieties:											
	Raw:											
316	Coarsely shredded or sliced	1 cup	70	18	2	2	60	2	2	*	4	2
317	Finely shredded or sliced	1 cup	90	22	2	2	70	2	2	2	4	2
318	Cooked, drained	1 cup	145	30	2	4	80	4	4	2	6	2
319	Red, raw, coarsely shredded or sliced	1 cup	70	22	2	*	70	4	2	2	2	4
320	Savoy, raw, coarsely shredded or sliced	1 cup	70	18	2	2	60	2	4	*	4	4
321	Cabbage, celery or Chinese, raw, coarsely shredded.	1 cup	75	10	2	2	30	2	2	2	4	2
322	Cabbage, spoon (or pakchoy), cooked, drained	1 cup	170	25	4	110	40	4	8	6	25	6
	Carrots:											
	Raw:											
323	Grated or shredded	1 cup	110	45	2	240	15	4	2	4	4	4
324	Strips, ¼- to ⅜-inch wide, 2½- to 3-inches long.	6–8 strips or 1 oz.	28	10	*	60	4	2	*	*	2	2
325	Cooked, sliced, drained	1 cup	155	50	2	330	15	6	4	4	6	4
326	Canned, sliced, drained	1 cup	155	45	2	470	4	2	2	4	4	6
	Cauliflower:											
327	Raw, sliced flowerbuds	1 cup	85	25	4	2	110	6	4	4	2	4
328	Cooked, drained flowerbuds	1 cup	125	30	4	2	120	8	6	4	2	4
	Celery, green (Pascal type):											
	Raw:											

329	Stalk, large outer, 8 inches long by about 1½ inches at root end.	1 stalk	40	8	*	2	6	*	*	*	2	*
330	Chopped or diced pieces	1 cup	120	20	2	6	20	2	2	2	4	2
331	Cooked, diced pieces, drained	1 cup	150	22	2	6	15	2	2	2	4	2
332	Chard, Swiss, leaves, cooked, drained	1 cup	175	30	4	190	45	4	10	4	15	15
333	Collards, cooked, drained	1 cup	190	60	10	300	240	15	20	10	35	8
	Corn, sweet (white or yellow):											
334	Cooked, ear, 5 x 1¾ inches[29]	1 ear	140	70	4	6[30]	10	6	4	6	*	2
335	Cooked kernels (cut off cob before cooking), drained.	1 cup	165	140	8	15[30]	20	10	10	10	*	6
	Canned:											
336	Cream style, solids and liquid	1 cup	256	210	3	15[30]	20	6	8	15	*	8
337	Whole kernel, drained	1 cup	165	130	6	10[30]	10	4	4	8	*	4
	Cowpeas, immature seeds, including blackeye peas:											
338	Cooked, drained	1 cup	165	180	20	10	45	35	10	10	4	20
339	Canned, solids and liquid	1 cup	255	180	20	4	15	15	8	6	4	20
340	Cress, garden, cooked, drained	1 cup	135	30	4	210	80	6	15	6	8	6
	Cucumbers, raw:											
341	Pared, sliced, ⅛ inch thick	1 cup	140	20	2	*	25	2	4	2	2	2
342	Not pared, sliced, ⅛ inch thick	1 cup	105	16	2	6	20	2	2	*	2	6
343	Dandelion greens, cooked, drained (greens not pressed down; approx. ½ cup, greens pressed down).	1 cup	105	35	4	250	30	10	10	*	15	10
344	Eggplant, diced, cooked, drained	1 cup	200	40	4	*	10	6	4	4	2	6
345	Endive, curly (including escarole), raw, cut or broken into small pieces.	1 cup	50	10	2	35	8	2	4	2	4	4
346	Kale, leaves without stems, cooked, drained	1 cup	110	45	8	180	170	8	10	8	20	10
	Lettuce, raw:											
347	Butterhead, as Boston types and Bibb, 5-inch diameter head.	1 large, 2 medium or 3 small leaves.	15	2	*	2	2	*	*	*	*	2
	Crisphead varieties, as Iceberg (4¾-inch diameter head):											
348	Chopped or shredded pieces	1 cup	55	8	*	4	4	2	2	*	2	2
349	Chunks, small	1 cup	75	10	2	4	8	2	2	*	2	2
350	Wedge, approx. ¼ head	1 wedge	135	18	2	8	15	6	4	2	2	4
351	Portion of leaf, 5 x 4½ inches	1 piece	20	4	*	2	2	*	*	*	*	*
352	Looseleaf, or bunching varieties, chopped or shredded pieces.	1 cup	55	10	2	20	15	2	2	*	4	4
	Mushrooms:											
353	Raw, slices, chopped or diced pieces	1 cup	70	20	2	*	4	4	20	15	*	4
354	Canned, solids and liquid	1 cup	244	40	8	*	6	2	35	25	2	6

*None or less than 1 percent.

See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	VEGETABLES AND FRUIT—Continued											
	Mustard greens, cooked, drained:											
355	Fresh	1 cup	140	30	4	160	110	8	10	4	20	15
356	Frozen, chopped	1 cup	150	30	6	180	50	4	8	4	15	15
357	Okra, crosscut slices, cooked, drained	1 cup	160	45	4	15	60	15	15	6	15	4
	Onions:											
	Mature, dry:											
	Raw:											
358	Sliced	1 cup	115	45	2	*	20	2	2	*	4	4
359	Chopped	1 tbsp	10	4	*	*	2	*	*	*	*	*
360	Cooked, drained, whole or sliced	1 cup	210	60	4	2	25	4	4	2	4	4
361	Young green, raw, bulb and white portion of top	2 medium or 6 small onions.	30	14	*	*	10	*	*	*	2	2
362	Parsley, raw, chopped	1 tbsp	4	2	*	6	10	*	*	*	*	2
363	Parsnips, cooked, drained, diced or 2-inch pieces	1 cup	155	100	4	*	25	8	8	*	6	4
	Peas, green:											
364	Cooked, drained	1 cup	160	110	15	15	60	30	10	20	4	15
365	Canned, drained	1 cup	170	150	10	25	25	10	6	6	4	20
	Peppers, sweet:											
	Immature, green:											
366	Raw (about 5 per lb)	1 pod	90	16	2	6	160	4	4	2	*	2
367	Cooked, sliced, drained	1 cup	135	25	2	10	220	6	6	4	2	4
	Mature, red:											
368	Raw (about 5 per lb)	1 pod	90	25	2	70	250	4	4	2	*	2
	Potatoes:											
369	Baked in skin, long type, 4¾ x 2⅓ inches	1 potato	202	150	6	*	50	10	4	15	2	6
370	Boiled in skin, medium, round type, 2½-inch diameter.	1 potato	150	100	4	*	35	8	2	10	*	4
371	Boiled, pared before cooking, medium, round type, 2½-inch diameter.	1 potato	112	70	4	*	30	6	2	6	*	4
	Boiled, sliced or diced:											
372	Cooked in skin, peeled	1 cup	155	120	6	*	40	10	4	10	2	4
373	Pared before cooking	1 cup	155	100	4	*	40	10	2	10	*	4

	French-fried, pieces 2—3½ inches long:												
374	Cooked in deep fat	10 pieces	50	140	4	*	30	4	2	8	*	4
375	Frozen, oven-heated	10 pieces	50	110	2	*	20	4	*	6	*	4
376	Potato chips (smooth or corrugated surfaces), medium, 2-inch diameter.	10 chips	20	110	2	*	4	2	*	4	*	2
377	Potato sticks	1 cup	35	190	4	*	25	4	2	8	2	4
378	Pumpkin, canned	1 cup	245	80	4	310	20	4	8	8	6	6
379	Radishes, raw, red, medium, without tops	10 radishes	50	10	*	*	20	2	2	*	2	2
380	Rutabagas, cooked, drained, cubed or sliced	1 cup	170	60	2	20	70	6	6	6	10	2
381	Sauerkraut, canned, solids and liquid	1 cup	235	40	4	2	60	4	6	2	8	6
	Soybeans, sprouted seeds:											
382	Raw	1 cup	105	50	10	2	25	15	10	4	4	6
383	Cooked, drained	1 cup	125	50	10	2	8	15	10	4	6	4
	Spinach:											
384	Raw, chopped	1 cup	55	14	2	90	45	4	6	2	6	10
385	Cooked, drained	1 cup	180	40	8	290	80	8	15	4	15	20
386	Canned, drained	1 cup	205	50	8	330	50	2	15	4	25	30
	Squash:											
387	Summer, all varieties, cooked and drained, cubed or diced.	1 cup	210	30	2	15	35	6	10	8	6	4
388	Winter, all varieties, baked, mashed	1 cup	205	130	6	170 [21]	45	6	15	6	6	8
	Sweetpotatoes:											
	Cooked, medium, 5 x 2 inches:											
389	Baked in skin	1 potato	146	160	4	180	40	6	4	4	4	6
390	Boiled in skin	1 potato	180	170	4	240	45	10	6	4	4	6
	Canned, vacuum or solid pack:											
391	Pieces	1 cup	200	220	6	310	45	6	4	6	4	8
392	Mashed	1 cup	255	280	8	400	60	8	6	8	6	10
393	Dehydrated flakes, prepared with water	1 cup	255	240	4	610	45	4	4	4	4	8
	Tomatoes:											
394	Raw, including skin, approx. 3-inch diameter, 2⅛ inches high, 7 oz.[19]	1 tomato	200	40	4	35	70	8	4	6	2	4
395	Cooked	1 cup	241	60	4	50	100	10	8	10	4	8
396	Canned, solids and liquid	1 cup	241	50	4	45	70	8	4	8	2	6
397	Tomato paste, canned	1 cup	262	220	15	170	210	35	20	40	8	50
398	Turnips, cooked, cubed, drained	1 cup	155	35	2	*	60	4	4	2	6	4
	Turnip greens:											
399	Cooked, drained	1 cup	145	30	4	180	170	15	20	4	25	8
400	Canned, solids and liquid	1 cup	232	40	6	220	70	4	10	6	25	20
	Watercress, raw:											
401	Whole	Approx. 10 sprigs.	35	8	2	35	45	2	4	2	6	4

*None or less than 1 percent.

See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	VEGETABLES AND FRUIT—Continued											
402	Chopped, finely	1 cup	125	25	4	120	170	6	10	6	20	10
	Vegetable mixtures:											
403	Corn fritters, 2 x 1½ inches	1 fritter	35	130	4	2[22]	2	4	4	4	2	4
404	Corn pudding	1 cup	245	260	15	15[22]	8	4	20	4	15	6
405	Peas and carrots, frozen, cooked, drained	1 cup	160	90	8	300	20	20	6	10	4	10
	Potatoes:											
406	Mashed, milk and butter added	1 cup	210	200	6	8	30	10	6	10	4	4
	Dehydrated mashed:											
407	Flakes, without milk, prepared with water, milk and butter.	1 cup	210	200	6	6	15	6	4	10	6	4
408	Granules with milk, prepared with water and butter.	1 cup	210	170	6	4	10	4	6	8	6	8
409	Scalloped	1 cup	245	260	10	8	45	10	15	10	15	6
410	Succotash (corn and lima beans), frozen, cooked and drained.	1 cup	170	160	10	10	15	10	4	10	2	10
411	Sweetpotatoes, candied, pared before cooking; piece, 1¼ x 2 inches.	1 piece	85	140	2	110	15	4	2	2	4	4
412	Vegetables, mixed (carrots, corn, peas, green snap beans, lima beans), frozen, cooked, drained.	1 cup	182	120	8	180	25	15	8	10	4	15
	Vegetable juices:											
413	Sauerkraut juice, canned	1 cup	242	25	2	2	70	4	6	2	8	15
414	Tomato juice, canned or bottled	1 cup	243	45	4	40	70	8	4	10	2	10
415	Vegetable juice cocktail, canned	1 cup	242	40	4	35	35	8	4	10	2	6
	Vegetable salads:											
	Coleslaw, made with:											
416	French dressing (homemade)	1 cup	120	160	2	2	60	4	2	2	4	2
417	French dressing (commercial)	1 cup	120	110	2	2	60	4	2	2	4	2
418	Mayonnaise	1 cup	120	170	2	4	60	4	4	2	6	2
419	Salad dressing (mayonnaise type)	1 cup	120	120	2	4	60	4	4	2	6	2
	Potato salad, from home recipe, made with:											
420	Cooked salad dressing, seasonings	1 cup	250	250	10	6	45	15	10	15	8	8
421	Mayonnaise and French dressing, hard-cooked eggs and seasonings.	1 cup	250	360	10	8	45	10	8	10	4	10
	Fruit:											
	Apples:											
422	Raw, including skin (about 3 per lb)[19]	1 apple	150	80	*	2	10	2	2	*	*	2

423	Dried, cooked, unsweetened	1 cup	255	200	2	*	*	2	4	2	2	8
	Applesauce, canned:												
424	Sweetened	1 cup	255	230	*	2	4 [24]	4	2	*	*	8
425	Unsweetened	1 cup	244	100	*	2	4 [24]	4	2	*	*	6
	Apricots:												
426	Raw, including skin (about 12 per lb) [25]	3 apricots	114	60	2	60	20	2	2	4	2	2
	Canned, fruit and liquid:												
427	Sirup pack, heavy	1 cup	258	220	2	90	15	4	2	4	2	4
428	Water pack	1 cup	246	90	2	90	15	4	2	4	2	4
	Dried:												
429	Uncooked	10 medium halves.	35	90	2	80	6	*	4	6	2	10
430	Cooked, unsweetened, fruit and liquid	1 cup	250	210	6	150	15	*	8	15	6	25
	Avocados, raw:												
	California:												
431	Halved fruit, served with skin	½ avocado	120	190	4	6	25	8	15	8	2	4
432	Cubes (½ inch)	1 cup	150	260	6	8	35	10	20	10	2	4
	Florida:												
433	Halved fruit, served with skin	½ avocado	180	200	4	8	35	10	20	10	2	4
434	Cubes (½ inch)	1 cup	150	190	2	8	35	10	20	10	2	4
	Bananas, raw:												
435	Medium, 8¾ inches long [26]	1 banana	175	100	2	4	20	4	4	4	*	4
436	Sliced	1 cup	150	130	2	6	25	4	6	4	2	6
437	Banana flakes	1 cup	100	340	6	15	10	10	15	15	4	15
	Blackberries:												
438	Raw	1 cup	144	80	2	6	50	2	4	4	4	8
	Canned, fruit and liquid:												
439	Sirup pack, heavy	1 cup	256	230	4	6	30	2	2	2	6	8
440	Water pack	1 cup	244	100	4	6	30	4	2	2	6	8
	Blueberries:												
441	Raw	1 cup	145	90	2	2	35	2	6	4	2	8
	Frozen:												
442	Sweetened	1 cup	230	240	2	2	30	6	6	4	2	4
443	Unsweetened	1 cup	165	90	2	2	20	4	6	4	2	8
444	Boysenberries, canned, water pack, fruit and liquid.	1 cup	244	90	2	6	30	2	15	8	4	15
445	Cantaloup, raw, 5-inch diameter, served with rind	½ melon	477	80	2	180 [25]	150	8	4	8	4	6
446	Casaba melon, raw, wedge, 7¾ inches long, 2 inches wide at center, served with rind.	1 wedge	245	40	2	*	30	4	2	4	2	4
	Cherries:												
	Raw:												

*None or less than 1 percent.
See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	VEGETABLES AND FRUIT—Continued											
447	Sour, red, without pits and stems	1 cup	155	90	2	30	25	6	6	4	4	4
448	Sweet, whole	10 cherries	75	45	2	2	10	2	2	2	2	2
449	Without pits and stems	1 cup	145	100	2	4	25	4	6	4	4	4
	Canned, fruit and liquid:											
450	Sour, red, pitted, water pack	1 cup	244	110	4	35	20	4	2	2	4	4
451	Sweet, pitted, sirup pack, heavy	1 cup	257	210	4	4	15	4	2	2	4	4
452	Unpitted, water pack	1 cup	270	120	4	2	10	4	2	2	4	4
453	Cranberries, raw	1 cup	95	45	*	*	15	2	2	*	2	2
454	Dates, pitted, chopped	1 cup	178	490	6	2	*	10	10	20	10	30
	Figs, canned, fruit and liquid:											
455	Sirup pack, heavy	1 cup	259	220	2	2	4	6	4	2	4	6
456	Water pack	1 cup	248	120	2	2	4	4	4	2	4	6
457	Fruit cocktail, canned in heavy sirup, fruit and liquid.	1 cup	255	190	2	8	8	4	2	4	2	6
	Fruit salad, canned, fruit and liquid:											
458	Sirup pack, heavy	1 cup	255	190	2	25	8	2	4	8	2	4
459	Water pack	1 cup	245	90	2	25	10	2	4	8	2	4
	Grapefruit (seedless):											
	Raw, medium, 3¾-inch diameter: [19]											
460	Pink or red, served with peel	½ grapefruit.	241	50	*	10	70	4	2	*	2	2
461	White, served with peel	½ grapefruit.	241	45	*	*	70	4	2	*	2	2
	Raw sections with 2 tbsp of juice per cup:											
462	Pink or red	1 cup	230	90	2	20	140	6	2	2	4	4
463	White	1 cup	230	90	2	*	140	6	2	2	4	4
	Canned sections, fruit and liquid:											
464	Sirup pack	1 cup	254	180	2	*	130	6	2	2	4	4
465	Water pack	1 cup	244	70	2	*	120	4	2	2	4	4
	Grapes:											
	Raw:											
466	American type, slip skin [19]	1 cup	153	70	2	2	6	4	2	2	2	2
467	European type, adherent skin [19]	1 cup	160	110	2	4	10	6	2	2	2	4
	Canned, Thompson seedless, fruit and liquid:											
468	Sirup pack, heavy	1 cup	256	200	2	4	8	6	2	2	2	4
469	Water pack	1 cup	245	130	2	4	8	6	2	2	2	4

470	Honeydew melon, raw, wedge, 7 inches long, 2 inches wide at center, served with rind.	1 wedge	226	50	2	2	60	4	2	4	2	4
471	Kumquats, raw, including skin, medium size [19]	1 kumquat	20	12	*	2	10	*	2	*	2	*
472	Lemons, raw, 2⅛-inch diameter,[19] size 165; juice only.	1 lemon	110	20	2	*	70	2	*	*	2	2
473	Loganberries, raw	1 cup	144	90	2	6	60	2	4	4	4	10
474	Mangos, raw, whole fruit [19]	1 mango	300	130	2	190	120	6	6	10	2	4
475	Melon balls (cantaloup or honeydew), frozen in sirup.	1 cup	230	140	2	70	60	4	2	6	2	4
476	Nectarines, raw, including skin, 2½-inch diameter [19]	1 nectarine.	150	90	2	45	30	2	4	6	*	4
	Oranges, raw, all commercial varieties:											
477	Whole fruit, 2⅝-inch diameter [19]	1 orange	180	60	2	6	110	8	2	2	6	2
478	Sections without membranes	1 cup	180	90	2	8	150	10	4	4	8	4
479	Papayas, raw, cubed, ½-inch pieces	1 cup	140	55	2	50	130	4	4	2	2	2
	Peaches:											
	Raw:											
480	Whole, 2½-inch diameter, about 4 per lb [19]	1 peach	115	40	*	25 [26]	10	2	2	4	*	2
481	Sliced	1 cup	170	70	2	45 [26]	20	2	4	8	2	4
	Canned, yellow fleshed, fruit and liquid:											
482	Sirup pack, heavy, halves or slices	1 cup	256	200	2	20	15	2	2	8	*	4
483	Water pack	1 cup	244	80	2	20	10	2	4	8	*	4
	Dried:											
484	Uncooked	1 cup	160	420	8	120	50	2	20	45	8	60
485	Cooked, unsweetened, fruit and liquid	1 cup	250	210	4	60	8	*	8	20	4	25
486	Frozen, sliced, sweetened	1 cup	250	220	2	35	170 [27]	2	6	8	*	8
	Pears:											
	Raw, including skin:											
487	Whole, 3½ x 2½ inches [19]	1 pear	180	100	2	*	10	2	4	*	2	2
488	Sliced or cubed	1 cup	165	100	2	*	10	2	4	*	2	2
	Canned, fruit and liquid:											
489	Sirup pack, heavy, halves or slices	1 cup	255	190	*	*	4	2	2	2	2	2
490	Water pack	1 cup	244	80	*	*	4	2	2	*	2	2
	Dried:											
491	Uncooked	1 cup	180	480	8	2	20	2	20	6	6	15
492	Cooked, unsweetened, fruit and liquid	1 cup	255	320	6	2	8	*	10	4	4	8
	Pineapple:											
493	Raw, diced	1 cup	155	80	*	2	45	10	2	2	2	4
	Canned, fruit and liquid:											
	Heavy sirup pack:											
494	Chunk, tidbits, crushed	1 cup	255	190	2	2	30	15	2	2	2	4

*None or less than 1 percent.
See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	VEGETABLES AND FRUIT—Continued											
495	Medium slice	1 slice, 1¼ tbsp liquid.	58	45	*	*	6	4	*	*	*	2
496	Water pack	1 cup	246	100	2	2	.30	15	2	2	2	4
497	Frozen, chunks, sweetened	1 cup	245	210	2	2	35	15	4	4	2	6
	Plums:											
498	Raw, including skin, except prunes, 2⅛-inch diameter.[19]	1 plum	70	30	*	4	6	2	2	2	*	2
	Canned (Italian prunes), with pits and liquid:											
499	Sirup pack	1 cup	272	210	2	60	8	4	2	4	2	15
500	Water pack	1 cup	262	110	2	60	8	4	2	4	2	15
501	Pomegranate, raw, 3⅜-inch diameter	1 pomegranate.	275	100	2	*	10	4	2	2	*	2
	Prunes, dried, "softenized," medium:											
502	Uncooked (with pits)	10 prunes	75	160	2	20	4	4	6	4	4	15
503	Cooked, fruit and liquid, unsweetened	1 cup	250	250	4	30	4	4	8	8	6	20
	Raisins, seedless:											
504	Packaged, 1½ oz or approx. ⅓ cup, not pressed down.	1 pkg	43	120	2	*	*	4	2	*	2	8
505	Cup, pressed down	1 cup	165	480	6	*	4	10	8	4	10	30
	Raspberries:											
506	Black, raw	1 cup	134	100	4	*	40	2	8	6	4	6
	Red:											
507	Raw	1 cup	123	70	2	4	50	2	6	6	2	6
508	Canned, fruit and liquid, unsweetened	1 cup	243	90	2	4	35	2	6	6	4	8
509	Frozen, sweetened	1 cup	250	250	2	4	90	4	8	8	4	8
510	Rhubarb, cooked, sweetened	1 cup	270	380	2	4	25	4	8	4	20	8
	Strawberries:											
511	Raw, whole berries, capped	1 cup	149	60	2	2	150	2	6	4	4	8
512	Canned, fruit and liquid, water pack	1 cup	242	60	2	2	80	2	4	4	4	10
513	Frozen, sweetened	1 cup	255	280	2	2	230	4	8	6	4	10
514	Tangelo, raw, medium, 2 9/16-inch diameter[20]	1 tangelo	170	40	*	8	45	4	2	*	2	2
515	Tangerine, raw, medium, 2⅜-inch diameter, size 176.[19]	1 tangerine	116	40	2	8	45	4	2	*	4	2
	Watermelon, raw:											
516	Diced pieces	1 cup	160	40	2	20	20	4	2	2	2	4

517	Wedge, 4 x 8 inches (1/16 of 10 x 16-inch melon, about 2 lbs with rind).	1 wedge	926	110	4	50	50	8	8	4	2	10
	Fruit juices:											
518	Apple juice, bottled or canned	1 cup	248	120	*	*	4	2	2	*	2	8
	Grapefruit juice:											
519	Fresh	1 cup	246	100	2	4 [20]	160	6	2	2	2	2
	Canned:											
520	Sweetened	1 cup	250	130	2	*	130	4	2	2	2	6
521	Unsweetened	1 cup	247	100	2	*	140	4	2	2	2	6
	Frozen concentrate, diluted with 3 parts water by volume:											
522	Sweetened	1 cup	248	120	2	*	140	4	2	2	2	2
523	Unsweetened	1 cup	247	100	2	*	160	6	2	2	2	2
	Grape juice:											
524	Canned or bottled	1 cup	253	170	*	*	*	6	2	2	2	4
525	Frozen concentrate, sweetened, diluted with 3 parts water by volume.	1 cup	250	130	*	*	15 [20]	4	4	2	*	2
526	Lemon juice, fresh	1 cup	244	60	2	*	190	4	2	*	2	2
527	Lime juice, fresh	1 cup	246	60	2	*	130	4	2	*	2	2
	Orange juice:											
528	Fresh, all varieties	1 cup	248	110	2	10	210	15	4	4	2	2
	Canned:											
529	Sweetened	1 cup	250	130	2	10	170	10	2	4	2	6
530	Unsweetened	1 cup	249	120	4	10	170	10	2	4	2	6
531	Concentrate, canned, unsweetened, diluted with 5 parts water by volume.	1 cup	248	110	4	10	200	15	2	4	2	4
532	Concentrate, frozen, unsweetened, diluted with 3 parts water by volume.	1 cup	249	120	2	10	200	15	2	4	2	2
	Pineapple juice:											
533	Canned, unsweetened	1 cup	250	140	2	2	40 [20]	8	2	2	4	4
534	Frozen, concentrate, unsweetened, diluted with 3 parts water by volume.	1 cup	250	130	2	*	50 [20]	10	2	2	2	4
535	Prune juice, canned or bottled	1 cup	256	200	2	30	8 [20]	2	2	4	4	60
	Tangerine juice:											
536	Canned, sweetened	1 cup	249	120	2	20	90	10	2	*	4	2
537	Frozen concentrate, unsweetened, diluted with 3 parts water by volume.	1 cup	248	110	2	20	110	10	2	*	4	2
	CEREAL AND BAKERY PRODUCTS											
	Breads and crackers:											
	Bagel, 3-inch diameter:											
538	Egg	1 bagel	55	165	10	*	*	10	6	6	*	6
539	Water	1 bagel	55	165	10	*	*	10	6	8	*	6
	Biscuits, baking powder, 2-inch diameter: [*]											
540	From home recipe with enriched flour	1 biscuit	28	100	4	*	*	6	4	4	4	8

*None or less than 1 percent.

See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	CEREAL AND BAKERY PRODUCTS—Continued											
541	From enriched flour mix, made with milk	1 biscuit	28	90	4	*	*	6	4	4	2	8
	Breads: [11]											
542	Boston brown bread, canned, slice, 3¼ x ½ inch	1 slice	45	100	4	*	*	4	2	2	4	4
543	Cracked-wheat bread, 18 slices per 1-lb loaf	1 slice	25	70	4	*	*	2	2	2	2	2
	French bread, slice 5 x 2½ x 1 inch:											
544	Enriched [12]	1 slice	35	100	4	*	*	10	4	6	2	10
545	Unenriched	1 slice	35	100	4	*	*	2	2	2	2	2
	Italian bread, slice 4½ x 3¼ x ¾ inch:											
546	Enriched [12]	1 slice	30	80	4	*	*	8	4	6	*	8
547	Unenriched	1 slice	30	80	4	*	*	2	2	*	*	2
	Vienna bread, slice 4¾ x 4 x ½ inch:											
548	Enriched [12]	1 slice	25	70	4	*	*	6	4	4	2	8
549	Unenriched	1 slice	25	70	4	*	*	2	2	*	2	2
550	Raisin bread, 18 slices per 1-lb loaf	1 slice	25	70	2	*	*	*	2	*	2	2
	Rye bread:											
551	American, light (⅓ rye, ⅔ wheat flour), 18 slices per 1-lb loaf.	1 slice	25	60	4	*	*	4	2	2	2	2
552	Pumpernickel, slice, 5 x 4 x ⅜ inch	1 slice	32	80	4	*	*	4	2	2	2	4
553	Salt-rising bread, unenriched, 19 slices per 1-lb loaf.	1 slice	24	60	2	*	*	*	*	*	*	*
	White bread, enriched: [12]											
	Soft-crumb type:											
554	18 slices per 1-lb loaf	1 slice	25	70	4	*	*	6	4	4	2	8
555	24 slices per 1½-lb loaf	1 slice	28	80	4	*	*	8	4	4	2	8
	Firm-crumb type:											
556	20 slices per 1-lb loaf	1 slice	23	60	4	*	*	6	4	4	2	8
557	34 slices per 2-lb loaf	1 slice	27	70	4	*	*	8	4	4	2	8
	White bread, unenriched:											
	Soft-crumb type:											
558	18 slices per 1-lb loaf	1 slice	25	70	4	*	*	2	2	2	2	2
559	24 slices per 1½-lb loaf	1 slice	28	80	4	*	*	2	2	2	2	2
	Firm-crumb type:											
560	20 slices per 1-lb loaf	1 slice	23	60	4	*	*	2	2	*	2	2
561	34 slices per 2-lb loaf	1 slice	27	70	4	*	*	2	2	*	2	2
	Whole-wheat bread:											
562	Soft-crumb type, 16 slices per 1-lb loaf	1 slice	28	70	4	*	*	6	2	4	2	4
563	Firm-crumb type, 18 slices per 1-lb loaf	1 slice	25	60	4	*	*	4	2	4	2	4

564	Breadcrumbs, dry, grated (enriched)[14]	1 cup	100	390	20	*	*	25	20	25	10	45
	Cornbread, baked from home recipe:											
565	Corn pone, made with white, whole-ground cornmeal; sector, ⅛ of pone, 9-inch diameter.	1 sector	60	120	4	*	*	6	2	2	4	4
566	Southern style, made with enriched, degermed cornmeal (2½ x 2½ x 1½ inches).	1 piece	83	190	10	2	2	10	10	4	8	6
567	Spoonbread, made with white, whole-ground cornmeal.	1 cup	240	470	25	15	*	15	25	4	25	15
568	Cornbread, baked from mix; made with egg and milk (2½ x 2½ x 1⅜ inches).	1 piece	55	180	6	2	*	6	6	4	15	4
	Crackers:											
569	Butter, round, 1⅞-inch diameter	4 crackers	13	60	2	*	*	*	*	*	2	*
	Cheese:											
570	Rectangular sticks or 1-inch squares	10 crackers	9	45	2	*	*	*	*	*	4	*
571	Round, 1⅞-inch diameter	4 crackers	14	70	2	*	*	*	*	*	4	*
572	Graham, 2½ inches square	2 crackers	14	60	2	*	*	*	2	*	*	2
573	Saltines (packet)	4 crackers	11	50	2	*	*	*	*	*	*	*
574	Sandwich type, cheese-peanut butter; 1½-oz packet, 6 sandwiches.	1 packet	42	210	10	*	*	*	2	8	2	2
575	Soup or oyster (hexagon-shaped, ½-inch sides)	10 crackers	8	35	2	*	*	*	*	*	*	*
576	Danish pastry, plain (without fruit or nuts), round piece, approx. 4¼-inch diameter x 1 inch.	1 piece	65	270	8	4	*	4	6	2	4	4
	Muffins, baked from home recipe, made with enriched flour:[14]											
577	Blueberry (2⅝-inch diameter)	1 muffin	40	110	4	2	*	6	6	4	4	10
578	Bran (2⅝-inch diameter)	1 muffin	40	100	4	2	*	4	8	10	6	10
579	Corn, made with enriched, degermed cornmeal (2⅝-inch diameter).	1 muffin	40	130	4	2	*	6	6	4	4	4
580	Plain (3-inch diameter)	1 muffin	40	120	4	*	*	6	8	4	4	10
	Muffins, baked from mix; made with egg and milk:											
581	Corn, 2⅝-inch diameter	1 muffin	40	130	4	2	*	4	4	4	10	4
582	Popovers, baked from home recipe with enriched flour,[14] 2¾-inch diameter at top, 2 inches at bottom.	1 popover	40	90	6	2	*	4	8	4	4	6
	Rolls, enriched:[14]											
583	Brown and serve, pan or cloverleaf, browned	1 roll	26	90	4	*	*	8	4	4	2	8
	Cloverleaf or pan:											
584	Home recipe	1 roll	35	120	4	*	*	8	8	6	2	10
585	Commercial	1 roll	28	80	4	*	*	8	4	4	2	8
586	Frankfurter or hamburger	1 roll	40	120	6	*	*	10	6	6	2	10
587	Hard, round or rectangular	1 roll	50	160	8	*	*	15	8	8	2	15
588	Hoagie or submarine, 11½ x 3 x 2½ inches	1 roll	135	390	20	*	*	35	20	25	6	40
589	Parkerhouse, baked from frozen dough	1 roll	24	80	4	*	*	6	4	4	*	8

*None or less than 1 percent.
See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	CEREAL AND BAKERY PRODUCTS—Continued											
	Rolls, unenriched:											
590	Brown and serve, pan or cloverleaf, browned	1 roll	26	90	4	*	*	2	2	*	2	2
591	Cloverleaf or pan	1 roll	28	80	4	*	*	2	2	*	2	2
592	Frankfurter or hamburger	1 roll	40	120	6	*	*	2	2	2	2	2
593	Hard, round or rectangular	1 roll	50	160	8	*	*	2	2	2	2	2
594	Hoagie or submarine, 11½ x 3 x 2½ inches	1 roll	135	390	20	*	*	8	6	6	6	4
595	Parkerhouse, prepared from frozen dough	1 roll	24	80	4	*	*	2	2	*	*	2
596	Rye wafers, whole grain, 1⅞ x 3½ inches	2 wafers	13	45	2	*	*	2	2	*	*	2
	Salt sticks:											
597	Regular type (breadsticks without salt coating), stick, 7¾ x ¾ inch.	2 sticks	20	80	4	*	*	*	*	*	*	2
598	Vienna bread type, stick, 6½ x 1¼ inches	1 stick	35	110	6	*	*	2	2	2	2	2
599	Zwieback, approx. 3½ x 1½ x ½ inch	1 piece	7	30	2	*	*	*	*	*	*	*
	Cakes and doughnuts:											
	Cakes made from home recipes:[33]											
600	Angelfood, 1/16 of 9¾-inch-diameter tube cake.	1 piece	45	120	4	*	*	*	4	*	*	*
601	Boston cream pie, 1/12 of 8-inch-diameter cake	1 piece	69	210	6	2	*	2	4	*	4	2
602	Caramel with caramel icing, 2-layer cake	1 piece[34]	83	320	4	4	*	2	4	*	6	6
	Chocolate (devil's food):											
603	Without icing, sheet cake	1 piece[35]	39	140	2	2	*	*	2	*	2	2
604	With chocolate icing, 2-layer cake	1 piece[34]	78	290	6	2	*	2	4	*	6	4
	With uncooked white icing:											
605	Sheet cake	1 piece[35]	52	190	4	2	*	*	2	*	4	2
606	2-layer cake	1 piece[34]	77	280	4	2	*	2	4	*	4	2
607	Cupcake, 2¾-inch diameter with chocolate icing.	1 cupcake	44	160	4	2	*	*	2	*	4	2
	Cottage pudding, made with enriched flour,[36] 1/6 of 8 x 8 x 1½-inch cake:											
608	With 1⅓ tbsp chocolate sauce	1 piece	99	320	8	2	*	10	10	8	6	20
609	With 1⅓ tbsp strawberry sauce	1 piece	94	270	8	2	20	10	10	8	6	15
610	Fruitcake, dark, made with enriched flour,[36] 1/30 of 1-lb loaf.	1 slice	15	60	2	*	*	2	2	*	2	2
611	Fruitcake, light, made with enriched flour,[36] 1/30 of 1-lb loaf.	1 slice	15	60	2	*	*	2	2	*	*	2

612	Gingerbread, made with enriched flour[36]	1 piece[36]	117	370	6	2	*	15	8	8	8	20
	Plain cake:											
613	With[illegible]t icing	1 piece[36]	86	310	6	2	*	2	4	*	6	2
614	W[illegible]iled white icing	1 piece[36]	114	400	6	2	*	2	4	*	6	2
615	W[illegible]hocolate icing	1 piece[36]	123	450	8	4	*	2	6	*	8	4
616	Cupcake, 2¾-inch diameter, with uncooked white icing.	1 cupcake	47	170	2	2	*	*	2	*	2	*
617	Pound cake, 3½ x 3 x ½ inch	1 slice	30	150	2	2	*	*	2	*	2	2
618	Sponge, tube cake, 1/12 of 9¾-inch-diameter cake.	1 piece	66	200	8	6	*	2	6	*	2	4
619	White cake with uncooked white icing, 2-layer cake.	1 piece[34]	82	310	4	2	*	*	2	*	4	*
620	Yellow cake with chocolate icing, 2-layer cake	1 piece[34]	79	290	6	2	*	2	4	*	6	2
	Cakes, frozen, commercial, devil's food:											
621	With chocolate icing, ⅙ of 1-layer, 18-oz cake	1 piece	85	320	6	8	*	2	4	*	4	4
622	With whipped cream filling, chocolate icing, ⅙ of 2-layer, 18-oz cake.	1 piece	56	320	4	4	*	2	4	*	6	2
	Cakes, prepared and baked from mixes:											
623	Angelfood, 1/16 of 9¾-inch-diameter tube cake.	1 piece	40	100	4	*	*	*	2	*	4	*
624	Chocolate malt, made with eggs, water, with uncooked white icing, 2-layer cake.	1 piece[37]	67	230	4	2	*	2	2	*	4	2
625	Coffee cake, with enriched flour,[36] made with eggs and milk, ⅙ of cake.	1 piece	72	230	6	2	*	10	8	6	4	15
	Cupcakes, made with egg, milk, 2¾-inch diameter:											
626	Without icing	1 cupcake	33	120	2	*	*	*	2	*	6	2
627	With chocolate icing	1 cupcake	48	170	4	2	*	2	2	*	6	2
628	Devil's food, made with eggs, water, with chocolate icing, 2-layer cake.	1 piece[37]	69	230	4	2	*	2	4	*	4	4
629	Gingerbread, made with water, 2¾ x 2¾ x 1⅜ inches.	1 piece	63	170	4	*	*	2	4	2	6	6
630	Honey spice, made with eggs, water, with caramel icing, 2-layer cake.	1 piece[37]	77	270	4	2	*	2	4	*	6	4
631	Marble, made with eggs, water, with boiled white icing, 2-layer cake.	1 piece[37]	65	220	4	2	*	*	2	*	6	2
632	White, made with egg whites, water, with chocolate icing, 2-layer cake.	1 piece[37]	71	250	4	*	*	*	4	*	6	2
633	Yellow, made with eggs, water, with chocolate icing, 2-layer cake.	1 piece[37]	69	230	4	2	*	*	4	*	6	2
	Doughnuts, made with enriched flour:[38]											

*None or less than 1 percent.
See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	CEREAL AND BAKERY PRODUCTS—Continued											
634	Cake type, plain, 3¼-inch diameter, 1 inch high.	1 doughnut	42	160	2	*	*	6	6	4	2	8
635	Yeast leavened, plain, 3¾-inch diameter, 1¼ inches high.	1 doughnut	42	170	4	*	*	6	6	4	2	10
	Cereals:											
636	Ready-to-eat [39]	1 oz	28	110	4	20	20	25	25	20	*	20
	Hot cooked:											
637	Bulgur, canned, unseasoned	1 cup	135	230	15	*	*	4	2	15	2	10
	Corn grits, degermed:											
638	Enriched	1 cup	245	130	4	240	*	6	4	4	*	4
639	Unenriched	1 cup	245	130	4	240	*	4	2	2	*	2
	Cornmeal, white or yellow, degermed:											
640	Enriched	1 cup	240	120	4	2 [a]	*	10	6	6	*	6
641	Unenriched	1 cup	240	120	4	2 [a]	*	4	2	*	*	2
	Farina:											
	Enriched:											
642	Regular	1 cup	245	100	4	*	*	6 [a]	4 [a]	4 [a]	*	70 [a]
643	Quick-cooking	1 cup	245	110	4	*	*	8 [a]	4 [a]	4 [a]	15	70 [a]
644	Instant-cooking	1 cup	245	140	6	*	*	10 [a]	6 [a]	6 [a]	20	90 [a]
645	Unenriched, regular	1 cup	245	100	4	*	*	2	2	*	*	2
646	Oat flakes, maple-flavored, quick-cooking	1 cup	240	170	10	*	*	10	4	2	2	8
647	Oat granules, maple-flavored, regular	1 cup	245	150	8	*	*	10	4	2	2	8
648	Oatmeal or rolled oats, regular or quick-cooking.	1 cup	240	130	8	*	*	15	2	*	2	8
649	Oat and wheat cereal	1 cup	245	160	10	*	*	15	4	6	2	10
650	Rice breakfast cereal, added nutrients	1 cup	245	120	4	*	*	10	2	10	*	10
651	Rice, brown, long grain, hot	1 cup	195	230	8	*	*	10	2	15	2	6
	Rice, white, enriched:											
652	Common, commercial, hot	1 cup	205	220	6	*	*	15 [a]	2 [a]	10 [a]	2	10 [a]
653	cold	1 cup	145	160	4	*	*	10 [a]	* [a]	6 [a]	2	8 [a]
654	Instant, ready-to-serve, fluffed, hot	1 cup	165	180	6	*	*	15 [a]	2 [a]	8 [a]	*	8 [a]
655	cold	1 cup	130	140	4	*	*	10 [a]	* [a]	6 [a]	*	6 [a]
656	Parboiled, long-grain, hot	1 cup	175	190	6	*	*	15 [a]	2 [a]	10 [a]	4	8 [a]
657	cold	1 cup	145	150	4	*	*	10 [a]	* [a]	8 [a]	2	6 [a]

658	Rice, white, unenriched, hot	1 cup	205	220	6	*	*	2	2	4	2	2
659	Spanish rice, cooked from home recipe	1 cup	245	210	6	30	60	6	4	8	4	8
	Wheat breakfast cereals:											
660	Rolled	1 cup	240	140	6	*	*	10	2	8	2	6
661	Whole-meal	1 cup	245	110	6	*	*	10	2	8	2	6
	With malted barley, toasted:											
662	Quick-cooking	1 cup	245	160	8	*	*	8	2	*	2	6
663	Instant-cooking	1 cup	245	200	10	*	*	10	2	*	2	10
	Cookies:											
664	Animal crackers	5 crackers	13	60	2	*	*	*	*	*	*	*
	Brownies with nuts:[14]											
665	Baked from home recipe, enriched flour	1 brownie	20	100	2	*	*	4	2	2	*	2
666	Frozen, with chocolate icing	1 brownie	24	100	2	2	*	2	2	*	*	2
667	Butter, thin, rich, 2-inch diameter	4 cookies	20	90	2	2	*	*	*	*	2	*
	Chocolate chip:											
668	Baked from home recipe, enriched flour,[14] 2 1/3-inch diameter.	4 cookies	40	210	4	*	*	4	4	4	2	10
669	Commercial type, 2¼-inch diameter	4 cookies	42	200	4	*	*	2	2	*	2	4
670	Chocolate-coated graham cracker, 2½ x 2 inches.	1 cracker	13	60	2	*	*	*	2	*	2	2
671	Coconut bars, 2½ inches long	4 cookies	36	180	4	2	*	*	2	*	2	2
672	Fig bars	2 cookies	28	100	2	*	*	*	2	*	2	2
673	Gingersnaps, 2-inch diameter	4 cookies	28	120	2	*	*	*	2	*	2	4
674	Ladyfingers, whole	4 lady-fingers	44	160	6	6	*	2	4	*	2	4
675	Macaroons, 2¾-inch diameter	2 cookies	38	180	4	*	*	2	4	*	*	2
676	Molasses, 3⅝-inch diameter	1 cookie	32	140	4	*	*	*	2	*	2	4
677	Oatmeal, with raisins, 2⅝-inch diameter	2 cookies	26	120	2	*	*	2	2	*	*	4
	Sandwich type, 1¾-inch diameter:											
678	Chocolate or vanilla	2 cookies	20	100	2	*	*	*	*	*	*	*
679	Peanut filling	2 cookies	25	120	4	*	*	2	2	4	2	2
680	Shortbread, 1⅝ inches	4 cookies	30	150	4	*	*	*	*	*	2	*
681	Sugar, soft, thick, baked from home recipe with enriched flour,[14] 2¼-inch diameter.	4 cookies	32	140	2	*	*	4	4	4	2	6
682	Sugar wafers	4 cookies	38	180	2	2	*	*	2	*	2	*
683	Vanilla wafers, 1¾-inch diameter	5 cookies	20	90	2	*	*	*	*	*	*	*
684	crumbled	1 cup	80	370	6	2	*	2	4	*	4	2
	Pancakes and waffles:											
	Pancakes, 4-inch diameter:											
685	Buckwheat (made from mix, egg, and milk)	1 cake	27	60	2	2	*	2	2	*	6	2
686	Plain or buttermilk (made from enriched-flour mix,[14] egg, and milk).	1 cake	27	60	2	2	*	4	4	2	6	4

*None or less than 1 percent.
See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	CEREAL AND BAKERY PRODUCTS—Continued											
687	Plain, made from home recipe with enriched flour.[14]	1 cake	27	60	2	*	*	4	4	2	2	6
	Waffles, 4½ inches square:[14]											
688	Baked from home recipe with enriched flour	1 waffle	50	140	8	4	*	8	10	6	6	10
689	Made from mix (enriched), egg, and milk	1 waffle	50	140	6	2	*	6	8	4	10	10
	Frozen, made with enriched flour:											
690	10 waffles per 12-oz container	1 waffle	34	90	4	*	*	6	4	4	4	8
691	12 waffles per 9-oz container	1 waffle	22	60	2	*	*	4	2	2	2	6
	Pasta and noodles:											
	Macaroni:											
	Enriched:											
692	Cooked, tender stage, hot	1 cup	140	160	8	*	*	15[a]	6[a]	8[a]	2	8[a]
693	cold	1 cup	105	120	6	*	*	10[a]	4[a]	6[a]	*	4[a]
694	Cooked, firm stage	1 cup	130	190	10	*	*	15[a]	8[a]	8[a]	2	8[a]
	Unenriched:											
695	Cooked, tender stage, hot	1 cup	140	160	8	*	*	*	*	2	2	4
696	cold	1 cup	105	120	6	*	*	*	*	2	*	2
697	Cooked, firm stage	1 cup	130	190	10	*	*	2	2	2	2	4
	Noodles (egg noodles), cooked:											
698	Enriched	1 cup	160	200	10	2	*	15[a]	8[a]	10[a]	2	8[a]
699	Unenriched	1 cup	160	200	10	2	*	4	2	4	2	6
700	Noodles, chow mein, canned	1 cup	45	220	10	*	*	4	2	4	2	2
	Spaghetti, enriched:											
701	Cooked, firm stage, "al dente"	1 cup	130	190	10	*	*	15[a]	8[a]	8[a]	2	8[a]
702	Cooked, tender stage	1 cup	140	160	8	*	*	15[a]	6[a]	8[a]	2	8[a]
	Spaghetti, unenriched:											
703	Cooked, firm stage, "al dente"	1 cup	130	190	10	*	*	2	2	2	2	4
704	Cooked, tender stage	1 cup	140	160	8	*	*	*	*	2	2	4
	Pies:											
	Pie (piecrust made with unenriched flour):[14]											
	Sector, 4¾ inches, ⅙ of 9-inch-diameter pie:											
705	Apple (2 crust)	1 sector	158	400	6	*	4	2	2	4	2	2
706	Banana custard (1 crust)	1 sector	152	340	10	8	4	4	10	2	10	4
707	Blackberry (2 crust)	1 sector	158	380	6	2	10	2	2	2	2	4

708	Blueberry (2 crust)	1 sector	158	380	6	*	8	2	2	2	2	4
709	Butterscotch (1 crust)	1 sector	152	410	10	8	*	4	8	2	10	8
710	Cherry (2 crust)	1 sector	158	410	6	15	*	2	2	4	2	2
711	Chocolate chiffon (1 crust)	1 sector	108	350	10	6	*	2	6	*	2	8
712	Chocolate meringue (1 crust)	1 sector	152	380	10	6	*	4	10	2	10	6
713	Coconut custard (1 crust)	1 sector	152	360	15	6	*	6	15	2	15	6
714	Custard (1 crust)	1 sector	152	330	15	6	*	6	15	2	15	4
715	Lemon chiffon (1 crust)	1 sector	108	340	10	4	4	2	6	*	2	6
716	Lemon meringue (1 crust)	1 sector	140	360	8	4	6	2	6	2	2	4
717	Mince (2 crust)	1 sector	158	430	6	*	4	8	4	4	4	8
718	Peach (2 crust)	1 sector	158	400	6	25	8	2	4	6	2	4
719	Pecan (1 crust)	1 sector	138	580	10	4	*	15	6	2	6	20
720	Pineapple (2 crust)	1 sector	158	400	6	*	4	4	2	4	2	4
721	Pineapple chiffon (1 crust)	1 sector	108	310	10	8	2	2	6	2	2	6
722	Pineapple custard (1 crust)	1 sector	152	330	10	6	4	4	8	4	8	4
723	Pumpkin (1 crust)	1 sector	152	320	10	80	*	4	8	4	8	4
724	Raisin (2 crust)	1 sector	158	430	6	*	4	4	2	2	2	8
725	Rhubarb (2 crust)	1 sector	158	400	6	2	8	2	4	2	10	6
726	Strawberry (1 crust)	1 sector	124	250	4	*	50	2	2	2	2	4
727	Sweetpotato (1 crust)	1 sector	152	320	10	70	10	6	10	2	10	4
	Pie, frozen in unbaked form, baked:											
	Sector, 4⅛ inches, ⅙ of 8-inch-diameter pie:											
728	Apple	1 sector	92	230	2	*	*	2	2	*	*	2
729	Cherry	1 sector	97	280	4	6	4	2	2	*	2	2
730	Coconut custard	1 sector	100	250	10	4	*	2	10	*	10	4
	Pie crust, baked shell for pie, made with:											
731	Enriched flour [16]	1 shell	180	900	15	*	*	35	20	25	2	50
732	Unenriched flour	1 shell	180	900	15	*	*	4	2	4	2	4
	Miscellaneous cereal and bakery products:											
	Bread stuffing, prepared from mix:											
733	Dry, crumbly, prepared with water, table fat	1 cup	140	500	15	20	*	8	10	10	10	10
734	Moist, prepared with water, egg, table fat	1 cup	200	420	15	15	*	6	10	8	8	10
	Popcorn, popped (commercial):											
735	Plain, large kernel	1 cup	6	25	2	*	*	2	*	*	*	2
736	Oil and salt added, large kernel	1 cup	9	40	2	*	*	2	*	*	*	2
737	Sugar coated	1 cup	35	130	4	*	*	8	2	2	*	2
	Pretzels:											
738	Dutch, twisted	1 pretzel	16	60	2	*	*	*	*	*	*	2
739	Thins, twisted	1 pretzel	6	25	*	*	*	*	*	*	*	*
740	Sticks, 3⅛ inches long	10 pretzels	6	25	*	*	*	*	*	*	*	*

*None or less than 1 percent.
See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	MISCELLANEOUS											
	Beverages:											
	Alcoholic:											
741	Beer	1 cup	240	100	2	*	*	*	4	6	2	*
	Gin, rum, vodka, whiskey:											
742	80-proof	1 fl oz	28	70	*	*	*	*	*	*	*	*
743	86-proof	1 fl oz	28	70	*	*	*	*	*	*	*	*
744	90-proof	1 fl oz	28	70	*	*	*	*	*	*	*	*
745	94-proof	1 fl oz	28	80	*	*	*	*	*	*	*	*
746	100-proof	1 fl oz	28	80	*	*	*	*	*	*	*	*
	Wines:											
747	Dessert [45]	1 fl oz	30	40	*	*	*	*	*	*	*	*
748	Table [46]	1 fl oz	29	25	*	*	*	*	*	*	*	*
	Carbonated:											
749	Ginger ale	1 cup	244	70	*	*	*	*	*	*	*	*
750	Root beer	1 cup	247	100	*	*	*	*	*	*	*	*
	Sodas:											
751	Club	1 cup	237	*	*	*	*	*	*	*	*	*
752	Cola type	1 cup	247	90	*	*	*	*	*	*	*	*
753	Cream	1 cup	247	105	*	*	*	*	*	*	*	*
754	Fruit flavored	1 cup	248	110	*	*	*	*	*	*	*	*
755	Quinine (sweetened)	1 cup	244	70	*	*	*	*	*	*	*	*
	Fruit juice drinks:											
756	Apricot nectar	1 cup	251	140	2	50	15 [20]	2	2	2	2	2
757	Cranberry juice cocktail, bottled, sweetened	1 cup	253	160	*	*	70 [47]	2	2	*	2	4
758	Grapefruit juice, prepared from dehydrated crystals with water (1 lb yields about 1 gal).	1 cup	247	100	2	*	150	6	2	2	2	2
759	Grape juice drink, canned	1 cup	250	140	*	*	70 [48]	2 [48]	2 [48]	2	*	2
760	Lemonade concentrate, frozen, diluted with 4⅓ parts water by volume.	1 cup	248	110	*	*	30	*	2	*	*	*
761	Limeade concentrate, frozen, diluted with 4⅓ parts water by volume.	1 cup	247	100	*	*	8	*	*	*	*	*
762	Orange juice, prepared from dehydrated crystals (1 lb yields about 1 gal).	1 cup	248	110	2	10	180	15	4	4	2	2
763	Orange-apricot juice drink, canned	1 cup	249	120	2	30	70 [47]	4	2	2	2	2
764	Peach nectar, canned	1 cup	249	120	*	30	* [20]	2	2	4	*	2
765	Pear nectar, canned	1 cup	250	130	2	*	* [20]	*	2	*	*	2

766	Pineapple-grapefruit juice drink, canned	1 cup	250	140	*	*	70 [47]	4	2	2	2	2
767	Pineapple-orange juice drink, canned	1 cup	250	140	*	2	70 [47]	4	2	2	2	2
	Desserts (not previously listed):											
768	Apple brown betty [48]	1 cup	215	330	6	4	4	10	6	6	4	15
769	Bread pudding with raisins [49]	1 cup	265	500	25	15	4	15	35	10	30	20
770	Charlotte Russe, with ladyfingers, whipped cream filling (approx. 4 ladyfingers, ⅓ cup of filling).	1 serving	114	330	10	15	*	2	6	*	6	4
771	Cream puffs with custard filling (approx. 3½-inch diameter, 2 inches high).	1 cream puff	130	300	15	10	*	4	15	*	10	4
772	Eclairs with custard filling and chocolate icing (approx. 5 inches long, 2 inches wide, 1¾ inches high).	1 eclair	100	240	10	6	*	2	10	*	8	4
	Gelatin desserts made with water:											
773	Plain	1 cup	240	140	6	*	*	*	*	*	*	*
774	With fruit added	1 cup	240	160	4	*	10	*	*	*	*	*
775	Ices, water	1 cup	193	250	2	*	4	*	*	*	*	*
	Prune whip, baked:											
776	Served hot	1 cup	90	140	6	8	4	2	8	2	2	6
777	Served cold	1 cup	130	200	8	10	4	2	10	4	2	10
778	Rice pudding with raisins	1 cup	265	390	15	6	*	6	20	2	25	6
779	Sherbet	1 cup	193	260	2	2	6	2	4	*	4	*
	Fats, oils:											
	Butter:											
	Regular, 4 sticks per lb:											
780	2 sticks	1 cup	227	1630	2	150 [50]	*	*	*	*	4	*
781	Tablespoon (approx. ⅛ stick)	1 tbsp	14	100	*	10 [50]	*	*	*	*	*	*
782	Pat (1-inch square, ⅓ inch high; 90 per lb)	1 pat	5	35	*	4 [50]	*	*	*	*	*	*
	Whipped, 6 sticks or 2 8-oz tubs per lb:											
783	Approx. 2 sticks or ⅔ of an 8-oz tub	1 cup	151	1080	2	100 [50]	*	*	*	*	2	*
784	Tablespoon (approx. ⅛ stick)	1 tbsp	9	70	*	6 [50]	*	*	*	*	*	*
	Fats, cooking:											
785	Lard	1 cup	205	1850	*	*	*	*	*	*	*	*
786		1 tbsp	13	120	*	*	*	*	*	*	*	*
787	Vegetable fat, mixed-fat shortenings	1 cup	200	1770	*	*	*	*	*	*	*	*
788		1 tbsp	13	110	*	*	*	*	*	*	*	*
	Margarine:											
	Regular, 4 sticks per pound or soft, 2 8-oz tubs per lb:											
789	2 sticks or 1 tub	1 cup	227	1630	2	150 [51]	*	*	*	*	4	*
790	Tablespoon (approx. ⅛ stick)	1 tbsp	14	100	*	10 [51]	*	*	*	*	*	*

*None or less than 1 percent.
See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	MISCELLANEOUS—Continued											
791	Pat (1-inch square, ⅓ inch high; 90 per lb)	1 pat	5	35	*	4 [a]	*	*	*	*	*	*
	Whipped, 6 sticks or 2 8-oz tubs, per lb:											
792	Approx. 2 sticks or ⅔ of an 8-oz tub	1 cup	151	1090	2	100 [a]	*	*	*	*	2	*
793	Tablespoon (approx. ⅛ stick)	1 tbsp	9	70	*	6 [a]	*	*	*	*	*	*
794	Oils, salad or cooking	1 cup	218	1930	*	*	*	*	*	*	*	*
795		1 tbsp	14	120	*	*	*	*	*	*	*	*
	Salad dressing, commercial:											
796	Blue or Roquefort cheese	1 tbsp	15	80	2	*	*	*	2	*	2	*
797	French	1 tbsp	16	70	*	*	*	*	*	*	*	*
798	Italian	1 tbsp	15	80	*	*	*	*	*	*	*	*
799	Mayonnaise	1 tbsp	14	100	*	*	*	*	*	*	*	*
800	Mayonnaise-type salad dressing	1 tbsp	15	70	*	*	*	*	*	*	*	*
801	Russian	1 tbsp	15	70	*	2	2	*	*	*	*	*
802	Thousand Island	1 tbsp	16	80	*	2	*	*	*	*	*	*
	Salad dressings made from home recipe:											
803	Boiled	1 tbsp	16	25	2	2	*	*	2	*	2	*
804	French	1 tbsp	14	90	*	*	*	*	*	*	*	*
805	Sandwich spread (with chopped pickle)	1 tbsp	15	60	*	*	2	*	*	*	*	*
	Relishes:											
806	Apple butter	1 tbsp	18	35	*	*	*	*	*	*	*	*
807	Cranberry sauce, sweetened, canned, strained	1 cup	277	400	*	2	10	2	2	*	2	4
808	Mustard, prepared	1 tsp, serving pouch, or serving cup.	5	4	*	*	*	*	*	*	*	*
	Olives:											
809	Green	4 medium or 3 extra large or 2 giant.	16	20	*	*	*	*	*	*	*	2
810	Ripe, mission	3 small or 2 large.	10	18	*	*	*	*	*	*	2	2
	Pickles, cucumber:											
811	Dill, medium, whole, 3¾ inches long, 1¼-inch diameter.	1 pickle	65	8	*	2	6	*	*	*	2	4
812	Dill, sliced crosswise	1 cup	155	18	2	4	15	*	2	*	4	8
813	Fresh, sweetened, sliced	1 cup	170	120	2	4	25	*	2	*	6	15
814	Sweet, gherkin, small, whole, approx. 2½ inches long, ¾-inch diameter.	1 pickle	15	22	*	*	2	*	*	*	*	2

815	Relish, finely cut or chopped, sweet	1 tbsp	15	22	*	*	2	*	*	*	*	*
816	Soy sauce	1 tbsp	18	12	2	*	*	*	2	*	2	4
817	Tartar sauce	1 tbsp	14	70	*	*	*	*	*	*	*	*
818	Tomato catsup	1 cup	273	290	8	80	70	15	10	20	6	10
819		1 tbsp	15	16	*	4	4	*	*	*	*	*
820	Tomato chili sauce	1 cup	273	280	10	80	70	15	10	20	6	10
821		1 tbsp	15	16	*	4	4	*	*	*	*	*
	Sauces:											
822	Barbecue sauce	1 cup	250	230	6	20	20	2	2	4	6	10
	White sauce, made with enriched flour: [16]											
823	Thin	1 cup	250	300	15	15	*	8	25	4	30	4
824	Medium	1 cup	250	410	15	25	*	8	25	4	30	8
825	Thick	1 cup	250	500	15	30	*	10	25	6	25	10
	Soups:											
	Canned, condensed, ready-to-serve:											
	Prepared with an equal volume of milk:											
826	Cream of asparagus	1 cup	245	150	10	10	*	4	15	4	20	4
827	Cream of celery	1 cup	245	170	10	8	4	4	15	4	20	4
828	Cream of chicken	1 cup	245	180	10	10	4	4	15	4	15	2
829	Cream of mushroom	1 cup	245	220	10	4	*	4	20	4	20	2
830	Green pea	1 cup	250	210	15	10	15	6	15	6	20	6
831	Tomato	1 cup	250	170	10	25	25	6	15	6	15	4
	Prepared with an equal volume of water:											
832	Bean with pork	1 cup	250	170	10	15	4	8	4	4	6	10
833	Beef broth, bouillon, and consomme	1 cup	240	30	8	*	*	*	2	6	*	2
834	Beef noodle	1 cup	240	70	6	*	*	4	4	4	*	6
835	Chicken consomme	1 cup	240	22	6	*	*	*	2	6	2	6
836	Chicken gumbo	1 cup	240	60	4	4	8	2	2	6	2	2
837	Chicken noodle	1 cup	240	60	6	*	*	2	2	4	*	2
838	Chicken with rice	1 cup	240	50	4	2	*	*	2	4	*	2
839	Chicken vegetable	1 cup	245	80	6	45	*	2	2	4	2	2
840	Clam chowder, Manhattan type	1 cup	245	80	4	20	*	2	2	4	4	6
841	Cream of asparagus	1 cup	240	70	4	6	*	4	6	4	2	4
842	Cream of celery	1 cup	240	90	2	4	*	2	2	*	4	2
843	Cream of chicken	1 cup	240	90	4	8	*	2	2	2	2	2
844	Cream of mushroom	1 cup	240	130	4	2	*	2	8	4	4	2
845	Green pea	1 cup	245	130	8	6	10	4	2	4	4	6
846	Minestrone	1 cup	245	110	8	45	*	4	2	4	4	6
847	Onion	1 cup	240	70	8	*	*	*	2	*	2	2
848	Split pea	1 cup	245	150	15	8	*	15	8	8	2	8
849	Tomato	1 cup	245	90	4	20	20	4	2	6	2	4

*None or less than 1 percent.
See footnotes at end of table.

TABLE 1.—Food energy and percentage of U.S. Recommended Daily Allowance for eight nutrients provided by a specified amount of various foods—Continued

	Food, approximate measure, and weight (in grams)			Food energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
			Grams	*Calories*	*Percentage of U.S. RDA*							
	MISCELLANEOUS—Continued											
850	Turkey noodle	1 cup	240	80	6	4	*	4	2	6	2	4
851	Vegetable beef	1 cup	245	80	8	60	*	4	2	4	2	4
852	Vegetable with beef broth	1 cup	245	80	4	60	*	4	2	6	2	4
853	Vegetarian vegetable	1 cup	245	80	4	60	*	4	2	4	2	6
	Dehydrated, prepared with water:											
854	Beef noodle (2 oz mix in 3 cups water)	1 cup	240	70	4	*	*	6	2	4	*	2
855	Chicken noodle (2 oz mix in 4 cups water)	1 cup	240	60	2	*	*	4	2	2	*	2
856	Chicken rice (1½ oz mix in 3 cups water)	1 cup	240	50	2	*	*	*	*	*	*	*
857	Onion (1½ oz mix in 4 cups water)	1 cup	240	35	2	*	4	*	*	*	*	2
858	Pea, green (4 oz mix in 3 cups water)	1 cup	245	120	10	*	*	10	8	8	2	10
859	Tomato vegetable with noodles (2½ oz mix in 4 cups water).	1 cup	240	70	2	10	8	4	2	2	*	2
860	Oyster stew, home prepared (1 part oysters to 3 parts milk by volume).	1 cup	240	210	20	15	*	10	25	8	30	20
	Sugars and sweets:											
	Candy:											
861	Caramels, plain or chocolate	1 oz	28	110	2	*	*	*	2	*	4	2
862	Chocolate, milk, plain	1 oz	28	150	4	2	*	2	6	*	6	2
	Chocolate coated:											
863	All fondant	1 oz	28	120	*	*	*	*	2	*	2	2
864	Peanuts	1 oz	28	160	8	*	*	6	2	10	4	2
865	Raisins	1 oz	28	120	2	*	*	2	4	*	4	4
866	Fondant (candy corn, uncoated mints)	1 oz	28	100	*	*	*	*	*	*	*	2
867	Gumdrops, starch jelly pieces	1 oz	28	100	*	*	*	*	*	*	*	*
868	Hard	1 oz	28	110	*	*	*	*	*	*	*	2
869	Marshmallows, plain	1 oz	28	90	*	*	*	*	*	*	*	2
870	Peanut bars	1 oz	28	140	8	*	*	8	2	15	2	2
871	Peanut brittle	1 oz	28	120	2	*	*	2	*	4	*	4
872	Chocolate, bitter or baking	1 oz	28	140	4	*	*	*	4	2	2	10
	Chocolate-flavored sirup or topping:											
873	Thin type	2 tbsp	38	90	2	*	*	*	2	*	*	4
874	Fudge type	2 tbsp	38	120	2	2	*	*	4	*	4	2
	Chocolate-flavored beverage powder (approx. 4 heaping teaspoons per oz):											
875	With nonfat dry milk	1 oz	28	100	8	*	2	2	10	*	15	2
876	Without nonfat dry milk	1 oz	28	100	2	*	*	*	2	*	*	4
877	Honey, strained or extracted	1 tbsp	21	60	*	*	*	*	*	*	*	*
878	Jams and preserves	1 tbsp	20	60	*	*	*	*	*	*	*	2

879	Jellies	1 tbsp	18	50	*	*	2	*	*	*	*	2
880	Marmalade, citrus	1 tbsp	20	50	*	*	2	*	*	*	*	*
	Molasses, cane:											
881	Light (first extraction)	1 tbsp	20	50	*	*	*	*	*	*	4	4
882	Blackstrap (third extraction)	1 tbsp	20	45	*	*	*	2	2	2	15	20
	Sirups:											
883	Maple	1 tbsp	20	50	*	*	*	2	*	*	2	2
884	Sorghum	1 tbsp	21	60	*	*	*	2	2	*	4	15
885	Table blends, chiefly corn, light and dark	1 tbsp	20	60	*	*	*	*	*	*	*	4
	Sugars:											
886	Brown, firmly packed	1 cup	220	820	*	*	*	2	4	2	20	40
	White:											
887	Granulated	1 cup	200	770	*	*	*	*	*	*	*	2
888		1 tbsp	11	40	*	*	*	*	*	*	*	*
889	Powdered, unsifted, spooned into cup	1 cup	120	460	*	*	*	*	*	*	*	*

[1] Value applies to unfortified product; value for fortified product would be 30 percent.

[2] Contributed largely by beta-carotene used for coloring.

[3] Chocolate rennin dessert made from mix, with milk, weighs 255 grams. Calories and the percentage of the U.S. RDA for the other nutrients are as listed in this table.

[4] Cuts described as "lean and fat" contain proportions of fat considered to be typical.

[5] Prepared with bacon, butter or margarine, onion, celery, and bread cubes.

[6] Dipped in egg, milk or water, and bread crumbs.

[7] If bones are discarded, value will be greatly reduced.

[8] Dipped in egg, bread crumbs, and flour, or in batter.

[9] Prepared with flour, baking powder, butter, and egg.

[10] Prepared with bread cubes, butter, parsley, eggs, lemon juice, and catsup.

[11] Prepared with crab, butter or margarine, flour, milk, onion, green pepper, egg, and lemon juice.

[12] Prepared with butter, egg yolks, sherry, and cream.

[13] Prepared with salmon, rice, water, milk, bread cubes, eggs, parsley, green pepper, and lemon juice.

[14] Prepared with lobster, onion, sweet pickle, celery, eggs, salad dressing (mayonnaise type), and tomatoes.

[15] Prepared with tuna, celery, salad dressing (mayonnaise type), pickle, onion, and egg.

[16] Values for thiamin, riboflavin, niacin, and iron reflect the enrichment levels for flour specified by the Food and Drug Administration in October 1973 (Federal Register, No. 198, October 15, 1973).

[17] Prepared with canned flaked fish, bread cubes, eggs, tomatoes, onion, and butter or margarine.

[18] Based on unenriched flour. If product is made with enriched flour (see footnote 16), increase values per sector by the following amounts: Thiamin, 8 percent; riboflavin, 4 percent; niacin, 6 percent; iron, 10 percent.

[19] Measure and weight apply to entire vegetable or fruit (including parts not usually eaten). Unless noted, nutritive values are only for parts usually eaten.

[20] Based on yellow varieties; white varieties contain only traces of cryptoxanthin and carotenes, the pigments in corn that have biological activity.

[21] Value based on freshly harvested squash. The carotenoid content increases during storage, the amount of increase varying according to variety and conditions of storage.

[22] Based on fritters made with yellow sweet corn; with white corn the percentage of the U.S. RDA for vitamin A in one fritter is negligible.

[23] Based on corn pudding made with yellow sweet corn; with white corn the percentage of the U.S. RDA for vitamin A in 1 cup of pudding is 10 percent.

[24] This is the amount from the fruit. Additional vitamin C may be added by the manufacturer. Refer to the label for this information.

[25] Value for varieties with orange-colored flesh; for varieties with green-colored flesh the percentage of the U.S. RDA for vitamin A is about 10 percent.

[26] Based on yellow-fleshed varieties; for white-fleshed varieties the percentage of the U.S. RDA for vitamin A is negligible for a 115-gram peach and 2 percent for a cup of sliced peaches.

[27] This value includes ascorbic acid added by the manufacturer.

[28] Weight is for the whole fruit; nutritive values are for juice only.

[29] This represents an average of all varieties. For white-fleshed varieties the percentage of the U.S. RDA for vitamin A per cup is negligible; for red-fleshed varieties it is 20 percent per cup.

[30] Applies to product without added vitamin C. Check the label for addition of vitamin C by the manufacturer.

[31] Number of slices per loaf includes end slices.

[32] Based on product made with enriched flour (see footnote 16). With unenriched flour the approximate values for one popover are: Thiamin, 2 percent; riboflavin, 4 percent; niacin, negligible; iron, 2 percent.

[33] Unenriched cake flour and cooking fat used unless otherwise specified.

[34] Piece: One-twelfth of 8-inch-diameter, two-layer cake.

[35] Piece: 2 by 2 by 2 inches.

[36] Sheet cake, piece: 3 by 3 by 2 inches.

[37] Piece: One-sixteenth of 8- or 9-inch-diameter, two-layer cake.

[38] Based on product made with enriched flour (see footnote 16). With unenriched flour the approximate values per doughnut are: Thiamin, negligible; riboflavin, 2 percent; niacin, 2 percent; iron, 2 percent.

[39] Based on average of values on labels of 59 varieties of ready-to-eat cereals, February 1973. Vitamin and mineral values vary widely among cereals. For more precise information refer to the label.

[40] This value is based on cornmeal made from yellow varieties of corn; cornmeal made from white varieties contains only a trace of vitamin A per cup.

[41] Values for thiamin, riboflavin, and niacin are based on the minimum levels of enrichment specified in standards of identity promulgated under the Federal Food, Drug, and Cosmetic Act (Federal Register, No. 20, December 20, 1955). The value for iron is based on a much higher level of enrichment.

[42] Values for thiamin, niacin, and iron are based on the minimum levels of enrichment specified in standards of identity promulgated under the Federal Food, Drug, and Cosmetic Act (Federal Register, No. 22, August 27, 1947). The value for riboflavin is based on unenriched rice. If the minimum level of enrichment for riboflavin specified in the standards of identity becomes effective, the value will be 8 percent per cup of parboiled or white rice.

[43] The values for thiamin, riboflavin, niacin, and iron are based on the minimum levels of enrichment specified in standards of identity promulgated under the Federal Food, Drug, and Cosmetic Act (Federal Register, No. 20, December 20, 1955).

[44] If pie is made with enriched flour (see footnote 16), increase values per sector by the following amounts:

Sector of one-crust pie weighing from 108 to 140 grams: Thiamin, 2 percent; riboflavin, 2 percent; niacin, 2 percent; iron, 2 percent.

Sector of one-crust pie weighing 152 grams: Thiamin, 4 percent; riboflavin, 2 percent; niacin, 2 percent; iron, 2 percent.

Sector of two-crust pie weighing 158 grams: Thiamin, 6 percent; riboflavin, 4 percent; niacin, 4 percent; iron, 4 percent.

[45] This group includes wines containing more than 15 percent alcohol by volume, such as apple, muscatel, sherry, port, and tokay; also aperitif wines and vermouth.

[46] This group includes wines containing less than 15 percent alcohol by volume, such as barbera, burgundy, cabernet, chablis, champagne, chianti, claret, Rhine wine, rosé, and sauterne. Cherry, peach, berry, and variety wines usually fall in this class, although some have an alcoholic content high enough to be classified with dessert wines (usually noted on the label).

[47] Based on products with labels stating that a 6-fluid-ounce serving provides 50 per cent of the U.S. RDA.

[48] Ascorbic acid may be added as a preservative or as a nutrient. Sometimes the product is enriched with thiamin and riboflavin but not with ascorbic acid. Refer to the label for precise information.

[49] Made with enriched bread (see footnote 16).

[50] Year-round average.

[51] Based on the average vitamin A content of fortified margarine. Federal specifications for fortified margarine require a minimum of 15,000 International Units per pound.

Explanation of Table 2

Table 2 shows what percentage of the U.S. RDA you need in order to get the Recommended Dietary Allowance (see p. 4) for various nutrients. Calorie allowances, which may differ depending on body composition and size and activity of the person, are also shown.

Most peope do not need 100 percent of the U.S. RDA for every nutrient. Use of 100 percent of the U.S. RDA as a nutritional goal is in no way dangerous, but it may lead to unnecessary changes in your diet and in food spending, as well as unwarranted concern about shortages of nutrients.

For meal planning tailored to your needs, use the appropriate goals shown in table 2. For example, the recommended amount of iron for a 60-year old-woman is only 60 percent of the U.S. RDA. Therefore, food for a day that provides 60 percent or more of the U.S. RDA for iron, rather than 100 percent, can be used as her goal in meal planning.

TABLE 2.—Allowances for food energy and percentages of the U.S. Recommended Daily Allowances needed to meet the Recommended Dietary Allowances for children, men, and women of different ages

Age	Food energy [1]	Protein [2]	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin [3]	Calcium	Iron
Years	*Calories*	*Percent of U.S. Recommended Daily Allowance*							
Child:									
1–3	1300	35	40	70	50	50	30	80	85
4–6	1800	50	50	70	60	65	35	80	60
7–10	2400	55	70	70	80	75	50	80	60
Male:									
11–14	2800	70	100	75	95	90	55	120	100
15–18	3000	85	100	75	100	110	55	120	100
19–22	3000	85	100	75	100	110	60	80	60
23–50	2700	90	100	75	95	95	45	80	60
51+	2400	90	100	75	80	90	35	80	60
Female:									
11–14	2400	70	80	75	80	80	45	120	100
15–18	2100	75	80	75	75	85	30	120	100
19–22	2100	75	80	75	75	85	35	80	100
23–50	2000	75	80	75	70	75	30	80	100
51+	1800	75	80	75	70	65	25	80	60
Pregnant	+300 [4]	+50 [4]	100	100	+20 [4]	+20 [4]	35	120	100+
Nursing	+500 [4]	+35 [4]	120	135	+20 [4]	+30 [4]	35	120	100

[1] Calorie needs differ depending on body composition and size, age, and activity of the person.

[2] U.S. RDA of 65 grams is used for this table. In labeling, a U.S. RDA of 45 grams is used for foods providing high-quality protein, such as milk, meat, and eggs.

[3] The percentage of the U.S. RDA shown for niacin will provide the RDA for niacin if the RDA for protein is met. Some niacin is derived in the body from tryptophan, an amino acid present in protein.

[4] To be added to the percentage for the girl or woman of the appropriate age.

Source: U.S. Recommended Daily Allowance, "Food Labeling," Federal Register, vol. 38, no. 49, part II, March 14, 1973. Recommended Dietary Allowances, 8th ed. 1974, National Academy of Sciences, National Research Council.

LISTS OF FOODS THAT ARE IMPORTANT SOURCES OF NUTRIENTS

The foods from table 1 that are the best sources of each nutrient are shown in the accompanying lists. Foods are listed in descending order for each nutrient according to the percentage of the U.S. RDA they provide. Consider the amount of food specified. It may not be the same as the amount you usually eat.

Percentages have been rounded off to the nearest percentage that would be shown on labels.

Consider a food superior to another food as the source of a nutrient only if it provides a substantially higher percentage of the U.S. RDA. Labeling regulations allow a manufacturer to claim that his food is superior to another food only if it contains at least 10 percent more of the U.S. RDA per serving specified on the label.

VITAMIN A

Food	*Percentage of U.S. RDA*	*Amount of food*
MEAT AND MEAT ALTERNATES:		
Liver, beef	910	3 ounces
Liver, calf	560	3 ounces
Liver, hog	250	3 ounces
Liver, chicken	60	1 ounce
Chicken or turkey potpie, home recipe.	60	⅓ of 9-inch pie
Beef and vegetable stew	50	1 cup
VEGETABLES AND FRUIT:		
Carrots, canned	470	1 cup
Sweetpotatoes, mashed	400	1 cup
Carrots, cooked	330	1 cup
Spinach, canned	330	1 cup
Pumpkin, canned	310	1 cup
Sweetpotatoes, pieces, canned.	310	1 cup
Collards, cooked	300	1 cup
Peas and carrots, cooked	300	1 cup
Spinach, cooked	290	1 cup
Dandelion greens, cooked.	250	1 cup
Carrots, raw, grated	240	1 cup
Sweetpotatoes, boiled in skin.	240	Medium potato
Turnip greens, canned, solids and liquid.	220	1 cup
Cress, garden, cooked	210	1 cup
Chard, Swiss, cooked	190	1 cup
Mango, raw	190	1 fruit (⅔ pound)
Cantaloup, raw	180	½ of 5-inch-diameter melon
Kale, cooked	180	1 cup
Mustard greens, cooked from frozen.	180	1 cup
Sweetpotatoes, baked in skin.	180	Medium potato
Turnip greens, cooked	180	1 cup
Vegetables, mixed, cooked.	180	1 cup
Squash, winter, baked	170	1 cup
Mustard greens, cooked	160	1 cup
Apricots, dried, cooked	150	1 cup
Beet greens, cooked	150	1 cup
Cabbage, spoon, cooked	110	1 cup
Sweetpotatoes, candied	110	3-ounce piece
Broccoli, chopped, cooked from frozen.	100	1 cup
Apricots, canned	90	1 cup
Broccoli, cooked	90	Medium stalk
Spinach, raw, chopped	90	1 cup
Apricots, dried, uncooked.	80	10 medium halves
Broccoli, cut, cooked	80	1 cup
Melon balls, frozen, in sirup.	70	1 cup
Pepper, red	70	1 pod
Apricots, raw	60	3 fruits
Peaches, dried, cooked	60	1 cup
Plums, canned	60	1 cup
Carrots, strips, raw	60	6-8 strips (2½-3 inches long)
Papaya, raw, cubed	50	1 cup
Tomatoes, cooked	50	1 cup
Watermelon, raw	50	4 x 8-inch wedge (2 pounds)
CEREAL AND BAKERY PRODUCTS:		
Pie, pumpkin	80	4¾-inch sector
Pie, sweetpotato	70	4¾-inch sector
MISCELLANEOUS:		
Soup:		
Vegetable, with beef broth.	60	1 cup
Vegetable, vegetarian	60	1 cup
Vegetable beef	60	1 cup
Apricot nectar	50	1 cup

VITAMIN C

Food	*Percentage of U.S. RDA*	*Amount of food*
MEAT AND MEAT ALTERNATES:		
Peppers, stuffed	120	1 pepper (6.5 ounces)

Lobster salad	80	A salad[8]
Chop suey, with beef and pork, home recipe.	60	1 cup
Liver, calf	50	3 ounces
VEGETABLES AND FRUIT:		
Broccoli, cooked	270	Medium stalk
Pepper, red, raw	250	1 pod
Collards, cooked	240	1 cup
Broccoli, cut, cooked	230	1 cup
Brussels sprouts, cooked.	230	1 cup
Strawberries, frozen, sweetened.	230	1 cup
Pepper, green, cooked	220	1 cup
Orange juice, fresh	210	1 cup
Orange juice, from frozen or canned concentrate.	200	1 cup
Broccoli, chopped, cooked from frozen.	180	1 cup
Kale, cooked	170	1 cup
Turnip greens, cooked	170	1 cup
Orange juice, canned	170	1 cup
Peaches, frozen	170	1 cup
Pepper, green, raw	160	1 pod
Grapefruit juice, fresh or from frozen unsweetened concentrate.	160	1 cup
Cantaloup, raw	150	½ of 5-inch-diameter melon
Orange sections, raw	150	1 cup
Strawberries, raw	150	1 cup
Grapefruit sections, raw, white or pink.	140	1 cup
Grapefruit juice, canned, unsweetened.	140	1 cup
Grapefruit juice, from frozen sweetened concentrate.	140	1 cup
Grapefruit sections, canned, sirup pack.	130	1 cup
Grapefruit juice, canned, sweetened.	130	1 cup
Papaya, raw, cubed	130	1 cup
Grapefruit sections, canned, water pack.	120	1 cup
Mango, raw	120	1 fruit (⅔ pound)
Cauliflower, cooked	120	1 cup
Cauliflower, raw	110	1 cup
Mustard greens, cooked	110	1 cup
Orange, raw	110	2⅝-inch-diameter orange
Tangerine juice, from frozen concentrate.	110	1 cup
Tomatoes, cooked	100	1 cup
Raspberries, red, frozen.	90	1 cup
Tangerine juice, canned	90	1 cup
Cabbage, cooked	80	1 cup
Cress, garden, cooked	80	1 cup
Spinach, cooked	80	1 cup
Strawberries, canned	80	1 cup
Cabbage, raw, finely shredded.	70	1 cup
Cabbage, red, raw, shredded.	70	1 cup
Rutabagas, cooked	70	1 cup
Tomatoes, raw	70	3-inch-diameter tomato
Turnip greens, canned, solids and liquid.	70	1 cup
Tomato juice, canned or bottled.	70	1 cup
Sauerkraut juice	70	1 cup
Grapefruit, white or pink, raw.	70	½ medium fruit
Lemons, raw	70	1 lemon
Asparagus, pieces, cooked or canned.	60	1 cup
Cabbage, common or savoy, raw, coarsely shredded.	60	1 cup
Okra, sliced, cooked	60	1 cup
Peas, green, cooked	60	1 cup
Sauerkraut, canned	60	1 cup
Sweetpotatoes, canned, mashed.	60	1 cup
Turnips, cooked	60	1 cup
Coleslaw	60	1 cup
Honeydew melon, raw	60	2 x 7-inch wedge (½ pound)
Loganberries, raw	60	1 cup
Melon balls, frozen, sirup pack.	60	1 cup
Beans, lima, Fordhook, cooked from frozen.	50	1 cup
Beans, lima, immature seeds, cooked.	50	1 cup
Mustard greens, cooked from frozen.	50	1 cup
Potato, baked in skin	50	Medium potato
Spinach, canned	50	1 cup
Blackberries, raw	50	1 cup
Raspberries, red, raw	50	1 cup
Watermelon, raw	50	4 x 8-inch wedge (2 pounds)
Pineapple juice, from frozen concentrate.	50	1 cup
CEREAL AND BAKERY PRODUCTS:		
Spanish rice	60	1 cup
Pie, strawberry	50	4¾-inch sector

[8] See footnote 14, table 1 (p. 45).

MISCELLANEOUS:

Orange juice, from dehydrated crystals.	180	1 cup
Grapefruit juice, from dehydrated crystals.	150	1 cup
Cranberry juice cocktail	70	1 cup
Grape juice drink, canned.	70	1 cup
Orange-apricot juice drink.	70	1 cup
Pineapple-orange juice drink.	70	1 cup
Pineapple-grapefruit juice drink.	70	1 cup

THIAMIN

Food	*Percentage of U.S. RDA*	*Amount of food*
MEAT AND MEAT ALTERNATES:		
Sunflower seeds	190	1 cup
Pork, loin, chopped, lean	100	1 cup
Brazilnuts, shelled	90	1 cup
Pork, fresh or cured, ham or shoulder, chopped, lean.	60	1 cup
Pork, loin, sliced, lean only.	60	3 ounces
Pecans, halves	60	1 cup
Pork, loin, sliced, lean and fat.	50	3 ounces
Pork, loin chop, lean and fat.	50	2.7 ounces
Pork, fresh or cured, ham or shoulder, ground, lean.	45	1 cup
Pork, loin chop, lean	40	2 ounces
Cashew nuts, whole kernels, roasted.	40	1 cup
Filberts, whole kernels, shelled.	40	1 cup
Pork, fresh or cured, ham or shoulder, sliced, lean.	35	3 ounces
Pork, cured, shoulder, sliced, lean and fat.	30	3 ounces
Pork, fresh, ham or shoulder, sliced, lean and fat.	30	3 ounces
Kidney, beef	30	3 ounces
Peanuts	30	1 cup
Pork, cured, ham, sliced, lean and fat.	25	3 ounces
Spareribs	25	3 ounces
Spaghetti (enriched) with cheese, canned.	25	1 cup
Cowpeas, dry, cooked	25	1 cup
Soybeans, dry, cooked	25	1 cup
Almonds, whole, shelled	25	1 cup
Chestnuts, shelled	25	1 cup
Pumpkin kernels	25	1 cup
Walnuts, English, chopped.	25	1 cup
Liver, hog	20	3 ounces
Beef potpie, home-prepared from enriched flour.	20	⅓ of 9-inch pie
Chicken or turkey potpie, home-prepared from enriched flour.	20	⅓ of 9-inch pie
Chop suey, with beef and pork, home recipe.	20	1 cup
Beans, navy (pea), dry, cooked.	20	1 cup
Peas, split, dry, cooked	20	1 cup
Walnuts, black, chopped	20	1 cup
Bacon, Canadian	15	1 slice
Lamb, leg or shoulder, chopped, lean.	15	1 cup
Heart, beef, sliced	15	3 ounces
Liver, calf or beef	15	3 ounces
Polish sausage	15	2.4-ounce link
Pork sausage	15	1-ounce patties or 2 links
Crab, deviled	15	1 cup
Lobster salad	15	A salad[1]
Macaroni (enriched) and cheese, home recipe.	15	1 cup
Spaghetti (enriched) with cheese, home recipe.	15	1 cup
Spaghetti (enriched) with meatballs, home recipe.	15	1 cup
Beans, canned, with pork and tomato sauce.	15	1 cup
Beans, lima, Great Northern, or kidney, dry, cooked.	15	1 cup
VEGETABLES AND FRUIT:		
Cowpeas, cooked	35	1 cup
Peas, green, cooked	30	1 cup
Peas and carrots, cooked	20	1 cup
Beans, lima, fresh, cooked.	20	1 cup
Asparagus, pieces, cooked.	15	1 cup
Collards, cooked	15	1 cup
Cowpeas, canned, solids and liquid.	15	1 cup
Okra, sliced, cooked	15	1 cup
Soybeans, sprouted seeds, raw or cooked.	15	1 cup
Turnip greens, cooked	15	1 cup
Vegetables, mixed, cooked.	15	1 cup
Potato salad, with cooked salad dressing.	15	1 cup

[1] See footnote 14, table 1 (p. 45).

Orange juice, fresh or from unsweetened frozen or canned concentrate.	15	1 cup
Pineapple, canned, water or sirup pack.	15	1 cup
Pineapple, frozen, sweetened.	15	1 cup
CEREAL AND BAKERY PRODUCTS:		
Hoagie roll, enriched	35	11½-inch-long roll
Cereal, ready-to-eat (check label).	25	1 ounce
Hard roll, enriched	15	1 roll (1.8 ounces)
Spoonbread	15	1 cup
Oatmeal, cooked	15	1 cup
Oat and wheat cereal, cooked.	15	1 cup
Macaroni, enriched, cooked.	15	1 cup
Noodles, enriched, cooked.	15	1 cup
Spaghetti, enriched, cooked.	15	1 cup
Rice, white, enriched, cooked.	15	1 cup
Gingerbread, with enriched flour.	15	⅙ of 9-inch-square cake
Pie, pecan	15	4¾-inch sector
MISCELLANEOUS:		
Orange juice, from dehydrated crystals.	15	1 cup
Soup, split pea	15	1 cup
Bread pudding, with enriched bread.	15	1 cup

RIBOFLAVIN

Food	*Percentage of U.S. RDA*	*Amount of food*
MILK AND MILK PRODUCTS:		
Cheese, cottage	35	1 cup
Milk, partially skimmed	30	1 cup
Malted beverage	30	1 cup
Custard, baked	30	1 cup
Milk, whole or skim	25	1 cup
Milk, nonfat dry, reconstituted.	25	1 cup
Buttermilk	25	1 cup
Chocolate drink	25	1 cup
Cocoa	25	1 cup
Ice milk, soft-serve	25	1 cup
Pudding, from mixes, with milk.	25	1 cup
Pudding, vanilla, home recipe.	25	1 cup
Rennin desserts	25	1 cup
Yogurt	25	1 cup
Ice cream, soft-serve	20	1 cup
Pudding, chocolate, home recipe.	20	1 cup
Tapioca cream	20	1 cup
MEAT AND MEAT ALTERNATES:		
Kidney, beef	240	3 ounces
Liver, hog	220	3 ounces
Liver, beef or calf	210	3 ounces
Almonds, whole	80	1 cup
Fish loaf	60	4⅛ x 2½ x 1-inch slice
Heart, beef, sliced	60	3 ounces
Almonds, sliced	50	1 cup
Liver, chicken	40	1 ounce
Beef, dried, chipped, creamed.	30	1 cup
Welsh rarebit	30	1 cup
Lamb, leg or shoulder, chopped, lean.	25	1 cup
Pork, fresh, ham or loin, chopped, lean.	25	1 cup
Veal, stewed or roasted, chopped.	25	1 cup
Braunschweiger	25	1 ounce
Chicken a la king, home recipe.	25	1 cup
Macaroni (enriched) and cheese, home recipe.	25	1 cup
Beef, chuck or rump, chopped, lean.	20	1 cup
Lamb, leg or shoulder, chopped, lean and fat.	20	1 cup
Pork, cured, ham or shoulder, chopped, lean.	20	1 cup
Pork, fresh, shoulder, chopped.	20	1 cup
Pork, fresh, ham or shoulder, ground, lean.	20	1 cup
Veal, loin, chopped	20	1 cup
Veal, rib, ground	20	1 cup
Turkey, dark meat, chopped.	20	1 cup
Chicken or turkey potpie, home-prepared from enriched flour.	30	⅓ of 9-inch pie
Chop suey with beef and pork, home recipe.	20	1 cup
Pepper, stuffed	20	1 pepper (6.5 ounces)
Spaghetti (enriched) with meatballs, home recipe.	20	1 cup
VEGETABLES AND FRUIT:		
Broccoli, cooked	20	Medium stalk
Broccoli, cut, cooked	20	1 cup
Corn pudding	20	1 cup
Collards, cooked	20	1 cup
Turnip greens, cooked	20	1 cup
Avocado, Florida, raw	20	½ fruit

Avocado, Florida or California, raw, cubed.	20	1 cup
CEREAL AND BAKERY PRODUCTS:		
Cereals, ready-to-eat (check label).	25	1 ounce
Spoonbread	25	1 cup
Hoagie roll, enriched	20	11½-inch-long roll
MISCELLANEOUS:		
Bread pudding, with enriched bread.	35	1 cup
Oyster stew, home recipe.	25	1 cup
Rice pudding	20	1 cup
Soup, cream of mushroom, with milk.	20	1 cup

NIACIN

Food	*Percentage of U.S. RDA*	*Amount of food*
MEAT AND MEAT ALTERNATES:		
Peanuts	120	1 cup
Liver, hog	100	3 ounces
Chicken, light meat, chopped.	80	1 cup
Turkey, light meat, chopped.	80	1 cup
Liver, calf or beef	70	3 ounces
Chicken, breast	60	½ breast (3.3 ounces)
Chicken, stewed, dark meat, chopped.	60	1 cup
Veal rib, chopped	60	1 cup
Tuna, canned in water	60	3 ounces
Chicken, roasted, light meat, sliced.	50	3 ounces
Turkey, canned	50	1 cup
Rabbit, domesticated	50	3 ounces
Tuna, canned in oil, drained.	50	3 ounces
Tuna salad	50	1 cup
Lamb, leg, chopped, lean.	45	1 cup
Kidney, beef	45	3 ounces
Pork, loin, chopped, lean.	45	1 cup
Veal, stewed, chopped	45	1 cup
Veal, rib, ground	45	1 cup
Chicken, canned	45	1 cup
Chicken, stewed, light meat, sliced.	45	3 ounces
Turkey, light meat, sliced.	45	3 ounces
Swordfish, broiled	45	3 ounces
Chicken, broiled	40	3 ounces
Goose	40	3 ounces
Lamb, shoulder, chopped, lean.	40	1 cup
Pork, fresh, ham, chopped, lean.	40	1 cup
Veal, loin, chopped	40	1 cup
Turkey potpie, home-prepared from enriched flour.	40	⅓ of 9-inch pie
Salmon steak, broiled or baked.	40	3 ounces
Sunflower seeds	40	1 cup
Beef, rump, chopped, lean.	35	1 cup
Pork, fresh or cured, shoulder, chopped, lean.	35	1 cup
Veal, rib, sliced	35	3 ounces
Heart, beef, sliced	35	3 ounces
Chicken, stewed, dark meat, sliced.	35	3 ounces
Chicken, roasted, dark meat, chopped.	35	1 cup
Halibut, broiled	35	3 ounces
Mackerel, broiled	35	3 ounces
Rockfish, oven-steamed	35	3 ounces
Shad, baked	35	3 ounces
Beef, chuck, chopped	30	1 cup
Beef, rump, ground, lean.	30	1 cup
Pork, cured, ham, chopped, lean.	30	1 cup
Pork, cured, shoulder, ground, lean.	30	1 cup
Pork, loin, sliced, lean	30	3 ounces
Chicken fricassee, home recipe.	30	1 cup
Turkey, dark meat, chopped.	30	1 cup
Salmon, pink, canned	30	3 ounces
Beef potpie, home-prepared from enriched flour.	30	⅓ of 9-inch pie
Beef, chuck, ground, lean.	25	1 cup
Beef, steak (club, porterhouse, T-bone, or sirloin), lean.	25	3 ounces
Beef, steak (round)	25	3 ounces
Ground beef	25	3 ounces
Lamb, leg, sliced	25	3 ounces
Lamb, loin chop, lean and fat.	25	3.5 ounces
Lamb, shoulder, sliced, lean.	25	3 ounces
Pork, cured, ham, ground, lean.	25	3 ounces
Pork, fresh, ham, sliced, lean.	25	3 ounces
Pork, loin chop, lean and fat.	25	2.7 ounces
Pork, loin, sliced, lean and fat.	25	3 ounces
Veal, stewed, sliced	25	3 ounces
Veal, loin or cutlet	25	3 ounces
Chicken, roasted, dark meat, sliced.	25	3 ounces
Chicken a la king, home recipe.	25	1 cup
Chicken potpie, home-prepared from enriched flour.	25	⅓ of 9-inch pie
Salmon, red, canned	25	3 ounces

Salmon rice loaf	25	6-ounce piece
Sardines, canned, drained.	25	3 ounces
Beef and vegetable stew, home recipe.	25	1 cup
Chop suey, with beef and pork, home recipe.	25	1 cup
Corned beef hash, canned.	25	1 cup
Peppers, stuffed	25	1 pepper (6.5 ounces)
Spaghetti (enriched) with cheese, canned.	25	1 cup
Beef, chuck, sliced	20	3 ounces
Beef, rump, sliced	20	3 ounces
Beef, rib, sliced, lean and fat.	20	3 ounces
Beef, flank steak	20	3 ounces
Beef, plate, lean	20	3 ounces
Beef, steak (club, porterhouse, T-bone, or sirloin), lean and fat.	20	3 ounces
Lamb, rib chop, lean and fat.	20	3.2 ounces
Lamb, loin chop, lean	20	2.3 ounces
Lamb, shoulder, sliced, lean and fat.	20	3 ounces
Pork, cured, ham, sliced, lean.	20	3 ounces
Pork, fresh, ham, sliced, lean and fat.	20	3 ounces
Pork, fresh or cured, shoulder, sliced.	20	3 ounces
Pork, loin chop, lean	20	2 ounces
Chicken, thigh	20	2.3-ounce piece
Turkey, dark meat, sliced.	20	3 ounces
Chicken and noodles, home recipe.	20	1 cup
Chow mein, home recipe	20	1 cup
Spaghetti (enriched) with meatballs, home recipe.	20	1 cup
Lobster salad	20	A salad[1]
Lobster Newburg	20	1 cup
Crab, deviled	20	1 cup
VEGETABLES AND FRUITS:		
Dates, pitted, chopped	20	1 cup
Peaches, dried, cooked, unsweetened.	20	1 cup
Peas, green, cooked	20	1 cup
CEREAL AND BAKERY PRODUCTS:		
Hoagie roll, enriched	25	11½-inch-long roll
Cereals, ready-to-eat (check label).	20	1 ounce

[1] See footnote 16, table 1 (p. 45).

CALCIUM

Food	Percentage of U.S. RDA	Amount of food
MILK AND MILK PRODUCTS:		
Cheese, Parmesan, grated.	40	1 ounce
Milk, partially skimmed	35	1 cup
Pudding, uncooked, from mix.	35	1 cup
Milk, whole or skim	30	1 cup
Milk, nonfat dry, reconstituted.	30	1 cup
Buttermilk	30	1 cup
Chocolate drink, made from whole milk.	30	1 cup
Cocoa	30	1 cup
Malted beverage	30	1 cup
Custard, baked	30	1 cup
Pudding, vanilla, home recipe.	30	1 cup
Rennin desserts	30	1 cup
Yogurt, made from partially skimmed milk.	30	1 cup
Chocolate drink, made from skim milk.	25	1 cup
Cheese, cottage, creamed	25	1 cup
Cheese, Swiss	25	1 ounce
Yogurt, made from whole milk.	25	1 cup
Ice cream or ice milk, soft-serve.	25	1 cup
Pudding, cooked, from mix, with milk.	25	1 cup
Pudding, chocolate, home recipe.	25	1 cup
Cheese, American, process.	20	1 ounce
Cheese, Cheddar, natural	20	1 ounce
Cheese, cottage, uncreamed.	20	1 cup
Ice cream or ice milk, hardened.	20	1 cup
MEAT AND MEAT ALTERNATES:		
Welsh rarebit	60	1 cup
Sardines, canned, drained.	35	3 ounces
Macaroni (enriched) and cheese, home recipe.	35	1 cup
Potatoes au gratin	30	1 cup
Beef, dried, chipped, creamed.	25	1 cup
Cheese souffle	20	1 cup
Lobster Newburg	20	1 cup
Macaroni (enriched) and cheese, canned.	20	1 cup
VEGETABLES AND FRUIT:		
Collards, cooked	35	1 cup
Cabbage, spoon, cooked	25	1 cup
Spinach, canned	25	1 cup
Turnip greens	25	1 cup
Kale, cooked	20	1 cup

Mustard greens, cooked	20	1 cup
Rhubarb, cooked	20	1 cup
CEREAL AND BAKERY PRODUCTS:		
Spoonbread	25	1 cup
Farina, enriched, instant	20	1 cup
MISCELLANEOUS:		
Bread pudding	30	1 cup
Oyster stew, home recipe	30	1 cup
Rice pudding	25	1 cup
Soup, with milk:		
Green pea	20	1 cup
Cream of celery	20	1 cup
Cream of mushroom	20	1 cup
Cream of asparagus	20	1 cup

IRON

Food	*Percentage of U.S. RDA*	*Amount of food*
MEAT AND MEAT ALTERNATES:		
Liver, hog	140	3 ounces
Pumpkin kernels	90	1 cup
Liver, calf	70	3 ounces
Kidney, beef	60	3 ounces
Sunflower seeds	60	1 cup
Liver, beef	40	3 ounces
Walnuts, black, chopped	40	1 cup
Clams, canned, drained, chopped.	35	1 cup
Beans, lima, dry, cooked	35	1 cup
Beans, with pork and sweet sauce, canned.	35	1 cup
Almonds, whole, shelled	35	1 cup
Beef, chuck or rump, chopped, lean.	30	1 cup
Pork, cured, shoulder, chopped, lean.	30	1 cup
Pork, fresh, ham or loin, chopped, lean.	30	1 cup
Heart, beef, sliced	30	3 ounces
Clams, raw	30	4 or 5 clams
Beef potpie, home-prepared from enriched flour.	30	⅓ of 9-inch pie
Beans, navy (pea), dry, cooked.	30	1 cup
Beans, white, dry, canned, solids and liquid.	30	1 cup
Cashew nuts, whole kernels, roasted.	30	1 cup
Beef, chuck or rump, ground, lean.	25	1 cup
Pork, cured, ham, chopped, lean.	25	1 cup
Pork, fresh, shoulder, chopped.	25	1 cup
Pork, fresh, ham, ground, lean.	25	1 cup
Veal, chopped	25	1 cup
Chicken or turkey potpie, home-prepared from enriched flour.	25	⅓ of 9-inch pie
Chile con carne with beans, canned.	25	1 cup
Chop suey, with beef and pork, home recipe.	25	1 cup
Corned beef hash, canned.	25	1 cup
Beans, Great Northern or red kidney, dry, cooked.	25	1 cup
Beans, red kidney, dry, canned, solids and liquid.	25	1 cup
Lentils, dry, cooked	25	1 cup
Soybeans, dry, cooked	25	1 cup
Beans, with frankfurters, canned.	25	1 cup
Beans, with pork and tomato sauce, canned.	25	1 cup
Beef, chuck, sliced, lean	20	3 ounces
Beef, flank steak	20	3 ounces
Beef, plate, lean	20	3 ounces
Beef, steak, sirloin, lean	20	3 ounces
Pork, cured, ham or shoulder, ground, lean.	20	1 cup
Pork, fresh, shoulder, ground, lean.	20	1 cup
Pork, fresh, ham, sliced, lean.	20	3 ounces
Pork, loin, sliced, lean	20	3 ounces
Turkey, dark meat, chopped.	20	1 cup
Veal, rib, ground	20	1 cup
Peppers, stuffed	20	1 pepper (6.5 ounces)
Spaghetti (enriched) in tomato sauce, with meatballs; canned or home-prepared.	20	1 cup
Cowpeas, dry, cooked	20	1 cup
Peas, split, dry, cooked	20	1 cup
Beef, chuck, lean and fat, sliced.	15	3 ounces
Beef, corned	15	3 ounces
Beef, plate, lean and fat	15	3 ounces
Beef, rump, sliced	15	3 ounces
Beef, rib, sliced, lean	15	3 ounces
Beef, steak (round)	15	3 ounces
Beef, steak (club, porterhouse, or T-bone), lean.	15	3 ounces
Beef, steak (sirloin), lean and fat.	15	3 ounces
Ground beef	15	3 ounces
Lamb, shoulder, chopped, lean.	15	1 cup
Lamb, leg, chopped	15	1 cup
Pork, cured, shoulder, sliced.	15	3 ounces
Pork, cured, ham, sliced, lean.	15	3 ounces

Pork, fresh, loin or ham, sliced, lean and fat.	15	3 ounces
Pork, loin chop, lean and fat.	15	2.7 ounces
Pork, fresh, shoulder, sliced.	15	3 ounces
Veal, sliced	15	3 ounces
Veal, cutlet or loin	15	3 ounces
Beef and vegetable stew, home recipe.	15	1 cup
Chicken, dark meat, chopped.	15	1 cup
Chicken, canned	15	1 cup
Spaghetti (enriched) with tomato sauce and cheese, canned.	15	1 cup
Turkey, canned	15	1 cup
Chow mein, chicken, home recipe.	15	1 cup
Chicken a la king, home recipe.	15	1 cup
Crab, deviled	15	1 cup
Sardines, canned	15	3 ounces
Shrimp, canned	15	3 ounces
Lobster salad	15	A salad[9]
Tuna salad	15	1 cup
VEGETABLES AND FRUIT:		
Peaches, dried, uncooked	60	1 cup
Prune juice, canned	60	1 cup
Dates, pitted, chopped	30	1 cup
Raisins, seedless	30	1 cup
Spinach, canned	30	1 cup
Asparagus, pieces, canned.	25	1 cup
Beans, lima, canned	25	1 cup
Beans, lima, fresh or frozen, baby, cooked.	25	1 cup
Apricots, dried, cooked	25	1 cup
Peaches, dried, cooked	25	1 cup
Cowpeas, cooked	20	1 cup
Cowpeas, canned, solids and liquid.	20	1 cup
Peas, green, canned	20	1 cup
Spinach, cooked	20	1 cup
Turnip greens, canned, solids and liquid.	20	1 cup
Prunes, dried, cooked	20	1 cup
Beans, lima, Fordhook, cooked.	15	1 cup
Beet greens, cooked	15	1 cup
Chard, Swiss, cooked	15	1 cup
Mustard greens, fresh or frozen, cooked.	15	1 cup
Peas, green, cooked	15	1 cup
Sauerkraut juice	15	1 cup
Vegetables, mixed, cooked.	15	1 cup
Boysenberries, canned	15	1 cup
Plums, canned, water or sirup pack.	15	1 cup
Prunes, dried, uncooked	15	10 prunes
CEREAL AND BAKERY PRODUCTS:		
Farina, instant, enriched, cooked.	90	1 cup
Farina, regular and quick-cooking, enriched, cooked.	70	1 cup
Hoagie roll, enriched	40	11½-inch-long roll
Cereals, ready-to-eat (check label).	20	1 ounce
Cottage pudding with enriched flour and chocolate sauce.	20	⅙ of 8-inch-square cake
Gingerbread, with enriched flour.	20	⅙ of 9-inch-square cake
Pie, pecan	20	4¾-inch sector
Coffeecake, with enriched flour.	15	2.5-ounce piece
Cottage pudding, with enriched flour and strawberry sauce.	15	⅙ of 8-inch-square cake
Hard roll, enriched	15	1 roll (1.8 ounces)
Spoonbread	15	1 cup
MISCELLANEOUS:		
Bread pudding, with raisins and enriched bread.	20	1 cup
Oyster stew, home recipe	20	1 cup
Molasses, blackstrap	20	1 tablespoon
Apple brown betty, with enriched bread.	15	1 cup
Sirup, sorghum	15	1 tablespoon

[9] See footnote 14, table 1 (p. 45).

MORE INFORMATION FROM THE U.S. DEPARTMENT OF AGRICULTURE

A number of other publications of the U.S. Department of Agriculture give information about nutrients and the nutritive value of foods. Single copies of the following publications are available free from the Office of Communication, U.S. Department of Agriculture, Washington, D.C. 20250. Send your request on a postcard and include your ZIP Code.

L 424, "Food for Fitness: A Daily Food Guide."
HG 1, "Family Fare: A Guide to Good Nutrition."
HG 74, "Food and Your Weight."
HG 90, "Conserving the Nutritive Values in Foods."

The following publications are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC. 20402.

HG 72, "Nutritive Value of Foods." 85 cents.
AB 364, "Calories and Weight: The USDA Pocket Guide." $1.00.
AH 8, "Composition of Foods . . . Raw, Processed, Prepared." $2.85.

The NUTRIMETER, a device for totaling the number of calories and the percentages of the U.S. Recommended Daily Allowances obtained from a day's food, is also for sale by the Superintendent of Documents.

INFORMATION FROM THE U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

The Food and Drug Administration of the Department of Health, Education, and Welfare has several publications about the nutrition labeling program.

Single copies of the following publications are available free from the Food and Drug Administration, 5600 Fishers Lane, Rockville, Md. 20852.

"Metric Measures of Nutrition Labels."
"Nutrition Labeling—Terms You Should Know."
"Nutrition Labels and the U.S. RDA."
"Read the Label, Set a Better Table."
"The New Look in Food Labels."

Two pamphlets are available for 25 cents each from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

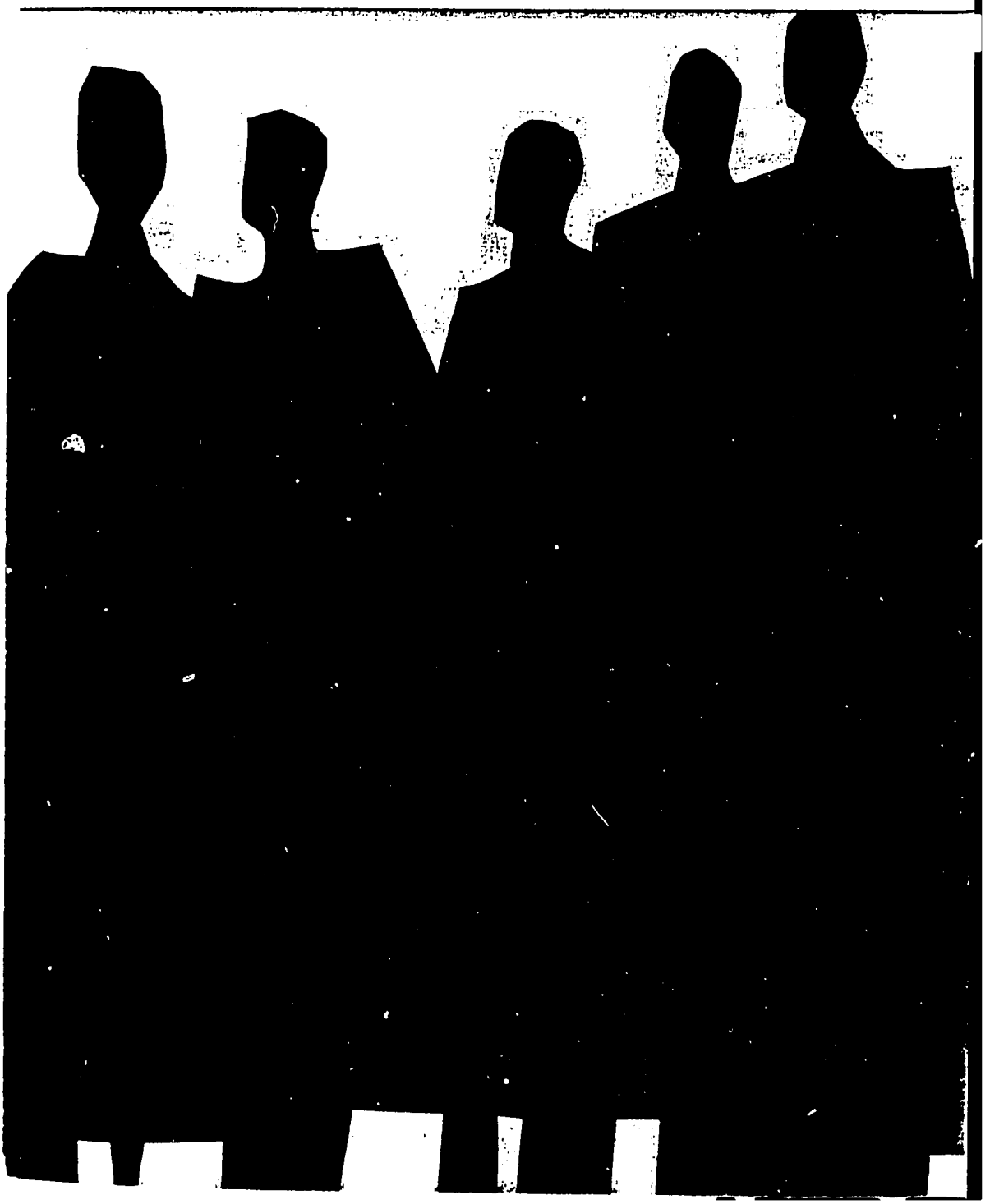
"We Want You to Know About Labels on Food."
"We Want You To Know About Nutrition Labels on Food."

☆ U.S. GOVERNMENT PRINTING OFFICE: 1975 O—561-962

Malnourished People
a policy view

Poverty and Basic Needs Series
June 1981

Alan Berg



This is one of a series of booklets prepared by the staff of the World Bank on the subject of basic needs. The series includes general studies that explore the concept of basic needs, country case studies, and sectoral studies. The work by the Bank staff on basic needs was coordinated by the Policy Planning and Program Review Department.

This study was prepared by Alan Berg, with background papers or other assistance from Paul Isenman
and Shlomo Reutlinger
of the World Bank staff and
Harold Alderman
James Austin
Doris Calloway
Sol Chafkin
Davidson Gwatkin
Per Pinstrup-Andersen
C. Peter Timmer
Janet Wilcox
Christine Woods
and Joe Wray, consultants.
The views and interpretations expressed are those of the author and should not be attributed to the World Bank, to its affiliated organizations, or to anyone acting in their behalf.

Preface

Despite the impressive level of economic growth the developing world has achieved over the past quarter century, some 800 million individuals there remain caught up in absolute poverty: a condition of life so limited by malnutrition, disease, illiteracy, low life expectancy, and high infant mortality as to be beneath any rational definition of human decency.

The self-perpetuating plight of the absolute poor has tended to cut them off from the economic progress that has taken place elsewhere in their own societies. They have remained largely outside the entire development effort, able neither to contribute much to it, nor to benefit fairly from it.

Unless specific efforts are made to bring them into the development process, no feasible degree of traditional welfare, or simple redistribution of already inadequate national income, can fundamentally alter the circumstances that impoverish them.

The only practical hope, then, of reducing absolute poverty is to assist the poor to become more productive. The World Bank has put a major emphasis on that strategy in its lending operations over the last several years: projects specifically designed to enhance the earning power of the poor.

A critical component of that approach is for governments of developing countries to provide better access for the absolute poor in their societies to essential public services, particularly basic education, primary health care, and clean water. These fundamental services—combined with the better shelter and nutrition that improved incomes can afford—are the key to the poor's being able to meet their own basic needs.

None of this can be achieved, of course, except in a climate of economic growth. But growth alone—essential as it is—cannot assist the poor unless it reaches the poor. And it does not reach the poor well enough today in much of the developing world. It all too often passes them by.

In this situation the right kind of public services are those which not only reach the poor, but help them alter their personal circumstances so that their own inherent potential can be more fully realized.

What the Bank's experience clearly demonstrates is that investment in the absolute poor's human development is not merely more equitable social policy, but very sound economics as well.

Robert S. McNamara

Contents

Chapter

1. **The Need for Nutrition Actions** 1

2. **The Many Facets of the Nutrition Problem** 5
   - Energy Standards 8
   - Consequences of Inadequate Intake 9
   - Costs in Mental Development 10
   - Costs in Resistance to Disease 12
   - Costs in Infant Development 13
   - Costs in National Development 14

3. **The Short-run Inadequacy of the Growth Process** 16
   - Projected Changes through the Growth Process 18
   - The Time That Elimination of the Deficit Would Require 20
   - The Nutritional Impact of Income Redistribution with Growth 23

4. **The Range of Possible Actions** 25
   - Selection of Actions 25
   - Whose Basic Needs? 27
   - Costs 27

5. **Promising New Avenues of Intervention: Nutrition-oriented Food Policies** 29
   - Primary Considerations for Nutrition-oriented Food Policies 30
   - Agricultural Production and Nutrition 31
   - Food Distribution and Subsidy Programs 34

6. **Putting New Approaches to Work** 47
   - Priorities 48
   - Nutrition in Agriculture 50
   - Nutrition in Health 51
   - Implications for Development-Assistance Agencies 51

Works on Nutrition and Related Subjects by Members of the World Bank Staff and Consultants 53

Appendix

A. **Commodity-specific Orientation to a Nutrition-related Food Policy** 57
   - The Policy Dilemma 57
   - The Experience of Indonesia 58
   - The Effects of Price Changes on Consumption 61

B. Statistical Evidence as to the Effects of Energy Deficiency 64
Life Expectancy 68
Child Mortality 69
Infant Mortality 70
Definitions and Sources of Data 71

C. Can Nutrition Efforts Make a Difference? 73
The Effect of the Experimental Projects on Infant and Child Mortality, Physical Growth, and Fertility 81
Factors Contributing to the Effectiveness of Projects 85
Implications for Future Efforts 90

D. The Costs of Nutrition Programs 93

E. Dietary Measures and Standards 96

F. Equations 100

Table

1. Dietary Standards for Daily Nutritional Intake 6
2. Numbers and Percentages of the Populations of Five Selected Countries Whose Energy Intakes Are below Requirements, 1972–74 and Projected for 1995 17
3. Deficit of Calories in the Average Diet of the Undernourished Population and the Aggregate Calorie Deficit as Percentage of Total Calories Consumed in Five Selected Countries, 1972–74 and Projected for 1995 18
4. Levels and Growth Rates of the Supply of Food Energy Required if the Demand Is to Be Met, under Different Assumptions as to Future Incomes and Prices, in Selected Countries, 1972–74 and Projected for 1995 19
5. Number of Years Required for the Elimination of the Average Energy Deficit in the Lowest Decile of the Population in the Normal Course of Development, in Selected Countries 21
6. Estimated Percentage Change in the Share of the Population and in the Absolute Number of Persons Having Energy-deficient Diets, by Region, between 1964–66 and 1972–74 21
7. Rates of Growth in Income per Capita Required for the Elimination of the Average Energy Deficit in All Deciles of the Population within Twenty Years, in Selected Countries 23

A.1 Elasticity of Income for Starchy Staple Calories in Indonesia 61

B.1 Data from Thirty-nine Countries concerning Parameters Related to Nutrition, Mid 1960s 64

B.2 Simple Correlation Matrix of the Principal Variables Based on Data from Thirty-nine Developing Countries 69

B.3 Simple Correlation Matrix of the Principal Variables Based on Data from Thirteen Countries in Latin America 70

C.1 Summary Results of Selected Field Projects in Nutrition and Health 74

Figure

1. Rates of Life Expectancy and Infant Mortality in Sri Lanka Compared to World Norms, by per Capita Income, 1975 37

E.1 Functional Deterioration 98

E.2 Dietary Standards for Protein, Vitamins, and Minerals 98

Notes 102

Chapter 1
The Need for Nutrition Actions

Nutrition is fundamental to life, work, and well-being. Inadequate nutrition—or malnutrition—is responsible for human and economic waste of consequential proportions. In developing societies, malnutrition plays a part in substantial numbers of deaths, and inadequate diet and related illness interfere with the learning ability, capacity to work, behavior, and well-being of large segments of the populations. The nutritional state of the populace both influences and reflects the level and pace of national development. Adequate nutrition therefore must be viewed not only as an objective but also as a means of economic development. And efforts to attack the problem of malnutrition must address the needs of people of all ages and both sexes—in contrast to the tendency of most national nutrition planning to focus almost exclusively on the needs of children and pregnant and lactating women.

It is now apparent that the dominant malnutrition problem in large populations is insufficient intake of food energy, or calories, which is related essentially to the problem of inadequate income. Steps to increase the per capita incomes of the poor—ranging from increased employment to reduced population growth—will have a fundamental and powerful effect on a country's nutritional status. In the long run, nutritional improvement will depend largely on national economic growth and the pattern of that growth. But for most of the world's malnourished, the growth process is too slow. Even under optimistic growth assumptions, national growth would take much more than a generation to push nutrition to adequate levels. The process is long because per capita incomes of the poor increase slowly and because their energy intake rises less than half as rapidly. People tend to spend proportionately less on food as their incomes rise and to consume more expensive, though more nutritious, foods such as fruits and milk. They tend also to switch from low-cost sources of energy to more expensive sources, even though those shifts—from coarse grains to polished rice, for example—may cause losses in nutritional value. Such shifts tend to occur even in low-income households where energy intakes are inadequate.[1]

Malnutrition in large populations has been measured primarily by comparing people's actual diets with what nutritionists regard as adequate diets. Opinions differ, however, as to what is adequate. The energy, or calorie, requirements established by the Food and Agriculture Organization of the

United Nations (FAO) and the World Health Organization (WHO) are considered by some to be too high. Others believe that while people can adjust their output of energy to accommodate lower intakes, this adjustment is part of the problem rather than its solution. The argument is moot, however, when the question becomes, How many more people die as the number adequately nourished declines? For this study, the effect of malnutrition on mortality was tested through multivariate analysis of data from thirty-nine countries.* The findings are striking. Energy deficiency is a key determinant of life expectancy, growth, and both infant and child mortality. More important for policy, the effects of energy deficiency cannot be explained away by inadequate income, health care, or education. Income is a primary determinant of energy (or calorie) deficiency, but energy deficiency is a better indicator than income of life expectancy, growth, and mortality, and it remains statistically important even after the influences of education and health programs have been controlled for. Even when famine is not a problem, inadequate energy intake has a significant effect on the death rate. Analysis of several estimates of mortality for 1978, a good crop year in most countries, suggests that malnutrition was a factor in the deaths of at least 10 million children.

A traditional response to the nutrition problem has been to grow more food. Increasing the food supply is fundamental to meeting the problem of inadequate nutrition, but the often impressive agricultural development of the past twenty years has demonstrated that it is not enough. At the height of India's Green Revolution, for example, while agricultural production in the Punjab became a model for that of the world, the poor nutritional status of the low-income population did not improve.[2] There is widening recognition that programs aimed at increasing the production of food, even if they are successful, must be accompanied by efforts designed to affect the distribution of income and patterns of diet.

The present world agricultural output per capita of grain alone could supply everyone with more than 3,000 calories and 65 grams of protein daily. If distribution of that production were ideal, nearly all the 500 million malnourished people in the world would be well nourished. Crude as the calculation is, the obvious disparity between reality and possibility justifies the search beyond agricultural science and production techniques for means of meeting basic needs for nutrition.

Solutions to the problem of malnutrition are not easy, and analysis suggests that responses must be more carefully differentiated by occupation and other characteristics of the malnourished than they have been. Small farmers can be helped by improving their production and their access to markets, and much attention is now justifiably given to them. An estimated 15 percent—$1.7 billion—of the World Bank's lending program in fiscal 1980 was directed toward small farmers. This represents half of all the Bank's lending to the agriculture sector, an increase of $1.0 billion in five years.

See Appendix B for a definition of the variables used and for the multiple regression results.

Unfortunately, even if the rural development effort to reach small farmers were to be completely successful, it would not solve the problems of the urban poor, the rural poor not engaged in farming, the landless agricultural laborers, and the unemployed. In most countries these groups constitute more than half the malnourished population—and in some countries considerably more than half. Their nutritional problems demand different programs.

The extent to which the nutritional needs of a country are being met is often related to social organization. Countries politically committed to eliminating most overt malnutrition seem to be capable of doing so. Generally, if the distribution of income in a country improves, so does its nutritional status. Some countries in which per capita incomes are high have considerable malnutrition and certain low-income countries have little. Yet even among countries that have similar political and economic systems, nutritional status seems to vary. In recent years many governments have become involved in nutrition, whether for reasons of distributive justice, economic gain, or political necessity. It appears that there are compelling reasons beyond equity and compassion to attend to basic needs in nutrition.

Almost all political and development policies and activities have an effect on nutrition. It is because development efforts are largely ineffective with respect to nutrition, however, that something special in this regard appears to be needed. The problem of the malnourished can be viewed as part of a complex tangle of poverty. But malnutrition is more than a poverty problem. While virtually all those who suffer from deficiencies of food energy, or calories, are poor, not all the poor suffer from energy deficiencies or any other nutritional deficiencies. Without in any way minimizing the importance and complexity of the fundamental causes of poverty—which take us back to the shortcomings of the development process and of economic, political, and social systems—overcoming these formidable problems for most countries is likely to be a slow process. The concern of this study is with actions that can lessen malnutrition within the present generation.

Efforts to improve nutrition are often regarded as a palliative rather than as a solution to basic needs—a repugnant form of government charity, or a political act to allay political unrest. They are attacked for distracting attention from the need to change a system that has failed and for diverting and wasting resources that could be used to bring about an equitable distribution of income and wealth and broader participation by the poor in policymaking and decisionmaking. Clearly, changes must be pursued, but to forgo nutrition programs while waiting for basic change to take place is to accept avoidable human waste, damage, and death.

There is a group of nutrition programs that are widely accepted and well documented. But certain important aspects of nutrition—for example, the effects, both positive and negative, of agricultural policies on nutritional status and the potential significance of large-scale consumer food subsidies— have been generally neglected. These sometimes contentious subjects must be addressed in a serious discussion of meeting basic needs. Nutrition policy and food policy are treated separately in most countries. Here the extent to which adequate nutrition depends on building considerations of nutrition into food policy is emphasized. Widely recognized programs such as nutrition education and institutional feeding and the concomitant problems of management and implementation are treated in a highly distilled form. The links between health and nutrition are treated briefly because health problems and approaches are well reviewed elsewhere.[3] Viewing nutritional problems from the perspective of health-delivery systems, moreover, invites solutions that are limited in both outreach and scope. The objective here is to consider broad approaches to the problem of reducing deficiencies among the widest number of malnourished persons.

Chapter 2
The Many Facets of the Nutrition Problem

The need for food is second only to the need for air and water. Nutrients are required for survival, for growth and reproduction, and for the capacity to work, to learn, and to function in society. More than forty dietary nutrients that the body cannot make are essential to these processes. They include the energy-yielding substances as a group—fats, starches, sugars, alcohol—and other substances usually referred to as the "essential nutrients"—nine amino acids that are the basic components of proteins, one fatty acid, at least nineteen or twenty minerals, many of which are needed only in very small amounts, and about thirteen vitamins. Standard international levels of intake have been established only for energy, protein, three of the minerals, and eight of the vitamins (see Table 1 and Appendix E).

People whose diets fall short of these levels suffer from *malnutrition*, which is defined rigorously as the pathological condition brought about by inadequacy (or excess) of one or more of the essential nutrients. *Undernutrition* is the term applied to conditions that are the result of eating inadequate amounts of food and, thus, an inadequate supply of calories or food energy. In common usage, *malnutrition* is applied to both. Thus it serves here to reflect the fact that when their intake of food is too low, people are undernourished, because their diets supply too little energy, and are almost surely malnourished as well, because some of the essential nutrients are missing from their diets.

Most nutritionists regard insufficient intake of calories, or food energy, as the most serious nutritional problem in the world today. Until the early 1970s, protein deficiency was held to be the greatest problem. But recent surveys and studies from several parts of the world indicate that efficient use of protein depends on an adequate intake of food energy. Only among groups whose dietary staples are cassava, yams, and plantains is the lack of protein the more serious problem; in those groups, an expanded intake of energy without an expanded intake of protein could lead to serious problems, particularly in the very young. Nutrition scientists still differ over the amount of protein required. The significance of an inadequate intake of calories, however, is widely accepted. Other widespread nutritional problems, of considerable importance in some regions, are iron-deficiency anemia, whose symptoms are physical and mental sluggishness, including a decline in physical performance; vitamin-A deficiency, which affects both the severity of infectious diseases, and vision and may lead to blindness; and iodine deficiency, which leads to goiter and, in severe cases, deaf-

Dietary Standards for Daily Nutritional Intake[a]

Age group	Body weight (kilograms)	Energy[b] (kilocalories)	Energy[b] (megajoules)	Protein[b] Egg or milk (grams)	Protein[b] Score 60[c] (grams)	Vitamin A[d,e] (micrograms)	Vitamin D[f,g] (micrograms)	Thiamine[d] (milligrams)
Children less than 1	7.3	820	3.4	14	23	300	10.0	0.3
1–3	13.4	1,360	5.7	16	27	250	10.0	0.5
4–6	20.2	1,830	7.6	20	34	300	10.0	0.7
7–9	28.1	2,190	9.2	25	41	400	2.5	0.9
Male adolescents								
10–12	36.9	2,600	10.9	30	50	575	2.5	1.0
13–15	51.3	2,900	12.1	37	62	725	2.5	1.2
16–19	62.9	3,070	12.8	38	63	750	2.5	1.2
Female adolescents								
10–12	38.0	2,350	9.8	29	48	575	2.5	0.9
13–15	49.9	2,490	10.4	31	52	725	2.5	1.0
16–19	54.4	2,310	9.7	30	50	750	2.5	0.9
Male adults (moderately active)	65.0	3,000	12.6	37	62	750	2.5	1.2
Female adults (moderately active)	55.0	2,200	9.2	29	48	750	2.5	0.9
Pregnant women (latter half of term)		+350	+1.5	38	63	750	10.0	+0.1
Lactating women (first 6 months)		+550	+2.3	46	76	1,200	10.0	+0.2

[a]Energy requirements are average requirements of moderately active persons; other values are recommended daily allowances and are intended to meet the requirements of 97.5 percent of the population.

[b]Energy and Protein Requirements, Report of a Joint FAO/WHO ad Hoc Expert Committee Rome, 22 March–2[illegible] April 1971, FAO Nutrition Meetings Report Series no. 52, WHO Technical Report Series no. 522 (Rome: Food and Agriculture Organization of the United Nations 1973).

[c]Scores are estimates of the quality of the protein usually consumed in relation to that of egg or milk; score 60 would represent a diet based primarily on cereals, roots, and tubers.

[d]Requirements of Vitamin A, Thiamine, Riboflavin, and Niacin, Report of a Joint FAO/WHO Expert Group, FAO Nutrition Meetings Report Series no. 41, WHO Technical Report Series no. 362 (Rome, 1967).

[e]As retinol.

[f]Requirements of Ascorbic Acid, Vitamin D, Vitamin B_{12}, Folate, and Iron, Report of a Joint FAO/WHO Expert Group, FAO Nutrition Report Series no. 47, WHO Technical Report Series no. 452 (Rome, 1970).

Table 1

Age group	Riboflavin[d] (milligrams)	Niacin[d] (milligrams)	Folacin[f] (micrograms)	Vitamin B_{12}[f] (micrograms)	Ascorbic acid[f] (milligrams)	Calcium[h] (grams)	Iron[f,i] (milligrams)	Zinc[f] (milligrams)
Children less than 1	0.5	5.4	60	0.3	20	0.5–0.6	5–10	3–12
1–3	0.8	9.0	100	0.9	20	0.4–0.5	5–10	4–16
4–6	1.1	12.1	100	1.5	20	0.4–0.5	5–10	4–16
7–9	1.3	14.5	100	1.5	20	0.4–0.5	5–10	4–16
Male adolescents								
10–12	1.6	17.2	100	2.0	20	0.6–0.7	5–10	7–28
13–15	1.7	19.1	200	2.0	30	0.6–0.7	9–18	7–28
16–19	1.8	20.3	200	2.0	30	0.5–0.6	5–9	7–28
Female adolescents								
10–12	1.4	15.5	100	2.0	20	0.6–0.7	5–10	7–26
13–15	1.5	16.4	200	2.0	30	0.6–0.7	12–24	6–22
16–19	1.4	15.2	200	2.0	30	0.5–0.6	14–28	6–22
Male adults (moderately active)	1.8	19.8	200	2.0	30	0.4–0.5	5–9	6–22
Female adults (moderately active)	1.3	14.5	200	2.0	30	0.4–0.5	14–28	6–22
Pregnant women (latter half of term)	[illegible]	12.3	400	3.0	30	1.0–1.2	k	8–30
Lactating women (first 6 months)	[illegible]	13.7	300	2.5	30	1.0–1.2	k	14–54

[illegible] established

[illegible] Requirements, Report of a Joint FAO/WHO Expert Group, FAO Nutrition Report Series no. 30, WHO Technical Report Series no. 230 (Rome, 1962).

[illegible] value applies when more than 25 percent of the energy in the diet comes from [illegible]; the higher value applies when animal foods represent less than 10 percent of the [illegible]

[illegible] figure is for diets containing generous amounts of animal foods and refined [illegible] absorption 40 percent—and the higher figure is for diets based on coarse cereals [illegible] absorption 10 percent.

[illegible] intakes of iron throughout life have been at the level recommended in this [illegible] of iron during pregnancy and lactation should be the same as that [illegible] of childbearing age who are not pregnant or lactating. For women [illegible] iron is not satisfactory at the beginning of pregnancy, the require- [illegible] on the extreme situation of women with no stores of iron, the require- [illegible] be met without supplementation.

mutism and cretinism. Which problem is of primary concern in a given population group differs with local circumstances. But caloric or energy deficiency is a significant factor in most countries and among all age groups. The food provided in programs designed to meet calorie deficiencies, moreover, commonly helps to meet deficiencies of other nutrients.

The amount of energy, or calories, that a person consumes affects his bodily processes (his basal metabolism), his physical activity, and his growth.* Energy is the only nutritional parameter regulated this way. Maintaining balance between energy expended and energy taken in thus constitutes the most basic nutritional requirement. When adults fail to meet their energy requirements, they use body tissue to make up the deficit and they lose weight. For those whose body weight is constant, the intake and output of energy are in balance. Even though that balance may be precarious, energy requirements of such persons are, by strict definition, being met; the quality both of their lives and of the society suffers, however.

When intake of nutrients is chronically low, all the body's adaptive mechanisms, both metabolic and behavioral, are fully activated to conserve the nutrients for their most critical functions. In this sense, diminished growth of children must be viewed as an adaptive physiological response to nutritional deficiency. Thus, judgments as to the adequacy of intake by children can be made only by comparing growth during a specified period to an accepted norm.†

Energy Standards

An Expert Committee convened by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) has defined the energy requirements of adults at various levels of physical activity, according to occupational category.‡ Generally, the physiological minimum amount of any nutrient required within any age and sex category to sustain essential functions is assumed to follow a normal pattern of distribution, but there is no evidence that this is true of all nutrients. Certainly, total energy requirements are not normally distributed. Among low-income segments of a population, for example, energy requirements may be less than the average for those who are urban unemployed and greater for those whose lot is hard physical labor.

Obviously there is a lower limit to the amount of energy a person must take in to care for his bodily functions and the minimum activity necessary for personal care.* If he must work, he will lose weight up to a certain limit.† Whenever possible, however, body weight is defended at the cost of reducing discretionary activity—that is, recreation and work that is not necessary to survival.

Standards established for the energy needs of children, like those for the needs of adults, are based on basal metabolism and physical activity, with an additional allowance for growth. The amount of energy needed for growth is quite small, about 2–3 percent of the total intake of a two-year-old child—about 30 calories of a required 1,360. Children whose energy intake is low become less active than they should be but continue to grow at expected rates if their intake is equal to about 70 percent of standard allowances. When their intake falls below this level, growth slows, and if low levels of feeding persist, their stature as adults is less than the genetic potential. Conversely, when intakes of food are generous, the rate of growth is accelerated, maturity is reached earlier, and adults are taller, as the progressive increase in the average height of adults in the lower socioeconomic groups in privileged societies demonstrates.[3]

One seeming peculiarity in the failure of children to grow is their inability in some instances to eat enough to meet standard requirements even though food is available in the household. Chronic infection, unpalatability or monotony of their food, reduced appetite, and the caloric density of the food may be at fault; some foods are so wet, starchy, and fibrous that under ordinary conditions children simply cannot take in enough to meet their needs. It is likely that a similar limitation exists for adults and that they require minimum amounts of fat or fatty foods if their intakes of energy are to reach standard levels.

Consequences of Inadequate Intake

If the productivity of low-income, inadequately fed workers is to be improved, their energy intake must be supplemented. Increased incomes and the market will generally, but not always, take care of that. Their

Activities of the internal organs, the nervous system, and resting muscle require energy; measured under defined conditions, the sum of these activities constitutes the basal metabolism, or, when expressed at the rate at which units of energy—calories or joules—are expended, the basal metabolic rate (BMR).

†*Ideally, these judgments would be based not only on height and weight but also on other attributes that are less readily measured.*

‡*These levels are for light activity or for persons who are moderately active, very active, or exceptionally active. The FAO/WHO category that coincides with the needs of most people in the developing societies is "moderately active": eight hours spent at work—in light industry, general farm work, fishing, general construction, work in the home without mechanical household appliances—four to six hours spent sitting or moving about in only light activity, and two hours of walking, active recreation, or nonoccupational work, plus eight hours of rest. For men who weigh sixty-five kilograms and for women who weigh fifty-five kilograms, that sort of life would require an average intake of 3,000 and 2,200 calories a day respectively. Habitual intakes below these levels would cause loss of body weight if a normal pattern of activity were maintained—as it must be to meet seasonal demands in agriculture, for example.*

The level of energy intake required to sustain essential functions is not the same for everyone, of course. Men's and women's needs differ because of differences in body size and composition and because of culture-related differences in what members of each sex are expected to do. Within age and sex groups there are also differences in requirements that are attributable to natural biological variability.[1]

It is now believed that this figure, for both adults and children, is about 1.5 times the basal metabolic rate, with a coefficient of variation of about 10 percent.

The amount of weight loss that can be tolerated depends on the amount of reserve body fat the person has. Persons who are well nourished but not obese can lose about 20–25 percent of body weight with seemingly full recovery on refeeding.[2]

incentives to increase their output will still be a matter of choice, of course.* Similarly, programs that are designed to increase the productivity of women and children—school or kitchen gardens, small-animal production projects, and so on—or to give them additional tasks—sanitation measures, for example, aimed at improving the living conditions and health of their families—must either provide additional food for the women and children or eliminate equivalent tasks on which their energy is now spent. Even where underused resources exist, communities and individuals will not develop if the people lack the food energy to put the resources to use, to interact, and to innovate.

There has been a continuing debate as to whether small size in itself is in any way disadvantageous. Where scarcity of food is the norm, might not the nutritional savings realized from being small be decisive for survival? These questions are difficult to answer because it is difficult to isolate the nutrition factor among the deprivations suffered by affected populations. Many studies have shown, however, that the decrease in growth, in both height and weight, associated with various degrees of malnutrition is accompanied by decreases in the circumference of the head, the size of the brain, and the number of brain cells, an alteration of the metabolism of the brain—amounts of important enzymes and neurotransmitters are decreased—and, even in less-than-severe cases, a lowering of scores on tests of cognitive and sensory ability.[5] With respect to cognitive ability it does appear that bigger is better, under conditions in which malnutrition and other hardships inhibit growth.

Costs in Mental Development

Early malnutrition affects different regions of the brain differently, depending on whether or not cell division is still actively taking place. But all regions suffer from the decreased cell division that accompanies malnutrition in the womb and in the first year of life. Thus, infants who succumb to marasmus—a severe wasting caused by lack of food energy—in their first year of life have smaller brains with fewer cells than normal; children who die of energy-protein malnutrition that occurs in their second year of life show little deficit in the number of brain cells, but they do show decreased brain weight.[6]

The chronology of the deficiency is important to the subsequent behavioral deficits. Marasmus usually occurs during the peak period of brain development and is reflected in long-term debilitation that limits the interaction of the child with his environment and in severe deficits is

*Workers given food supplements were found in one study to have gained weight rather than increasing their production or to have taken up more active recreational activities rather than cutting more sugarcane. If the incentive is great enough, as some wartime studies have shown, industrial production will be increased at the expense of body weight. But sustained industrial production, even in wartime, varies directly with the energy intake of workers.[4]

reflected in his intellectual development—his development quotient is one or two standard deviations below the mean for his population group.*

The later malnutrition occurs, the less it seems to damage cognitive function. Improvement has been seen in adaptive and motor behavior after treatment of children who experienced energy-protein malnutrition later than the first six months of life, but not in those afflicted at less than six months of age. Severe, short-term energy-protein malnutrition in the second year of life generally does not retard intellectual function permanently.[8]

The structural alterations and deficits in the brain and body caused by malnutrition may be manifested in functional disability, but malnutrition may also affect development less directly. Learning problems that begin with time lost because of illness go well beyond the first year. The apathy and reduced physical activity of the malnourished child diminish his interaction with the environment and deprive him of stimulating experiences and learning opportunities that may not come again.† These are likely to be consequences of moderate malnutrition, a condition that is much more prevalent than severe malnutrition but less often studied.‡ And because malnourished children usually come from families whose level of energy intake is low, they lack the stimulus of interaction with parents and siblings.§

Limitation of growth that leads to short adult stature may reduce physical ability as well as mental ability and thus limit the earnings of workers. A direct relation has been found between body size of adults of low to normal weight and height and the capacity to perform standard work tasks, as

*Children who have been rehabilitated after early severe malnutrition still show lags in development of motor activity, hearing, speech, social and personal behavior, problem-solving ability, coordination of eye and hand, and abstract thinking. And tracings of electrical activity of the brain reveal persistent abnormalities in response to visual and auditory stimuli. Irreversibly deficient intellectual development was evident in a group of South African children tested fifteen years after their treatment for severe marasmus in infancy. These children had decreased head circumference and faulty visual motor activity.[7]

†Studies made in Guatemala suggest that malnutrition decreases the capacity to assimilate information and that this decrease in attention span may persist in spite of rehabilitation and cause poor performance on intelligence tests.[9]

‡In an extensive logitudinal survey of nutrition and mental development in Guatemala it was found that even mild to moderate malnutrition, when it is chronic, affects cognitive development independent of other conditioning variables.[10] And an analysis of data in the U.S. National Health Examination Survey suggests that when family background and home environment variables are held constant, poor health and nutrition of American children have significant adverse effects on IQ and school achievement; the effects of low birth weight and poor nutritional status are especially important in low-income groups.[11]

§Failure of chronic underfeeding may keep a child from attaining his full potential, even if he is not severely malnourished as to warrant medical attention. There is evidence that improving the nutrition of women during pregnancy and lactation and that of their infants during the first few months of life is beneficial. In a study of rural Mexican communities, infants that received supplements attained higher scores on tests of mental development and activity than did infants from families that did not receive supplementary

measured by rate of heartbeat and use of oxygen.* The capacity for work has, in turn, been shown to be correlated with daily output of work of Colombian and Sudanese cane cutters. In a recent study of Guatemalan agricultural laborers it was found that taller workers cut more sugarcane at all ages than did shorter workers.[13] The output of men in light industry in India has been linked to body weight.[14]

Costs in Resistance to Disease

There has long been empirical evidence to suggest that malnutrition decreases resistance to disease. Persons who are malnourished seem more likely to contract infectious diseases, to suffer more severe cases, and to die more readily from disease than those who are well nourished. Infectious diseases, when they are associated with fever or diarrhea and with high worm loads—tapeworms, hookworms, and the like—increase energy requirements. Thus malnutrition and infection appear to act synergistically, each augmenting the pathological effects of the other.

Studies of patients in hospitals in developed countries show that those whose food intake is limited or who cannot absorb food adequately because of defects or injuries to the gastrointestinal tract become emaciated, are unable to respond adequately to challenges to the immune system, and frequently succumb to infection, even in clean environments. It is thus not surprising that undernourished children in unsanitary environments experience greater mortality and morbidity from infection than do well-nourished children. Not all immune responses are affected to the same extent. Indian children whose weights were 71–80 percent of the standard weights for their ages showed measurable deficiencies in one component of the immune system; those whose weights were 60–70 percent of standard showed deficiency in a second component as well, and it could be assumed that the risk of their contracting diseases to which they were exposed was greater. In a group of malnourished African children, immune responses returned to normal after rehabilitation with adequate feeding.[15]

The decreased ability of malnourished children to mount immune responses is an important factor in vaccination programs. The poor reactions to typhoid, diphtheria, influenza, and yellow fever vaccines that have been seen suggests that administration of vaccines, particularly those containing live attenuated viruses, may pose some additional risk to the malnourished.[16]

Serious diarrheal disease, which is closely linked to malnutrition, is the most common health problem among children in developing countries. Such ordinary childhood diseases as whooping cough and measles often push children across the margin into frank clinical states of malnutrition. In

*These comparisons are valid only for groups with similar patterns of habitual activity and other health conditions. Function of heart and lungs declines in sedentary persons, and in severe anemia the capacity of the blood to carry oxygen is not sufficient to maintain high levels of activity.

one study, measles was the precipitating cause in half the cases of children who were hospitalized for malnutrition. Malnutrition is also a contributory cause in a third to a half of the deaths from diseases among children less than five years old.[17]

Costs in Infant Development

There is extensive evidence of an association between malnutrition of pregnant women and low birth weight of their infants.* Supplementation of caloric intake during pregnancy does increase the weight of the infant at birth. This suggests that measures to improve nutrition of the fetus, and thus birth weight, might be more effective in reducing infant mortality and less costly than providing intensive medical care for the mass of underweight and premature babies born to undernourished women.[20]

Pregnant women who have suffered early malnutrition and enter pregnancy in a depleted state run high risks of miscarriage, premature delivery, and stillbirth. The demands of pregnancy and lactation impose a serious strain on their already deteriorated physical condition, and their increased body weight increases the amount of energy they need to do their work. The high incidence of nutrition-related disorders—edema, goiter, anemia, osteomalacia—and premature appearance of aging among women in developing countries indicate that the problems of mothers are serious.[21]

Until recently, it was generally thought that at least the quality of milk if not always the quantity remains adequate in a malnourished mother.* It has been found, however, that milk from malnourished mothers is low in vitamins, its fat content is below normal, and its protein content is at the lower limit of the normal range.[23]

*In a study made in the United States in 1969 a perinatal mortality rate of 12.4 per 1,000 live births was found among infants weighing 3,001–4,000 grams; the rate doubled when birth weights were 3,000 grams or less. Surveys show mean birth weights between 2,700 and 3,000 grams in developing countries, while in Western industrial nations the mean is 3,300 grams.[18] Small and immature babies have much lower potential for survival than those weighing about three kilograms and born at term. Low weight at birth has been found to be the main determinant of infant mortality when age, race, and socioeconomic conditions are considered. Infants of low birth weight are forty times as likely to die before they are a month old and five times as likely to die between the ages of one month and a year as infants of normal birth weight. There is also a high incidence of visual and hearing defects, cerebral palsy, and retardation among infants having low birth weights. In a comparison of neonatal mortality rates, infant mortality was higher in a Guatemalan Indian village than in a sample U.S. population, but differences proved to be slight when birth weight was taken into account.[19]

*It is generally agreed that a healthy, well-fed, lactating woman produces enough milk of good quality to meet the nutritional needs of a healthy infant during the first six months of life. If a woman's intake of energy is less than the sum of her own needs for metabolism and activity and the cost of lactation, then lactation will be maintained to some extent at the expense of her tissues. The malnourished woman's period of adequate lactation is shorter than that of others, and even in healthy women in developed countries, there is new evidence that low weights and low intakes of food are associated with poor lactation. There is also evidence that supplementing the diet of poorly nourished mothers increases the

Costs in National Development

Improved nutrition as a means of reducing deaths, lessening the severity of infections, and preventing various forms of retardation, blindness, anemia, and other malnutrition-related problems is, in itself, sufficient justification for investment in better nutrition. Adequate nutrition is now widely accepted as part of the purpose of development and need not be justified as a means to development. The case for investment in better nutrition, however, extends also to many of the processes that contribute to national growth.[24]

Productivity. Overcoming deficiencies in nutrition produces stronger, more energetic workers, reduces the number of work days lost because of illness, lengthens the working life span, and increases cognitive skills. The flow of earnings is thereby increased above what it would have been in the absence of improved nutrition and health.[25]

Education. Because malnutrition interferes with a child's motivation and his ability to concentrate and learn, it limits the potential returns on an investment in education. As if the malnourished child's listlessness and his mother's lethargy were not a sufficient disadvantage, the youngster often misses school because of his frequent bouts with nutrition-related illnesses.* Though nutritional improvement alone may not significantly improve the learning capacity of the disadvantaged child, there is little doubt that malnutrition contributes to poor performance, to low aspiration toward higher levels of education, and to the substantial rates of scholastic failure or dropout often found among the poorly fed.

Family Planning. In many poor areas, where large percentages of children die before reaching a productive age, uncertainty and the overcompensation that it induces have been found to be significant factors in the bearing of large families. Thus, reducing malnutrition, which is the prime contributor to child mortality, appears to be a necessary part of efforts to reduce birth rates. If a substantial further reduction of child mortality is a precondition of reducing the number of births desired, the sooner action is taken the better. The longer action is delayed, the larger will be the population base from which future generations will be reared.[26]

Redistribution of Income and Other Economic Benefits. Nutrition programs can be a direct and effective way of redistributing income. Most organized activities dealing with nutrition are of direct benefit to those in need, boosting both the health and the real incomes of the poor.† The large income earned by the well-nourished worker will improve the living standards and probably the future productivity of his dependents. And reducing the incidence of communicable diseases among the adequately nourished will bring economic benefits to others by reducing their exposure to disease.

Social Mobility. Changes in nutrition can also be expected to have some intangible effects. In societies that place a premium on social mobility, a strong obstacle to attainment of this goal may be the intellectual loss caused by malnutrition. A child's chances for advancement are greatly restricted if he is malnourished, no matter what else he may be offered by education or by other means designed by policymakers to facilitate upward movement within a society.

Well-being. In some ways the most important benefit of better nutrition is its contribution to human well-being. Even those who are economically very poor have the potential for enjoying a wide range of intangible benefits that are not quantifiable in the national accounts—nature, love, friends, the joy of children. Those who are apathetic and physically debilitated by frequent bouts with nutrition-related diarrhea and other ailments that accompany malnutrition, however, cannot enjoy these potential riches. It is well-being more than income that determines whether a person has the capacity to enjoy certain fundamental sources of satisfaction. It is not likely that in the near future many low-income countries can provide a very much wider range of material goods to those at the lower levels of income, but it may be within the power of public policy to improve the level of nutrition, which, in turn, can increase the capacity of a substantial part of the population to enjoy whatever sources of human satisfaction are available.

*In four Latin American countries, children missed more than an average of fifty school days a year because of illness; this constitutes as much as a third of the scheduled school days.

†Nutrition programs in Botswana can increase the income of the poorest 30 percent of the population by almost an eighth. Food programs in Lesotho can provide a family with as much income as a two acre farm.[27]

Chapter 3
The Short-run Inadequacy of the Growth Process

The traditional response to the problem of improving nutrition has been to focus on supply and thus to attempt to produce more food. As the low demand and low purchasing power among the poor and malnourished have been recognized, increased attention has also been given to the need for faster growth in the incomes of the poor. Bringing about growth in the incomes of the poor will depend not only on increasing the per capita amount of national income but also on the distribution of that income. The relative prices of staple foods, which are governed primarily by the rate at which the supply grows in relation to growth in the demand, are another important element of nutritional adequacy. And the relation of growth in intake of food to growth in incomes is yet another influential factor.

In five large countries where malnutrition is a problem, perhaps half the population cannot afford diets that contain an adequate amount of food energy. In India, Pakistan, Bangladesh, Brazil, and Morocco, the shortfall of calories in the daily diets of some people is as high as 40 percent.* But the quantity of food needed to eliminate the energy deficit in these countries is the equivalent of only about 8.5 percent of the calories in the existing food supply—approximately 17 million tons of food grain. Yet a 10 percent increase in the food supply of these countries clearly could not eliminate nutritional deprivation. In India, for example, a substantial amount of malnutrition persisted despite the unusually favorable harvests of the 1977–79 crop years.

Lowering the energy requirements on which these estimates are based would not alter the fact that access to food is the nub of the nutrition problem. Estimates of the number of persons subsisting on diets that contain less food energy than is adequate are, of course, highly sensitive to the requirement levels taken as the standard. Some experts suggest that estimates

*The period 1972–74 was the most recent three-year period for which FAO data were available at the time the analysis was performed. Per capita consumption during this period was virtually the same as that recently reported by the FAO for the nine-year average, 1969–77, in the five countries. The selection of countries was based on the availability of detailed data on food consumption by household in nationwide representative samples. The calculations and others that follow in this section were undertaken for this study by Shlomo Reutlinger and Harold Alderman.[1]

should be based on minimal requirements for survival—the level needed simply to maintain body composition and health—while others believe they should reflect what is necessary for functioning at a reasonable level.

The standard requirements established by the FAO and the WHO, on which the calculations in Tables 2 and 3 are based, are those for average persons, classified according to sex, age, and body weight, performing at a moderate level of activity, and, in the case of children, growing at a desirable rate. In many developing countries, the norm for work and leisure activities is below these levels. Indeed, large segments of the populations of some countries subsist on energy intakes lower than the FAO/WHO recommended levels without giving evidence of deterioration in body weight or showing visible signs of malnutrition. Since there is no clear agreement about how national estimates of energy needs should be made, the estimates used here may be seen as a general description of the relative size of

Table 2
Numbers and Percentages of the Populations of Five Selected Countries Whose Energy Intakes Are below Requirements, 1972–74 and Projected for 1995[a]

Country	1972–74	1995: Growth in income[b] (constant food prices) Low	1995: Growth in income[b] (constant food prices) High	1995: Growth in income[b] (1 percent annual rise in food prices) Low	1995: Growth in income[b] (1 percent annual rise in food prices) High
	Persons having energy deficits (millions)				
India	276	243	87	351	199
Pakistan	58	37	5	72	17
Bangladesh	61	93	68	102	89
Brazil	45	41	26	50	29
Morocco	9	7	0	10	2
Total	449	421	186	585	336
	Percentage of population having energy deficits				
India	47	25	9	37	21
Pakistan	c	31	4	60	14
Bangladesh	77	71	52	78	68
Brazil	43	22	14	27	16
Morocco	50	22	0	33	8
Total	54	30	13	42	23

[a] Average daily energy requirements in calories, as estimated by the Food and Agriculture Organization of the United Nations and the World Health Organization are: India, 2,110; Pakistan, 2,258; Bangladesh, 2,200; Brazil, 2,390; Morocco, 2,475. Requirements differ because of the varying percentages of the population in each age group and because of varying body weights.

[b] High rates of growth in income per capita are assumed to be as follows: India, 1.3*; Pakistan, 2.0 and 3.1*; Bangladesh, 0.5 and 1.5; Brazil, 3.0 and 4.8*; Morocco, 2.1*. Asterisks denote rates of growth achieved between 1960 and 1978.

[c] Estimate unavailable.

Table 3

Deficit of Calories in the Average Daily Diet of the Undernourished Population and the Aggregate Calorie Deficit as Percentage of Total Calories Consumed in Five Selected Countries, 1972–74 and Projected for 1995[a]

		1995			
		Growth in income (constant food prices)		Growth in income (1 percent annual rise in food prices)	
Country	1972–74	Low	High	Low	High
	Average daily calorie deficit in affected population				
India	357	282	268	334	239
Pakistan	228	53	35	87	37
Bangladesh	444	403	285	462	335
Brazil	468	302	291	345	388
Morocco	650	299	—	406	—
Total	353	291	271	328	266
	Calorie deficit as percentage of total calories consumed				
India	7.5	2.9	0.9	5.2	1.9
Pakistan	10.8	0.7	0.1	2.3	0.2
Bangladesh	18.7	14.1	6.7	19.3	11.1
Brazil	8.0	2.2	1.2	3.2	1.9
Morocco	15.3	2.2	0	4.6	0
Total	8.5	3.5	1.3	5.7	2.4

[a]*See footnotes to Table 2*

the problem, as a gap between existing intakes of energy and the requirements, and not as a clear description of the prevalence of malnutrition in these populations. However, even if the standard FAO/WHO levels, which are criticized by some nutritionists as being too high,[2] represent an overstatement by as much as 20 percent—which is unlikely—the total number of persons in these five countries whose diets were deficient in energy in 1972–74 would still be about 150 million.[a] A direct attack on the problem of malnutrition would thus be easier and less costly than the tables imply, but the policies and the time required to bring about a change would not be materially affected.

Projected Changes through the Growth Process

If rates of growth in income of the five countries followed the high projections to 1995 used in Tables 2 and 3 and if food prices remained constant, substantial reductions could be made in the proportion of the population whose diets are inadequate in calories and in the magnitude of

[a]*Data in the tables reflect the average energy intake of all individuals belonging to subgroups in the population that have varying levels of average income per capita. Ideally, the determination woud be based on intakes of individuals and their energy requirements. If the average calorie intake per capita of a group is lower than the national average, all individuals in the*

Table 4

Levels and Growth Rates of the Supply of Food Energy Required if the Demand Is to Be Met, under Different Assumptions as to Future Incomes and Prices, in Selected Countries, 1972–74 and Projected for 1995[a]

		1995			
		Growth in income[b] (constant food prices)		Growth in income[b] (1 percent annual rise in food prices)	
Country	1972–74	Low	High	Low	High
	Annual food-grain equivalents (millions of tons)				
India	136	247	275	233	260
Pakistan	13	30	31	29	30
Bangladesh	15	28	30	26	28
Brazil	28	58	63	57	62
Morocco	4	10	12	9	11
Total	196	373	411	354	391
	Annual rate of growth in the supply (percent)				
India		2.9	3.4	2.6	3.1
Pakistan		3.7	4.0	3.6	3.7
Bangladesh		2.9	3.3	2.5	3.0
Brazil		3.6	4.0	3.5	3.9
Morocco		3.9	4.7	3.6	4.4

[a]*The rates of growth of population are assumed to be as follows: India, 2.3 percent; Pakistan, 1.1 percent, Bangladesh, 2.5 percent; Brazil, 2.9 percent; Morocco, 2.8 percent.*

[b]*See Table 2, footnote b.*

their food deprivation. This would require a quite substantial increase in the supply of food, as Table 4 indicates. World Bank projections of foods traded internationally suggest that to meet the growth in market demand, real

subgroup are judged to be in deficit. Although this calculation reflects an aggregation bias [illegible] than income groups, it is a step forward in that it reduces the aggregation bias substantially [illegible] the per capita figures generally published. This technique, developed initially by Shlomo Reutlinger and Marcelo Selowsky, is not put forward as wholly satisfactory but as the best [illegible] by the state of the art today and as an advance over techniques used heretofore.[3] *[illegible] in the nutrition community suggest that the requirement per capita of a lower-income [illegible] is less than the average for the whole population. They note that in the lower-income [illegible] there is a higher ratio of children to adults, there is frequently less opportunity for [illegible] activity—that is, there is forced unemployment—and there are many adults whose [illegible] weights are lower than average, perhaps as a consequence of malnutrition in early childhood. In turn, however, it must be noted that the average number of calories per capita [illegible] by low income groups may be greater because they engage in occupations that [illegible] more physical exertion, their household chores are more laborious, they incur more [illegible] and do more breast-feeding, the ratio of young and middle-aged to older adults is [illegible] and they are subjected to more infectious diseases and parasites that impair absorption [illegible] calories. There is general agreement that calorie requirements may vary among individuals whose other characteristics are similar. Whether it is appropriate to conclude that all members of a group whose average intake is less than the average amount required are in [illegible] depends on the variability of intakes and requirements. Estimates of the correlation [illegible] the two of the kind reported here are not very sensitive to interpersonal variability in [illegible] and intakes.*[4]

prices of food must increase 25 percent—or about 1.3 percent a year—by 1995. Thus, even the projections based on the 1 percent annual increase in food prices are optimistic. The probable course of development as depicted in Tables 2 and 3 will call for extraordinary attention to growth in the national product and to its composition and distribution. There can be no deterioration in relative or absolute incomes of the poor, and there must be a high rate of growth in the availability of food. Nevertheless, the absolute size of the affected population is likely to remain large. If there is little growth in income and if food prices rise slightly, it is likely that the absolute number of this deprived population will increase. If the growth rate of income is high and the annual increase in relative food prices is 1 percent, the number of people whose diets are inadequate in calories will decline only 25 percent by 1995, but the energy deficits will drop from about 8.5 percent of the food supply of these five countries to only 2.4 percent in 1995.

The Time That Elimination of the Deficit Would Require

Projecting from actual growth rates between 1960 and 1976, only in Pakistan could it be expected that the entire population could enjoy adequate diets within less than thirty years (see Table 5). In the other countries, underfeeding of some segment of the population would persist for generations, even under optimistic prospects. Past performance of developing countries taken together (see Table 6) corresponds closely to the most pessimistic projections of changes in the underfed population of the five countries—low growth in income coupled with an annual increase of 1 percent in food prices. A reduction of a mere 8 percent can be expected in the share of the population that is underfed during the period of eight years, or approximately 1 percent a year. Since a large increase in total population is likely, this means a sizable increase in the number of underfed people.

Yet this speculation is probably optimistic, since the distribution of income tends to grow worse during the early stages of development. The traditional sector, where the poor and malnourished are concentrated, grows more slowly than the economy as a whole. In addition, world food prices increased substantially between 1960 and 1976, in spite of the moderating effect of the green revolution. Thus the real purchasing power of the poor, who spend most of their incomes on food, probably grew at a slower rate than that implied by the estimates in Table 5. It is likely that between 1964 and 1974 the percentage of the population in developing countries who were malnourished remained roughly constant, so the number of people unable to meet adequate energy standards increased significantly.

Another shred of evidence that the course of development in the past has done little to diminish the prevalence of calorie malnutrition is the record of the per capita consumption of food grain in India. It has remained essen-

Table 5

Number of Years Required for Elimination of the Average Energy Deficit in the Lowest Decile of the Population in the Normal Course of Development, in Selected Countries[a]

Country	Growth rate of per capita income (percent)	Number of years required: No price change	Number of years required: 1 percent annual rise in food prices
India	1.3[a]	60	167
	2.6	30	45
Pakistan	2.0	35	49
	3.1[a]	22	28
Bangladesh	0.5	235	not possible
	1.5	79	157
Brazil	3.0	50	68
	4.8[a]	31	38
Morocco	2.1[a]	43	69
	4.2	22	27

[a] Average annual growth rate, 1960–76.

Table 6

Estimated Percentage Change in the Share of the Population and in the Absolute Number of Persons Having Energy-deficient Diets, by Region, between 1964–66 and 1972–74[a]

Region	Change in share of population having energy-deficient diets: Diets less than FAO/WHO requirements	Change in share of population having energy-deficient diets: Diets less than 80 percent of FAO/WHO requirements	Change in number of persons having energy-deficient diets: Diets less than FAO/WHO requirements	Change in number of persons having energy-deficient diets: Diets less than 80 percent of FAO/WHO requirements
Africa	−1	0	27	30
Middle East	0	−31	24	−12
Asia	−11	−15	6	3
Latin America	−5	−4	21	25
All regions	−8	−11	13	10

[a] In the periods it is assumed that the energy intakes of various groups in the population are determined by an energy consumption function that specifies the relation between energy intake per capita and income, the distribution of income, and the supply of energy per capita. Adapted from Reutlinger and Marcelo Selowsky, Malnutrition and Poverty (Washington, World Bank, 1976). The estimates are predicated on the assumption of an energy income elasticity of 0.3, at the level of meeting requirements, and represent values interpolated from the step functions computed originally. In the absence of better information it is assumed that the relations between energy intake and income and between energy intake and the distribution of income have remained unchanged throughout the period. Changes in energy intakes, therefore, reflect changes reported by the FAO in the supplies of food per capita during the two periods.

tially unchanged for twenty years, averaging approximately 450 grams a day. Since the food supply per capita was essentially constant, the increase of 25 percent in average per capita incomes simply drove up the price of food grains. The poor, the increases in whose incomes averaged less than 25 percent, could buy less food than they had formerly been able to buy. In addition, bad weather in some years caused supplies to drop as much as 15 percent, driving up prices in those years by well over 15 percent. Here again those bearing the brunt of the price increases are the poor, who even in the best of times have difficulty achieving minimum levels of nutrition.

It seems almost unavoidable that growth in incomes and food production will fall far short of what is required to meet current estimates of nutritional needs. The shortfall may be less than estimates here imply if the more optimistic observers of nutritional requirements and production prospects in developing countries are right, or greater if the more pessimistic are borne out. In any event, the number of underfed persons will be staggeringly large—in the hundreds of millions. Whether the number is 200 million or several times that many, the problem of meeting the basic nutritional needs of the world is severe, and the kinds of responses needed are likely to be much the same.

Even though growth in incomes and food supply is not a *sufficient* condition for meeting basic needs in nutrition, it is a *necessary* condition. The availability of food must increase as fast as population and incomes increase. Otherwise, the relative prices of food will rise, at least partly offsetting any increases in the incomes of the poor. Tables 4 and 5 show the importance of food prices—and hence of growth in production—in reducing the numbers of the undernourished. If high priority is not given to increasing food production, prices could well rise more than the 1 percent a year estimated here; the effect on the number who are inadequately nourished and the severity of their deficit will be considerable. Balance-of-payments constraints will make it impossible for most countries to obtain a major part of the food that they need through imports.

Similarly, without rapid growth in incomes, the numbers of the underfed in 1995 will have increased by hundreds of millions in the five countries examined. There is a critical need to take the steps required for rapid, poverty-oriented growth, if the poor are to have the jobs and incomes that will enable them to afford enough food and if governments are to have the finances that will enable them to carry out nutrition programs and other measures to help the poor. And the inevitable pressures toward even more inequitable distribution of income during the early stages of development re-emphasize the need to see that the poor are beneficiaries of increases in income, through such measures as programs to help the small farmer. In short, increases in both the production of food and the incomes of the poor should receive high priority, both for the improvement of nutrition and for other reasons. Of the two, incomes might justify more attention even than

food production programs, since less progress has been made in increasing incomes.

The Nutritional Impact of Income Redistribution with Growth

There is a large potential for reducing energy deficiences through redistributive growth. As Table 7 indicates, if growth in income is concentrated in the lower deciles of national income, it is plausible for all the countries except possibly Bangladesh to reduce energy deficits substantially with only a slight effect on the weighted national growth in income. In India, with an annual growth rate of 2.6 percent, neutrally distributed, thirty years would be required to eliminate energy deficiencies in the lowest decile (see Table 5); with a growth rate of only 2.1 percent redistributed in proportion to the energy deficit in each decile of the population, the same could be done in twenty years (see Table 7). In Brazil, with a growth rate of [illegible] percent, suitably distributed, the problem could be eliminated in half the time that would be required if the historic rate of 4.8 percent prevailed and there were no changes in the distribution of income. Similarly, a study of calorie deficiencies in Cali, Colombia, shows that they could be eliminated by a mere 0.9 percent increase of total incomes, if all the increase went to the groups whose diets were deficient. If, on the other hand the distribution of income remained unchanged, the required increase would be 18.6 percent.[5]

[5] In these calculations it was assumed that food supplies would increase sufficiently to meet the nutritional needs at unchanged prices.

16

Table 7

Rates of Growth in Income per Capita Required for the Elimination of the Average Energy Deficit in All Deciles of the Population within Twenty Years, in Selected Countries

Decile	India	Pakistan	Bangladesh	Brazil	Morocco
			(percent a year)		
1 (lowest)	4.0	3.4	6.0	7.7	4.6
2	2.2	2.7	4.0	4.5	3.0
3	1.2	2.4	3.0	2.6	2.7
4	0.6	2.2	2.3	1.1	1.5
5	0.1	1.9	1.9	—	0.6
6	—	1.7	1.5	—	—
7	—	1.5	1.0	—	—
8	—	0.9	—	—	—
9	—	0.2	—	—	—
10 (highest)	—	—	—	—	—
			Weighted country average rates of growth[a]		
	2.1	2.2	2.5	2.2	2.2

[a] To be statistically realistic, a minimum growth rate of 2 percent was assumed for each decile.

Any redistribution of income would, of course, also increase supply requirements above the increases projected with income spread neutrally over the population or skewed to upper-income groups. A strong, committed government could be expected to make significant progress in solving the nutrition problem by directing growth in national income toward the lowest deciles or by taxing the relatively well off and transferring some of their income to the poor. Political and economic realities being what they are, however, income growth in most countries is more likely to resemble the neutral projections. Indeed, in most countries it may be a huge task merely to hold the line at existing levels of inequality. Even with moderate success in directing general development into accelerated growth in the income of the lowest deciles—combined with a strong effort to increase food production—strong complementary measures will be required to increase the level of food consumption of the poor. The expected course of national growth is not a promising means of meeting this generation's shortfalls.

Chapter 4
The Range of Possible Actions

Since in the probable course of meeting development needs there is little prospect of providing adequate nutrition within an acceptable length of time, special steps need to be taken to improve nutrition. One important approach to the problem is the inclusion of nutritional measures in public policies that may affect nutritional well-being—for example, in policies governing the supply and prices of nutritionally important foods. A better-known and more commonly used approach to nutrition problems is through more narrowly focused projects such as institutional child-feeding programs, nutrition education, and other nutrition-related actions provided through health services.[1]

The nutritional benefits of broader public policy measures are difficult to evaluate because of the difficulty of controlling for changes in the many outside variables that large-scale programs encompass. How, then, can it be determined whether measures designed to provide better nutrition will have favorable effects? The findings of carefully controlled, smaller, more direct actions may be instructive. Recent evaluations of the results of a group of projects that integrated nutrition and health programs, for example, offer insights into the question whether special steps to improve nutrition can make a difference.* The analysis of ten carefully directed and generally well-controlled projects, summarized in Appendix C, gives a clear indication that well-designed and effectively implemented measures can promote physical growth and reduce mortality. Taken together, the ten actions present a persuasive case that, under projects in the hands of able administrators, in populations of 60,000–70,000, infant and child mortality can be reduced by a third to a half within five years. These projects, and particularly their committed and skilled leaders, may be hard to replicate, but they serve to indicate how much can be accomplished by efforts that explicity address the malnutrition problem.

Selection of Actions

The selection of particular nutrition actions within a country should flow from an analysis of the nature of the problem and of those it affects. The needs of urban and rural populations differ, as do the needs of those with land and those without. Ethnic, cultural, and occupational distinctions are

*The evaluations undertaken for this study by Davidson R. Gwatkin, Janet R. Wilcox, and Joe D. Wray appear in Appendix C.[2]

further influences in the selection of nutrition actions. Yet another set of factors concerns the nature of the problem—whether it is seasonal, whether it is regional, what means is appropriate to reach the target population. A consumer food subsidy would only be helpful, for example, if people got their food through commercial channels; even then it would be necessary to know whether they bought in supermarkets or small neighborhood stores, how often they shopped, and so on. Responses must be aimed at solving specific nutrition problems. Where there are micronutrient deficiencies—vitamin A deficiency, for example, iron-deficiency anemia, or goiter—that can be treated with vitamins and minerals added to processed staple foods, such as wheat flour, sugar, and salt, fortification should be encouraged. The technology is simple, the costs are low, and the results can be dramatic; these simple approaches can increase receptivity to costlier and less visibly dramatic efforts.

Most malnutrition is caused either by shortages of food or by the inadequate purchasing power of certain population groups. Sometimes, however, malnutrition occurs simply because food habits are inappropriate. The problem is especially pronounced among populations undergoing rapid economic and social change. It is not uncommon, for example, to find children suffering from malnutrition in households in which incomes and food are adequate. Even among the poor, much childhood malnutrition could apparently be avoided. Although there is evidence that the diets of many of the poor are remarkably well balanced, considering their small expenditures on food, the intuitive sense that makes them so seems not to extend to discerning the needs of specific members of the family, particularly children of weaning age. Education programs can help. Families need to be taught to shift the distribution of food. Nutrition education would stress the importance of breast-feeding and the introduction of supplementary foods at the appropriate age. Overcoming strongly held habits is a difficult undertaking, but given its importance and some—albeit few—successes, it should be pursued. Educational projects that encourage the planting of community and home gardens and the processing and preserving of foods should be designed to reinforce local practice. In the Philippines, for example, a substantial part of the diet of the rural population comes from homegrown foods.[3] Agricultural programs should give attention to such substantial sources of the food supply.

Access to primary health care is important for the diagnosis of malnutrition in low-income groups—regular weighing of young children, for example, can identify those at risk, alert mothers to the problem, and serve as an entry point for nutrition supplementation. Distribution of iron, folic acid, or vitamin-A capsules, and vaccination against diseases such as measles that in combination with malnutrition cause serious illness or death are important to good nutrition, as are means of controlling the sources of infection and the high worm loads that increase requirements for nutrients. Improving environmental sanitation—especially upgrading the water

supply—is particularly significant. Health programs and food programs undertaken in the same area generally magnify each other's effects.

Whose Basic Needs?

Malnutrition affects all age groups among the very poor and contributes to suffering, low resistance to disease, and low productivity. Yet nutrition programs are customarily directed toward children less than three years old and pregnant and lactating women. The damage done by malnutrition in the early years of life and the critical role of pregnant and lactating women in the health of their children make these vulnerable groups a logical choice for concentration of limited resources. But the costs, the common family decisions to share the food with others in the family, and other difficulties of age-specific feeding programs will often make them an inefficient way of addressing basic needs.[4]

Clearly, young children and their mothers will continue to be the group given the highest priority. But in planning a program, it is preferable to start, not with a decision to assist a given group, but with the total malnourished population as a target. Priorities within the target group should be established by weighting, not by excluding all those outside a selected age group. Particular nutrition programs can be aimed at particular subgroups, as part of a package that offers the highest weighted benefits to the overall target group and satisfies benefit-cost, fiscal, balance-of-payments, socio-cultural, political, institutional, and other relevant concerns. The point of such a package is to be sure that good opportunities for addressing nutrition problems are not missed because of mistaken assumptions about target groups, limited budgets, and so on.

Even efforts undertaken to reach children might in some cases be more efficient if their target were malnourished households as a whole; in many countries a large percentage of malnourished children cannot be reached effectively in any other way.*

Costs

The costs of individual nutrition actions—and even more of overall nutrition strategies—will vary widely from country to country, depending on the nature and causes of the nutrition problem, institutional capabilities, per capita income, and the funds that are available.[5] The higher a country's income, the higher its minimum nutritional standards and hence the costs per capita of food and administration tend to be. Measuring costs raises

*The additional costs of broader programs are smaller than they at first seem to be. The cost per child alone of programs to feed children may be twice that of a broader subsidy program, partly because processed foods are used that are generally more expensive and partly because the costs of administration and delivery are high. In any event, part of the food allocated in programs for children is diverted in the home to other members of the family, but the cost much higher than that of feeding these same persons through a broader program.

[5] Issues are discussed in greater detail in Appendix D.

difficult questions. In many supplementary feeding programs, for example, the cost per person demonstrably helped has been several times the cost per person enrolled in the program.

Although certain nutritional efforts—such as closer scrutiny of the nutritional consequences of agricultural policies—could be undertaken without substantial budgetary costs, many of the principal actions suggested in this study would be costly. The costs of large-scale food ration and subsidy programs, for example, tend to be high.

Opportunities to mobilize resources for nutrition will also vary substantially from country to country, depending on the overall fiscal situation and the balance of payments, the persuasiveness of the analytical and political case for expenditures on nutrition as opposed to other needs, how appealing the possibility of avoiding malnutrition is, and the ability to mobilize additional resources from external sources, domestic voluntary agencies, and community institutions.

Because combatting malnutrition has political appeal, it may be possible to raise funds to cover nutrition programs by means of special taxes. It may also be feasible to reduce expensive consumer subsidies not focused on the poor and earmark the proceeds for nutrition programs. Food and beverages with little or no nutritional value could be taxed, as could consumer luxuries in general. Taxing high-grade rice or asking consumers to pay world market prices for it might help finance the subsidy of rice of a lower grade. Although nutrition programs should not have to bear the burden of financing themselves any more than should education, for example, those possibilities for generating revenue exist, and they might in some instances be helpful in providing a political context for important nutrition initiatives.

Recurrent costs might be reduced substantially if community groups and local voluntary agencies could be engaged in the nutritional effort. This generally involves much wider local institutional and political interests than nutrition per se, but nutrition could in some cases provide the impetus for broader efforts to mobilize local resources. The potential for mobilizing community groups—a subject about which too little is known—is probably culture-specific.

Other things being equal, the higher the income of a country, the more likely it is that the basic nutritional needs can be met. The extent of the problem will generally be less and the required financial and human resources will be easier to mobilize. For middle-income countries, a reasonable target might be, for example, to bring 95 percent of all families within 10 percent of the energy and protein requirements established by the FAO and the WHO, adjusted for composition of the family and other relevant factors, within the next decade. Lower-income countries generally would have to set less ambitious targets. In either case, the initial aim should be to raise the levels of consumption among the most-deprived groups—those whose diets are deficient by more than 400 calories, for example.

Chapter 5
Promising New Avenues of Intervention: Nutrition-oriented Food Policies

The deliberate use of public policy to influence the character of production, processing, and distribution of food within a country has been generally neglected as a means of increasing the amount of food consumed by the poor. Agricultural production strategies can be adapted to put more emphasis on the nutritional needs of the poor. And food distribution and subsidy programs can be better used to reach the poor; in some countries, subsidies already serve as the largest nutrition programs, though they are not usually regarded as such.

Fresh policy approaches to large-scale food subsidies for consumers may be highly productive in addressing nutritional needs. But there are formidable constraints on their use: the degree of government interest in basic needs, the magnitude of the costs in relation to the financial capacity of the government, objections from the economic and political constituencies affected, and considerable administrative difficulties in connection with some programs, particularly national ration programs that would be aimed at reaching significant numbers of the rural malnourished. Nevertheless, the enormity of the need for improved nutrition and the thus far limited effects of nutrition efforts demand that opportunities for intervention that go substantially beyond standard approaches be considered. Food policy measures may be a productive complement to more commonly employed efforts to aid vulnerable groups.

Every government now influences, in a variety of ways, the quantities and kinds of foods being produced, traded, and consumed. Yet the nutritional effects of agricultural and food policies are seldom adequately planned or anticipated. Few countries have systematically collected data on the nutritional consequences of changes in incomes and in food prices—evidence that the nutritional implications of food-consumption patterns are given little consideration in agricultural planning or in development planning in general. Overall trends in food production and trade do not describe the nutritional well-being of a population or provide a basis for discussing policies. Fortunately, several countries—India, Indonesia, and the Philippines, for example—have begun disaggregating data concerning food consumption by income group. Analyses of these data and experience gained from certain nutrition projects have suggested several important considerations for the design of food policies with the aim of improving nutrition.

Primary Considerations for Nutrition-oriented Food Policies

Although families with very low incomes spend most of their incomes on food, many of them still do not consume nutritionally adequate amounts of food. The diets of more than 40 percent of the population in the five countries examined in Tables 2 and 3 are deficient in energy, and the diets of 15 percent or more are deficient by more than 400 calories.

The foods bought by poor families differ markedly from those bought by the rest of the population; in Indonesia, for example, the three lowest deciles of the population in income obtain about 40 percent of their food energy, or calories, from cassava and corn and 46 percent from rice, while the three highest deciles obtain about 14 percent of their food energy from cassava and corn and 59 percent from rice. In Cali, Colombia, an increase of 10 percent in the supply of beef would add three times as many calories to the daily diets of the already adequately nourished group as to the diets of the energy-deficient group. In contrast, the benefits of an increase of 10 percent in the production of cassava would be received entirely by the energy-deficient group.[1] In every country, increases in the supply of some foods would bring nutritional benefits to the poor, while increases in the supply of others would not.

The balance between protein and calories in the diets of poor people tends to be adequate—that is, the diets provide enough protein when energy intakes are adequate—even when an important share of the energy comes from such low-protein, starchy staples as cassava.* In general, people appear to be more rational in their food-consumption practices than has usually been assumed, just as has proved to be true of their agricultural production practices.†

Many of the malnourished are the families of small farmers who earn their incomes primarily from cultivation of their own or leased land. The majority, though, are landless or nearly landless agricultural laborers, those who work in other poorly paid rural or urban jobs, or the unemployed. Thus, they benefit only indirectly from production programs for the small farmer. In the state of Maharashtra in India, for example, 40 percent of those whose incomes are too low for them to be able to afford adequate nutrition are small farmers, 40 percent are agricultural laborers, and the balance are either unemployed or are in poorly paid jobs. To those who are not small farmers what matters most is the relation between their incomes, which are determined by the demand for labor on and off farms, and the cost of food. For them, the nutritionally important programs are those that provide jobs for unskilled labor, including public works or food-for-work programs.

In most countries patterns of food consumption and the nutritional adequacy of diets vary greatly among regions and between rural and urban areas. The variations are in part reflections of differences in incomes and tastes. They also reflect differences in prices that are attributable to differences in the costs of transport, production, and storage, to marketing margins, and to government pricing policies. Despite these constraints, governments can take important steps to mitigate nutrition problems in backward or isolated regions.

The nutritional adequacy of diets often varies a great deal also with the seasons. In many countries in which there is only one main harvest period, there are substantial seasonal variations in food prices. A few months after the harvest, prices begin to rise; unfortunately, this rise may well coincide with seasonally low earnings of agricultural laborers. When the peak in prices comes—generally just before the main harvest—workers require extra energy for weeding and harvesting; this is often the time of the highest incidence of malnutrition.[3] Any food policy for improving nutrition should aim at reducing seasonal fluctuations in food prices and incomes.

The nutritional adequacy of diets varies even more from year to year than with the seasons. In most poor countries, agricultural production is dependent on rainfall that is highly variable. Periodically, there are serious problems caused by droughts, infestations of pests, floods, or other natural calamities or by shortages of key agricultural inputs. Prices of food rise and incomes of farm operators and laborers decline. The result can be famine or, if relief averts large-scale death from starvation, a significant increase in malnutrition and in malnutrition-related mortality. Variations in the availability of food from year to year can be reduced if steps toward ensuring food security are taken to alter supply and demand.[4]

Agricultural Production and Nutrition

In introducing a nutrition orientation into food policy, governments must review their agricultural production plans to determine what effect agricultural policies have on the access of the nutritionally vulnerable population to food and on their incomes; they must also work out changes that will maximize achievement of nutritional objectives.

The impression is widespread that diets based heavily on cassava almost always tend to be deficient in protein, with particularly adverse results for children—hence its reputation among some nutritionists as "the root of all evil." Indeed, if a child eats mainly cassava or other high-energy, low-protein food, he is almost certain to suffer from protein deficiency. There appears to be a natural upper limit to consumption of cassava, however; studies in low-income regions of India, Brazil, Zambia, and Indonesia show that more than half of all food energy comes from other sources.[2] Some persons need more protein as well as more energy, but in areas where protein intake already meets requirements—or is much closer to requirements than is the intake of calories—emphasis should be on energy. In any event, analysis of age-specific patterns of consumption should be carried out before steps are taken to encourage increased consumption of low-protein staples. Where problems are likely to emerge, adjustments can be made—in cropping patterns, for example, or in including legumes in ration programs, or in the nature and intensity of nutrition education.

†*As noted in Chapter 4, the diets of small children—and, in some societies, of women—are less rational, particularly during periods of modernization and increased commercialization of foods. Similarly, the incidence of malnutrition is not distributed equally throughout the population. Women and children suffer disproportionately because of problems of food distribution within the family and inadequate recognition of the special needs of small children and pregnant and nursing women. Also, the demographics of poverty show a disproportionate number of women and children among income groups too poor to afford adequate diets.*

Nutritional well-being should be a prime objective of agricultural research, and production of low-cost foods that are consumed primarily by the poor needs to be emphasized. Without improved technology, for example, producers of millet and sorghum in semiarid regions can be expected to remain poor and malnourished. Agricultural research institutions have begun to devote substantial attention to the root crops and coarse grains and legumes that are the cheapest sources of food energy and protein and that are often the dietary staples of the poor. Among the root crops that seem to offer improved yields is cassava, the basic source of food energy for some 300 million people, most of whom are poor. Nobel laureate Theodore Schultz complains that agricultural research institutes have neglected farm household production research, potentially of considerable importance to nutrition.[5] Research has generally been undertaken in response to market forces that reflect purchasing power more than nutritional need and has been built on the research work of developed countries. Emphasis should be on crops favored and conditions faced by the poor and should extend to every aspect of agricultural strategy—extension services, supply of inputs, credit, and marketing—taking social as well as technical and financial viability of the poor into account. In many countries, such a reorientation would require a substantial change in the views of agricultural planners.*

When choices are to be made in the allocation of funds and manpower for increasing production of crops—of rice, for example, or of cassava—emphasis should be placed on their nutritional effect. In Indonesia, analysis of the importance of the nutritional value of specific agricultural commodities offers an example of how food policy can be examined for nutrition objectives.[1] Government production programs can also do much to reduce seasonal and annual variability. Research and extension efforts should be directed at improving cropping patterns with an eye toward meeting seasonal nutrition needs. In food planning, the resistance of various crops to drought, disease, and insects must be taken into account. Cassava and certain other low-cost root crops tend to be resistant to drought and to require smaller investments in irrigation and drainage than other crops; they can be left unharvested—fresh, unprocessed cassava is perishable once it has been harvested—and can be planted and harvested throughout most of the year, thereby reducing seasonal variation. Millet and sorghum also tend to be more resistant to drought than other grains. Farmers often choose lower-yielding varieties over higher-yielding but risky alternatives. Crop diversity is another common practice of low-income farmers to limit risk. While

Planning wings of agriculture ministries in some countries, Indonesia and the Philippines, for example, have recently established units to plan and monitor the nutrition aspects and consequences of agriculture policies and programs.

[1]*C. Peter Timmer's country-specific analysis prepared for this study is summarized in Appendix A.*

taking formal account of these factors would make benefit-cost analysis even more complicated than it already is, these substantial benefits should not be ignored.

To help reduce seasonal, annual, and regional variability, active intervention by governments in wholesale grain trading may be required to address imperfections of the market or to improve the efficiency of private grain markets. In some cases the intervention might consist of buying large quantities of grain during seasonal lows and selling during seasonal highs, building stocks in good years and drawing them down in bad years, or buying in areas where there are surpluses and selling in areas where there are deficits. In considering possible government interventions in marketing, it is important to be aware that some such efforts in the past—in India and in some Western African countries, for example—have contributed to deterioration of the situation and have had the net effect of raising food prices. Such nutrition-oriented interventions should be undertaken only when they appear to be nutritionally required and when a government has the capacity for effective implementation of the intervention.

Between the production and consumption ends of the food chain, governments can make other important adjustments in the market that will bring about nutritional gains. At every stage in the marketing system, the nutritional quality of food may be affected. Grains that are inadequately dried at harvest or improperly stored, especially after milling, deteriorate rapidly because of the growth of microbes and funguses and infestation by insects. Investments in proper storage, at the farm and village levels as well as in larger, central locations, can reduce the loss of nutrients substantially, cutting the loss in half in fruits and vegetables. Processing methods dramatically affect the retention of nutrients—parboiled rice, for example, can retain most of the micronutrients lost when rice is polished. Government policies should be used to influence the choice of processing techniques. In other instances much might be accomplished by taking steps to make better market information available or improve farm-to-market roads. A number of governments are already active in one or more of these areas. Yet neither individual countries nor international assistance agencies have adequately explored the possibilities of intervening at the market level to improve nutrition. They should consider any economically justified marketing step that will increase the available food supply, reduce consumer prices, or help the poor in the purchase, selection, or preparation of adequate diets.

Farmers must take care that changes in agricultural technology or [illegible] do not have detrimental nutritional effects. Sometimes when food [illegible] are falling, governments choose to export food or encourage a shift [illegible] to nonfood crops. Although during nearly twenty years of a rural-[illegible]ment project in Tabasco, Mexico, agricultural production increased [illegible] while the population doubled—the nutritional status of the poorest [illegible] of the population of the project area dropped. Goals of maximiz-

ing exports and returns on investment were achieved at a cost of reducing crop diversity and stunting the growth of local food supplies.

In a shift to cash crops, even though total income may increase, heads of households may not spend enough on food to provide as much food as their families had when subsistence foods were grown.[6] In a successful coffee-growing area of Papua New Guinea overall food intake fell 22 percent below the level fifteen years earlier, before coffee was introduced.[7] Farm families also suffer in the switch to cash crops because their increased incomes cannot buy as much food at retail maket prices as the families could previously have sold at farmgate prices. If increases in income are expected to be quite large, this problem is not likely to occur, once there is an effective private or public system for marketing foods. But if increases in income are expected to be only moderate, projects that are intended to encourage the growing of cash crops must include measures to guard against a deterioration in nutrition—intensive nutrition education, for example, through extension services and plans for continued use of a portion of family lands for subsistence production.

In a recent extensive survey of studies of the relation between nutritional status and agricultural change, it was concluded that "there is reason to suspect that unless extraordinary precautions are taken to develop a distributive network and a pricing mechanism that will provide modernizing peasants with both the chance and the incentive to exchange newfound cash for nutritious food, absolute declines in nutritional status among some or all of the population can be expected."[8]

When agricultural prices are increased to improve production incentives for farmers, unskilled laborers may suffer. Their wage levels are likely to be geared largely to the cost of the prevailing least expensive diets and may adjust slowly to the sharp rise in food prices. Although increased food production could bring future food prices down, the transitional nutritional problems of those caught in between can be severe. The government must take direct steps, through wage policy and perhaps also through short-term subsidies for the benefit of these groups.

Food Distribution and Subsidy Programs

Until nutrition-oriented programs for food production and steps taken to increase the incomes of the poor begin to make the necessary contribution to meeting nutritional needs, special steps must be taken to reduce the cost to the malnourished of the food they require. The principal ways are programs that provide supplementary food free or at a nominal charge or in exchange for work, direct or indirect subsidies that reduce the cost of basic foods to consumers, and rationing that provides limited quantities of subsidized foods to eligible consumers. In certain ways, these categories may not differ sharply from one another. A large-scale take-home supplementary feeding program, for example, is little different in concept from a ration program directed to specific portions of the population.

Supplementary Feeding Programs. Virtually every country has supplementary feeding programs. These are generally the largest activities undertaken explicitly to improve nutrition. The total costs of these programs in developing countries are more than half a billion dollars a year, and much of the support is in the form of institutional and financial resources or food that would not otherwise be available. Many programs draw on nongovernment agencies that are staffed by highly committed, often unpaid volunteers. The programs are seldom broad enough to reach target groups throughout a country, although many have the potential for a substantial expansion of coverage.

Only recently have the benefits and costs of the supplementary feeding programs that have been widespread in developing countries for decades been systematically evaluated. The results are mixed.[9] Except in cases of severe food shortage, their effect on nutrition as measured by physical growth has been less than would be expected from the quantities of food energy and protein provided.* In recent reviews of programs operated for young children, however, the conclusion has been reached that physical growth may not be the most important benefit. The energy investment that does not show up in growth may be expended for increased physical activity, improvement in body composition, and restoration of normal basal metabolic rates.[10] Such programs may also have indirect and even nonnutritional benefits. To the extent that feeding of pre-school-age children leads to better performance in school and reduced rates of scholastic failure and dropout there is a greater return on the investment in education. Preliminary results of a feeding program combined with organized play and other stimulation for 24,000 pre-school-age children in the state of Pernambuco in northeast Brazil show that the rate of scholastic failure of these children is less than half that of children outside the program.[11]

Feeding programs directed to more than 100 million school children account for by far the greatest part of the supplemental feeding effort throughout the world. Their effect on nutrition is apparently diminished by problems connected with distribution of supplies, by the reduction of the children's food at home, and by concentration on children who are easy to reach. But well-run school food programs do have positive effects, both nutritionally and educationally. School attendance improves and students are reported to be more attentive and receptive to learning. For poor parents who feel that they cannot afford the modest direct costs and the wages forgone from having their children in school, school lunches make school attendance more profitable. Because nutritional status is closely linked with levels of parental education, helping to maintain a child in school can be expected to have subsequent nutritional benefits for him and

*A supplementary feeding program for women, infants, and children (WIC) from low-income families in the United States, on the other hand, has been responsible for reducing the incidence of low birth weight 40 percent. For every dollar spent on the program, $3 has been saved in hospital costs.

his children. Though the benefits of school food programs may not be concentrated among the age groups of highest priority, and though the programs may act indirectly as transfers of income to the children's families, the programs do help to meet basic needs.

Nevertheless, they are relatively expensive, if physical growth is used as the measure of their accomplishments. Support of the programs by educators might not be so strong if school-lunch funds could be used for other educational or nutritional purposes. School food programs have an extraordinary political appeal, however, in rich countries and poor. The support they receive in the form of international food aid, from national and local budgets, and through voluntary activities would not be readily transferable to other programs in nutrition or education. But when options exist—as when national nutrition strategies or food aid programs are being planned—the cost effectiveness of other feasible programs should be examined.

Adults, and through them their families, have been reached through food-for-work activities, which often have the added effect of creating roads, schools, storage, and other capital assets. They can be particularly useful in improving nutrition during the season when food prices are highest. The high costs of the projects—beyond the costs of wages—and the scarcity of managerial resources to plan and supervise their implementation are the main drawbacks of such programs. But where food and funds are available and other programs can provide the needed management, the use of food-for-work programs should be expanded. They are particularly attractive when nonfungible food resources are available. Cash for work is generally preferable to food for work as a means of providing local incentives to production of food, incorporating employment-generating activity into government budgets, and, in some instances, monetizing the economy. Food-for-work programs create problems similar to those of other public works programs.[12]

Supplementary feeding programs are generally worthy of encouragement, but they should be carefully evaluated for the nutritional and other benefits that they offer. They should be focused upon the neediest groups not likely to benefit from other government efforts.

Food Ration and Subsidy Programs. Food ration and subsidy programs—or food-demand programs—are expensive, both in budgeted costs and the balance of payments. Their high aggregate costs tempt governments to depress agricultural incentives by setting domestic procurement prices low levels or by encouraging excessive imports of food. Ration programs are difficult to administer, and they build up political constituencies that make them difficult to cut back. In South Asia they have reached more urban lower-middle classes than of the rural poor. It is not surprising that many development analysts believe that ration and subsidy programs are much more part of the problem of development than of the answer.

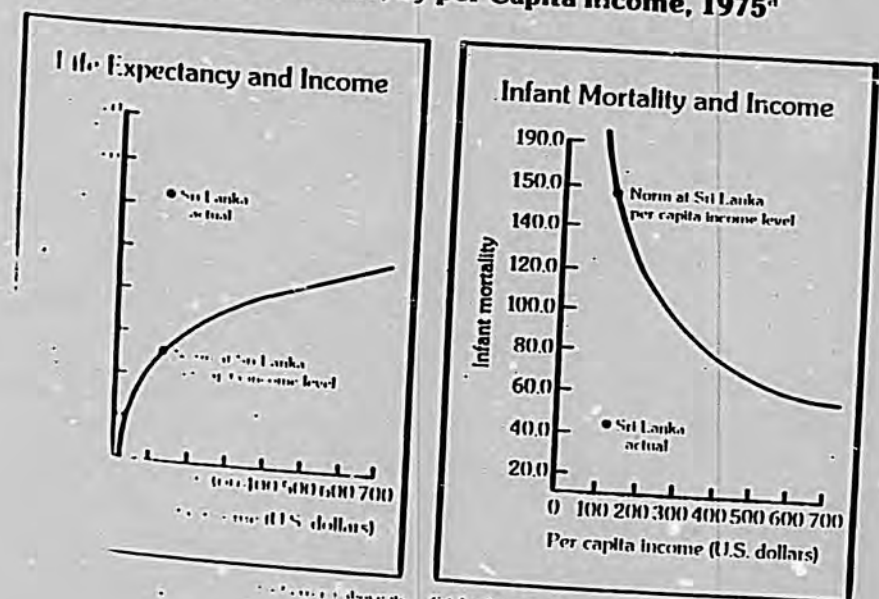
But few other nutrition actions offer the possibility of alleviating, in a reasonable length of time, any substantial part of the widespread malnutrition or preventing sizable numbers of nutrition-related deaths among poor people in developing countries. In several countries, food-demand programs have effectively reached the poor and have helped substantially to reduce severe malnutrition and deaths related to it.

The most successful food-demand programs—and among the most expensive—have been undertaken in Sri Lanka. A 1970 survey shows that the rice-ration program, which at that time included nearly the whole population, provided about 20 percent of the total calorie, or energy, intake of the participants and was equivalent in value to 14 percent of the income of the lowest-income groups. Only 5 percent of the adult-equivalent population consumed less than 1,900 calories a day. In 1975, life expectancy in Sri Lanka was sixty-six years, higher than in richer countries such as Brazil, Korea, and Malaysia and the highest recorded in the world in relation to income level; infant mortality was the lowest in relation to income. In 1975, life expectancy was 39 percent higher than would have been predicted for a country at Sri Lanka's income level, and infant mortality was 67 percent lower (see Figure 1).

How far is nutrition responsible for Sri Lanka's long life expectancy and

Figure 1

Rates of Life Expectancy and Infant Mortality in Sri Lanka Compared to World Norms, by per Capita Income, 1975[a]



Sri Lanka was 67 percent (2.4 standard errors) below its expected value.

[a]Regression equations appear in Appendix F.

low infant mortality? Sri Lanka also has a tradition of assisting the poor in meeting other basic needs: its literacy rate is 78 percent, its health services are good, and its water supply is better than that of most other poor countries. Clearly such achievements in meeting basic needs complement one another. But the direct relation between food supply, nutritional adequacy, and the low death rate in Sri Lanka was dramatically illustrated in 1974. Ration supplies were sharply reduced and food prices on the open market sharply increased when the cost of imported food grains more than doubled. In that year the death rate increased significantly. The literacy rate had not changed, nor had the accessibility of health services or the quality of the water supply. There was no plausible reason for the increases in the death rate other than the shortage of food. The experience of Sri Lanka suggests the importance of food supplies for the poor in reducing death rates.[13]

Programs in Kerala, India, and in Pakistan also appear to have had a positive effect on nutritional status. Pakistan's wheat subsidy program is estimated to have provided half the total calories and two thirds of the protein consumed by low-income recipients.[14] In Kerala the state-financed rice ration program provided 20 percent of the calories of poor households, according to one survey; the program appears to have had a strong positive effect on nutrition.[15] Egypt is another country with very low levels of severe malnutrition, even though its income per capita is less than $400. The average diet of 3,000 or more calories a day, made possible by the extensive food-subsidy program of the government, has clearly contributed to this condition.

In Sri Lanka, food rationing, along with health and education services, served for many years as the main mechanism for improving the welfare of the poor. Not only in Sri Lanka, but in most other countries, developed or developing, food is, politically and economically, a special commodity. Thus important distinctions must be made in weighing the question whether resources used to underwrite consumer food subsidies might have better development uses. There is ample evidence, for example, that redistribution of income is politically difficult.[16] Many countries, rich and poor, that are unwilling to transfer income to the needy are willing to transfer large sums to subsidize staple foods.[17] Feeding the hungry is considered not only humanitarian and virtuous but also as contributing to political stability.

And among donor countries there is more political support for providing foreign aid in the form of food, particularly that going to the poor and malnourished, than for other forms of aid. Food aid may in some cases be the most effective means of benefiting the very poor; the record of reaching the neediest segments of society with other forms of foreign aid is not strong. Sizable portions of many countries' subsidy programs are supported through international food aid, either donated or provided on concessional terms. This food is generally made available as a result of agricultural policies of the donor countries and is not grown specifically to

assist poor countries. Thus, for reasons that range from humanitarianism to increased prices for farmers who profit from and therefore support such programs to the furtherance of foreign policy objectives, there tends to be strong support in donor countries for food aid. A reduction in that aid—and hence in the food-subsidy, child-feeding, and food-for-work programs—is unlikely to be reflected in comparable increases in other forms of aid.

The issue of fungibility, or the interchangeability of aid, is not just whether cash assistance would be available in lieu of food aid but whether there are more productive development programs that additional money can be spent on. Some countries are probably unable to absorb more investment at good rates of return. In short, it does not necessarily follow that if consumer food subsidies were cut, other, more efficient, forms of development investment would be made. Where administrative capacities are strained and rates of return on other development programs are negative, the benefits of better nutrition may make food subsidies a very good use of the available external assistance.

Concentrating on the Nutritionally Needy. The costs of food subsidies can be high: In 1975 they accounted for 21 percent of Egypt's total budgeted expenditure, 19 percent of Korea's, 16 percent of Sri Lanka's, and 12 percent of Morocco's. What a country can afford depends in part on its fiscal circumstances, its balance of payments, and its domestic food supply. It also depends on the political importance attached to the task and on the cuts the government is willing to make in other expenditures to offset food subsidies.

To keep costs down, some form of concentration on the nutritionally needy is essential. Although in Sri Lanka the expenditures in most years were less than $10 per capita, the costs of the nearly universal ration and subsidy programs became unsustainably high in the first half of the 1970s; thus in 1979 the ration program was restricted to cover only the poorest half of the population, and most of the nationwide subsidy on wheat began gradually to be eliminated. The fact that programs without targets are likely to run short of funds and supplies just when they are needed most was amply demonstrated in Sri Lanka in 1974. Had targets been introduced earlier, the increase in the country's mortality rate could have been stemmed.

Concentrating on the nutritionally needy can be accomplished in a number of ways, most of them requiring some form of rationing to prevent serious leakage outside target groups. Income is probably the best means of indicating on a large scale where nutrition problems are concentrated. Imposition of a means test, however, is difficult both politically and administratively. As income data generally are not readily available or easy to collect, assessment of eligibility is extremely difficult except among those employed in the formal sector and among farmers, whose known landholdings often put them above the eligibility level.

Some countries may be able to make use of food stamps, a variant of subsidy by income. The low-income consumer generally buys the stamps at a discount and then can use them, with no further cash payment, to buy specified foods.* Ideally consumers should have to pay as much for food stamps as they had earlier spent for the foods covered by the stamp program; the stamps they received could be used to obtain a larger amount of food, thus assuring an increase in consumption. Also, the poorer the recipient of food stamps, the greater the subsidy would be. If consumers paid less than they had formerly paid for food—or bought stamps in one period and used them in another, or sold the stamps they bought—the expected nutritional benefits would be lessened. But to the extent that these problems can be avoided and that some rough distinctions can be made among eligible households according to income, the benefits of a food-stamp program can be concentrated among the poorest groups and its nutritional effects can be increased.

Targets for nutrition programs—although generally not for consumer-demand programs—are most often set by age group, usually focusing on young children and, consequently, on pregnant and lactating women as well. Age-specific targets can be focused more sharply if income or anthropometric measurements are used as criteria. Or programs can be focused by geographic area—concentrating on drought-prone areas, for example, or other areas of concentrated poverty. A part of Colombia's nutrition program provides food to all persons in specific age groups, regardless of income level, who live in specified geographic regions where there is need. In Recife, Brazil, a city of both high-income and low-income groups, the subsidy program operates only in the poorest neighborhoods.† Establishing targets by season is a promising but generally unexplored means of efficiently providing consumer food subsidies. With subsidies that run during months when food prices are normally highest, governments

In some circumstances the food stamp is not sold at a discount but assures access to scarce foods.

†The neighborhood concentration is an outgrowth of lessons learned from an earlier Recife program in which those families identified through the health system as nutritionally needy were given discounts on selected foods at government supermarkets. Nutrition was improved in many cases, but the neediest group showed little change. They apparently could not pull together the minimum funds required to buy the coupons biweekly that made the discount possible. For a variety of reasons, from cash flow to limited food-storage capacity, the poorest generally buy their food daily. The supermarkets could not handle the paper work that this implied and therefore set a twice-a-month limitation on discount purchases. These problems were addressed by the neighborhood approach, which made discounts available at all times, without coupons, to everyone in the very poor areas who shopped at small commercial retail stores. Nearly everyone in these areas is in need. Estimates were made that the program costs of any "leakage" (discounted sales to those who did not need the nutritional assistance) would be considerably less than the administrative costs of establishing elaborate machinery for determining eligibility and handling coupons. The foods used in this consumer subsidy program were purchased from cooperatives of small farmers in ways that would increase their production, incomes, and nutrition.

can cover the periods of severest nutritional vulnerability and of highest demand for the expenditure of human energy.

Such programs designed to concentrate on the nutritionally needy generally require rationing if large-scale leakages in their benefits are to be avoided. But when poor households are the target group, a careful choice of a small number of commodities to be subsidized could reduce—or even eliminate—the need for rationing and the extensive administrative machinery it requires. The best foods to subsidize are those whose cost per calorie or gram of protein is low and that have a positive income appeal for the poor and little appeal for others. Coarse grains, such as sorghum and millet, processed cassava flour, and certain legumes favored by the poor—macassar beans in Brazil, for example, whole wheat flour in rural Sri Lanka, lentils in central India, and black gram in south India—meet these criteria. These foods are generally consumed in small quantities, if at all, by persons at middle and upper income levels, so a subsidy would benefit the poor primarily.* Such subsidies on lower-status foods have rarely been tried, although Bangladesh recently conducted a large-scale test of subsidizing sorghum through its ration program. Sixty-three percent of the poorest users of the ration shop purchased the sorghum, thereby increasing their energy intake as much as 33 percent for the same expenditure.[18] In India also, sorghum was sold through government channels during the mid 1960s, when the food supply was limited.

Most subsidy programs for staples have been for high-status grains, such as wheat and rice, that the urban lower-middle and middle classes prefer and that have been widely available at concessional prices through food-aid programs. Staples such as cassava have been rejected as nutritionally inferior. With nutritional emphasis on energy intake, subsidies should now be aimed at grains or root staples with low costs per calorie and at edible oil products. For programs subsidizing cassava or other low-protein staples it must of course be ascertained that the composition of the diet is adequate to maintain correct energy-protein ratios, and care must be taken to ensure that the low-protein staple supplements are not substituted for other foods in the diet to the extent that the ratio would be altered unfavorably. Governments should not encourage intake of low-protein food alone if the total protein content of the diets of vulnerable groups would be less than 8–10 percent. Foods richer in protein should, in such instances, be added simultaneously. Subsidies on low-cost sources of protein, such as legumes, along with low-cost sources of energy, can be cheaper and can be better concentrated on the poor than can subsidies on such expensive foods as rice. Similar additional steps should be taken to increase protein con-

The subsidized price should not be set so low that there is danger of diversion to animal feed or exports. Commodities that are or would be used substantially as animal feed obviously should not be subsidized without rationing. Cassava, for example, should not be subsidized in Thailand, where it is fed almost exclusively to livestock, but subsidizing it could be considered in appropriate parts of Western Africa, where virtually all cassava is consumed by people.

sumption in areas and among age groups where protein deficiencies are prevalent even when intake of energy is adequate. When malnutrition in small children is a particularly serious problem, subsidies for nutritionally balanced, processed weaning foods can in some instances be helpful, and special foods for pregnant and nursing women, such as those developed in Brazil and Chile, have a place in these programs.

Aversion to switching from traditional foods is an argument sometimes raised against introducing different staples. But in many countries tastes have changed substantially among poor, malnourished people in the course of time, and when shortages were severe, quite rapidly in response to opportunities to improve nutritional status. The Indian Tamil workers on tea estates in Sri Lanka, for example, have switched from rice, their traditional staple, to wheat because it is a much cheaper source of energy. Similarly, consumption of wheat in Bangladesh and West Bengal has increased substantially since the 1960s. In the last fifteen years eating bread has become commonplace in India.

Target groups can be reached by subsidizing esthetically inferior qualities of a given staple as well as chosen staples. A subsidy on low-quality rice, for example—short-grain rice having a high percentage of broken grains—will reach more of those who are in poverty than will a subsidy on rice of a higher consumer-preference quality. In the People's Republic of China, officials are reported to have varied the value of rice coupons to encourage consumers to choose the less highly refined rices that are of greatest nutritional value.[19] Subsidies on so-called composite flours—mixtures of such low-cost foods as cassava with wheat flours—can also offer nutritional benefits. Encouraging consumption of these lower-valued foods is not, of course, to condemn poor people to consumption of poor foods but to help the needy to increase their energy intake and to save money on energy that can be used for other foods.

In short, a government can concentrate its subsidy programs on the poorest groups—and even on the most nutritionally vulnerable within these groups—in the neediest regions or neediest neighborhoods, in particularly difficult months of the year. Through such concentration, the costs of subsidy programs can be curtailed dramatically. The highly concentrated coupon program of Colombia, once it is in operation nationally, is expected to account for about 1 percent of the national budget.

Inevitably the benefits of food-demand programs leak to those outside the target groups, and resources of those within the group are diverted to purposes other than food purchases. Most nutrition programs and many other poverty-alleviation programs as well suffer such consequences. When intended beneficiaries of a food-demand program reduce their other food expenditures or sell rationed food, the program becomes at least partly a disguised transfer of income. The nutritional losses caused by substitution could, according to economic theory, be considerable, though decreasingly so as incomes declined and the percentage spent on foods increased. A

rigorous comparison of the nutritional effects of a ration program on energy intake and an equivalent transfer of income on energy intake in Kerala found the ration program to be substantially more beneficial.[21] But even a program that turns out to be primarily a disguised transfer of income to the poor cannot be assumed to be a waste of funds. People whose poverty forces their families to have serious nutrition problems tend to spend more than half their incomes for food, and most of the rest is spent for other basic needs, such as shelter and clothing. Consumer food subsidies and other public feeding programs appear to be one of the best ways—and for some countries the only politically acceptable way—of dealing with the otherwise very difficult issue of income redistribution that is fundamental to breaking the cycle of poverty.

Problems of Ration Programs. The institutional problems that ration or food-stamp programs give rise to are formidable: bureaucratic inefficiency, cheating by those who should not receive the ration, unintentional exclusion of those who should receive it, the invitation to corruption inherent in the power of officials to grant ration cards. But ration and food-stamp programs whose administrative costs do not wipe out savings on food and appear to be proportionately lower than the costs of other efforts to improve nutrition or alleviate poverty will be better than programs that are without targets. In every ration program there is some helpful self-selection at work. The lengthy queues, long waits, and sometimes uncertain availability that obtaining ration supplies often involves generally prompts those who can afford to avoid these inconveniences to do so.

To improve efficiency and ease the administrative burden on government, the normal commercial market system can be used for distribution of subsidized or rationed foods. Traders in the private sector probably should be encouraged to procure, store, transport, and distribute the foods, though governments would still have to determine eligibility and issue ration books for food stamps. In bad years, when rationed supplies were scarce and private traders had a strong financial incentive to charge poor consumers more than the rationed price, the government would probably have to play a stronger role.

Risks of Disincentive Effects. The adverse effects of ration and subsidy programs on agricultural production and the prices that farmers receive for their output are matters of widespread concern. Other things being equal, subsidy programs should cause increases in demand and thus raise agricultural prices and incomes. They would only act as a disincentive to farm production if they caused imports to increase by more than the net increase they brought about in demand. If the government had to pay more for the domestic product than for the imported product, it might import the gross amount of food to be distributed, ignoring the losses to local farmers from what they previously sold to people now under the program. If the favorable food imports is due to an overvalued rate of exchange, the government

must respond either by devaluing the currency or by taking action to compensate for the artificial cost of imports. Donors of food aid must be alert to the possibility that excessive imports caused by incremental concessional loans can reduce and defer the budgetary cost of food imports and thus act as a disincentive to local farmers. They should either gain the agreement of recipient countries to increase demand outside the ration program to absorb the excess supplied for the ration or reduce the volume of food they supply.* Large annual variations in donor countries' surpluses that cause food aid to fluctuate are likely to cause low agricultural production in recipient countries in years of high food aid and severe economic and nutritional problems in years in which levels of food aid are low.

The bulk of the evidence, however, indicates that concern for the disincentive effects of food aid is exaggerated.[22] Properly used, food aid can help local agriculture, and it may be entirely compatible with and even necessary for providing incentives to increased production in rural development programs.[23] From a recent study of Brazil it was found that 1,000 tons of wheat under food aid would bring about an increase of more than 1,000 tons in domestic production of grain.[24] Foreign food assistance enabled the government of Pakistan to conduct ration programs in the late 1960s without depressing farm prices, something that would otherwise have been necessary as part of an effort to reduce costs. Tunisia has used food aid to maintain a dual system with higher prices to producers than are considered politically acceptable for consumers. Recent studies of Botswana, Lesotho, and Upper Volta also showed no evidence that food aid caused a significant depression of producer prices.[25] A recent survey of twenty empirical studies of possible disincentives concluded that it does seem likely that a price disincentive effect on production can be avoided—and generally has been avoided—by an appropriate combination of policy tools.[26] According to a recent analysis of country case studies, food aid "is unlikely to have a negative effect and may well have a positive impact if it is supplied in good time and in the form of locally acceptable commodities to a food-deficit country with energetic agricultural development policies and as part of a broader package of measures designed to assist a poverty-oriented development strategy. It is likely to have a negative impact if supplied under the opposite circumstances."[27]

*Another effect of food aid that merits watching is the lessening of pressure on governments to mobilize local resources. When food aid is sold by assisted governments in domestic markets the resultant budgetary support reduces the need for adequate local taxation.

†The nutrition of low-income people in low-income countries can, in principle, be improved substantially by food aid. Calorie deficiencies are large, the poor spend a high proportion of their incomes on food and have high marginal propensities to spend money on food, and the quantities of food aid have been significant in relation to nutrition gaps in poor countries. In practice, most food aid has not been noticeably related to nutritional need or per capita income.[28]

Government efforts to puch down farm prices to reduce the procurement costs of food programs may also have disincentive effects. In Mali, for example, where the government held down the price of sorghum to be able to buy grain more cheaply for its urban subsidy program, domestic production of sorghum was probably inhibited. In India, the desire of the government to obtain domestic grain at low prices for distribution through "fair price" shops led to a ban in some years on trade between "food zones," which probably caused production to fall in surplus areas.* The remarkable achievements of India in grain production during the last fifteen years, however, make it clear that consumer subsidies need not be a disincentive to producers. And the long-standing consumer food-subsidy program of Sri Lanka was accompanied by a variety of incentives to farmers; in two decades, rice production tripled. Farm employment and rural incomes increased substantially.[29] Nonetheless, the need to provide incentives for domestic agricultural production is a serious one in developing countries, and attention must be given to assuring that food-demand programs are not allowed to aggravate it by depressing producer prices.

Many of the problems that have made food-demand programs unattractive—the fiscal problems and food riots in Egypt, for example—have arisen in programs whose primary goals were to keep down the urban cost of living and urban unrest—and in some instances, as in Zambia, to attract labor to urban industrial jobs—rather than the narrower goal of alleviating malnutrition. This explains why ration programs in such countries as India and Bangladesh fail to reach most of the poor: Most of the poor in the Indian subcontinent, as in Africa, live in rural areas. The ration and subsidy programs of Sri Lanka covered the poor unusually well, but a large part of the sizable expenditures made before income was made a condition of participation in the ration program in 1978 were for families not dependent on the program for adequate nutrition. Poverty-oriented food-demand programs have hardly ever been tried. Rural-development, credit, water-supply, and housing programs focused on the very poor are all relatively new instruments derived from earlier programs that were not poverty-oriented. The kind of persuasive arguments that were made to direct these programs toward the poor apply as well to food-demand programs.

Food-demand programs with the poor as targets can be a significant part of national programs for the improvement of nutrition and the alleviation of

*The food zone restrictions had an apparent depressing effect on incentives to farmers in surplus areas, although it was mitigated by the reductions in cost brought about by introduction of high yielding varieties of grain. The restrictions also drove up the price of grains on the open market in deficit areas. Yet Sri Lanka had a comparatively favorable pricing situation for farmers, in spite of its ration program, throughout the 1950s and 1960s. The high foreign exchange cost of food imports, very little of which was financed through foreign aid, put pressure on the government to keep the price of rice up in order to encourage domestic rural production. In the 1970s, as the rupee depreciated, there was a disincentive effect for production of rice and, to a greater extent, of cassava and coarse grains, for which there was no support price.

poverty. This is particularly true of programs intended to help the urban poor, although in some countries, such as Pakistan, most people in rural areas also have access to ration shops. These programs should not be dismissed out of hand because of failures of past programs generally designed for other purposes. On the other hand, they are not without potentially serious problems. Governments should not lightly become involved in food-demand programs. Those that they undertake should be carefully directed toward specific groups. Those that are not well planned are likely to run short of funds and supplies precisely when they are needed most—at times of shortage and high prices.

When food-demand programs appear to be needed and seem likely to be politically and economically feasible, governments should examine the whole range of issues that they may raise. Initially food-demand programs should be experimental and carefully monitored; as experience is gained, planning and implementation can be improved, so as to keep both direct and indirect costs at a minimum in relation to the benefits realized.

Chapter 6
Putting New Approaches to Work

It may be fair at this point to offer the following conclusions abo
nutrition problem:

- Malnutrition is a problem of major proportions.
- The nutritional condition of the poor is no better than it was a d
ago. In many countries it is worse.
- The nutrition problem is not likely to be resolved in most cou
within a generation by increasing incomes and agricultural producti
- The basic problem is food-energy insufficiency, sometimes co
cated by deficiencies of specific nutrients.
- The principal victims are the very poor, especially the rural poor.
governments are not reaching them with the benefits of nutrition; few i
central ministries with the outreach to do so.

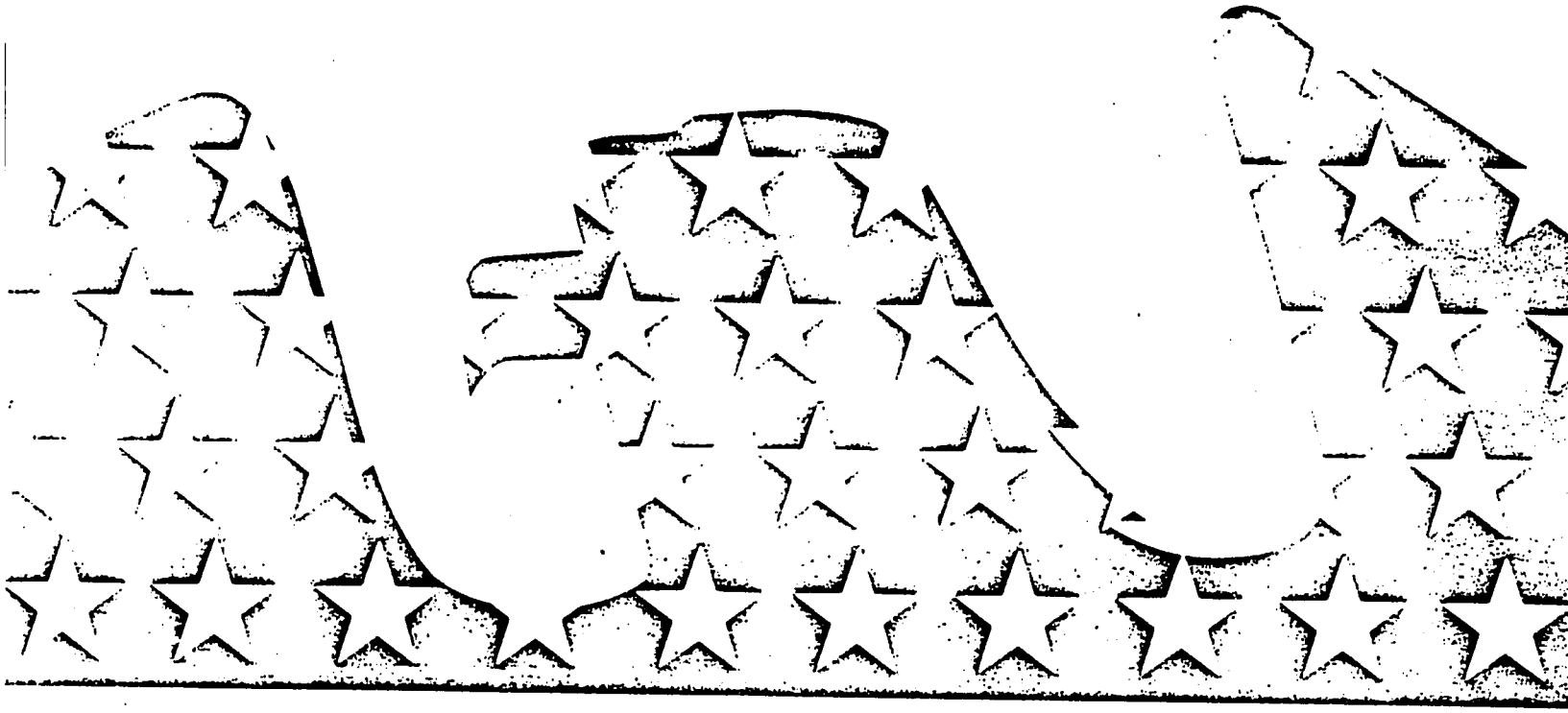
Commonly expressed goals to eradicate malnutrition in the near fu
are unrealistic. The aim should be to overcome malnutrition in those ar
forms, and population groups in which it exerts the greatest drag on de
opment. The problem exists in almost all countries, but within countri
differs significantly among various income groups, occupations, and
gions. Malnutrition in Northeast Brazil, for example, is as severe as it i
parts of South Asia. The largest problem in sheer numbers is in the Ind
subcontinent. The largest problem by proportion of population in need i
Sahelian Africa, Bangladesh, and parts of Central America.* In most pa
d the world, supply of food has kept ahead of population growth. In s
Saharan Africa, however, food production per capita has been declining
decade. Life expectancy is fifteen years less than in Asia and may well l
me worse.

The need for nutritional help exists among people of all ages and bo
not just small children and pregnant and lactating women. Tl
lem is particularly serious among families of landless agricultural l
farmers with small landholdings that rural development progran
reach, small-scale fishermen, and the urban unemployed. Togethe

*natural and man-made, would add different countries to this list in any give
and parts of Eastern Africa, for example, would have to be added in 1980
that arise as a result of disasters are not addressed here.

A.I.D. Policy Paper

NUTRITION



U.S. Agency for International Development
Washington, D.C. 20523

May 1982

2

A.I.D. Policy Paper

Nutrition

Bureau for Program and Policy Coordination
U.S. Agency for International Development
Washington, D.C. 20523

May 1982

TABLE OF CONTENTS

		Page
	Executive Summary	i
	Preface	ii
I.	Introduction	1
II.	Objective of the nutrition policy and its accomplishment	2
III.	Elements of the policy	2
	A. Problem identification	2
	B. Designing programs to address nutrition problems	4
	1. Agriculture and Rural Development	4
	2. Health	6
	3. Food Assistance	7
	4. Population	8
	5. Education and Training	8
	C. Targeting based on nutrition	8
	D. Evaluating nutrition impacts	9
	E. Complementing sectoral programs with nutrition projects	10
	F. Utilizing the private sector	10
	G. Improving host country policies	10
	H. Coordination	10
	Conclusions	11
	Selected Bibliography	12

Executive Summary

Estimates indicate that six hundred million people in less developed countries (LDCs) are in danger of not getting enough to eat. As a result, their productivity, health, and life expectancy are jeopardized. If the U.S. is to make progress toward helping LDCs improve agricultural production, economic performance, and human potential, nutrition must be included as a critical **input** as well as an essential **output** of development programs. Most of A.I.D.'s development assistance either **affects** health or food consumption or **relies upon** nutritional well-being to achieve development objectives. For this reason, it is of greatest importance to give increased attention to opportunities for improving the nutrition impact of sectoral policies, strategies, programs, and projects.

This policy paper reviews the justifications for U.S. investment in improving nutrition in LDCs and sets out some policy guidelines for A.I.D. programs. The objective of the nutrition policy is to maximize the nutritional impact of A.I.D.'s economic assistance. The policy recommendations are as follows:

- A.I.D. places highest priority on alleviating **undernutrition**—inadequate food consumption and biological utilization of nutrients.
- A.I.D.'s policy is to improve nutrition through **sectoral programs** in agriculture, health, food aid, population, and education as well as through direct-nutrition programs.
- This policy will be implemented through incorporating nutrition and food consumption as factors in decision making in sectoral strategies, programs and projects.

This can be effected through:

A. **identifying** projects based upon analysis of nutrition and food consumption problems; this is especially appropriate in formulating country development strategies.
B. **including** nutrition as a factor in project design:

1. in **agriculture**, through maximizing consumption effects of crop and technology selection, research and extension, and appropriate national policies.
2. in **health**, through primary health care which emphasizes growth monitoring of children, providing pre- and post-natal nutrition, supporting environmental health measures, and promoting proper infant feeding practices.
3. in **food aid**, through targeting appropriate rations to at-risk groups complemented by growth monitoring, health care, and nutrition education.
4. in **population** by complementing voluntary family planning services with nutrition programs whenever feasible.
5. in **education**, through promotion of basic education for women, nutrition education in the schools, training community outreach workers in nutrition, and advanced training for professionals and policy makers in LDCs in nutrition.

C. **targeting** sectoral projects to individuals or housholds at-risk of developing nutrition problems;
D. **monitoring** and **evaluating** nutrition impacts of projects that are likely to affect nutrition, food consumption, or food production.
E. **complementing** sectoral programs with nutrition projects to enhance nutrition impacts;
F. **utilizing the private sector**, especially the food industry, in food programs whenever feasible;
G. **encouraging** appropriate national agriculture, health, and nutrition policies to address nutrition and food consumption problems;
H. **coordinating** with LDC governments and other donors to achieve nutrition goals.

In seeking opportunities to integrate nutrition concerns throughout A.I.D.'s development assistance program, A.I.D. will focus on the factors that affect food consumption, nutritional needs, and health of nutritionally at-risk groups.

Preface

Since 1965, A.I.D. has been a leader in international efforts to improve nutritional status in LDCs. For instance, through A.I.D.'s pioneering work in nutrition planning and surveillance,[1] the multisectoral nature of the nutrition problem in LDCs has become increasingly clear. A.I.D.'s nutrition strategy of 1973[2] demonstrated keen foresight in emphasizing protein-calorie malnutrition[3] rather than the then-popular "protein-gap." A.I.D.'s nutrition strategy of 1977[4] introduced integrated preventive approaches to nutrition by focusing attention on **household purchasing power** for food. This approach was innovative not only in calling attention to the fact that all members of a household may be at nutritional risk (not just the women and children), but also in noting that nutrition problems involve more than aggregate food supply. A.I.D. has also been a major proponent of nutrition planning in developing countries and has been a leader in increasing the nutrition planning capacity of developing country policy advisors, through workshops and training sessions at U.S. institutions.

In the last decade, significant strides in nutritional science have caused A.I.D. to reexamine its nutrition policies and strategies. Major scientific and methodological findings have implications for nutrition programs.

— Measurement of children's growth in less developed countries (LDCs) has shown that until they reach 5 years of age, children in nearly all populations (excluding pygmies) have the potential to grow as tall as U.S. children. This means that children in LDCs are short not because of genetics but rather because of poor nutrition.

— A number of studies have shown that adequate dietary energy (calories) plays a central role in producing healthy, adequate birth weight babies. Supplementing marginally nourished pregnant women's energy intake improves pregnancy outcome significantly.

— Nutritionists and psychologists have shown that poor nutrition impairs cognitive and neurological development which in turn reduce learning capacity, attention span, and school performance.

— Studies on the effect of energy intake and iron status on energy expenditure have proved that undernutrition and anemia reduce work productivity. Improvement of nutritional status is matched by increased worker output.

— Investigators from many institutions have shown that most staple grains provide sufficient amounts of protein for human needs. Only for preschool-aged children fed entirely on staple grain and in some populations for which roots and tubers comprise nearly all of the dietary calories, protein content of the diet may be insufficient.

— Medical studies have shown that poor nutritional status impairs the body's immune system resulting in more frequent and longer bouts of illness and higher susceptibility to life threatening disease.

— Clinical nutrition studies have revealed previously unknown but essential components of the diet; for instance fiber, trace minerals and a balance of cholesterol and different fats have been found to be essential.

— The absence of a truly equivalent manufactured substitute for breastmilk has highlighted the unique role of breastfeeding in infant nutrition, even in the United States. In developing countries breastfeeding is essential to infants in low income households because breastmilk substitutes are often unhygienic because they are improperly prepared using unclean utensils and unsafe water.

A.I.D.'s policies in food and agriculture, health, population and food assistance have also changed, necessitating restatement of A.I.D.'s major policy objectives in nutrition to provide overall guidance for improving programming to meet these objectives.

---

[1] Nutrition surveillance involves collection and analysis of data on food consumption and nutritional status on a regular basis. The current work being carried on at Cornell University through the Office of Nutrition is a good example of pioneering efforts in tracking nutrition surveillance efforts and promoting the functional classification of malnutrition.

[2] **The A.I.D. Nutrition Program Strategy**, U.S. Agency for International Development, June 1973.

[3] Lack of protein and calories is sometimes called protein calorie malnutrition (PCM).

[4] "A.I.D.'s Responsibilities in Nutrition, "AIDTO Circular A-98, April 1977.

I. Introduction

Sound nutrition policies are essential to the overall development efforts of LDCs. One of the messages that the U.S. carried to the Cancun Summit (in October 1981) was that "increasing food production in developing countries is critically important—for some, literally a matter of life or death. It is also an indispensable basis for overall development." Despite enormous strides in agricultural technology in the last decade, however, people are still dying from starvation and extreme malnutrition.[5] Hundreds of millions are not getting enough to eat—thus rendering them vulnerable to disease and disability, and unable to work or learn to their full potential. If, as the U.S. emphasized at the UN General Assembly in September, 1981, "the individual is the beginning, the key element, and the ultimate beneficiary of the development process," then one of the first goals of development efforts must be to overcome the obstacles that stand in the way of individual initiative and potential. This paper examines a variety of policy initiatives that the U.S., other donors, and LDCs themselves can adopt to maximize the impact of development programs on nutritional status of citizens of the developing world.

U.S. foreign aid is based on a commitment to broad based economic growth in developing countries through "alleviation of the worst physical manifestations of poverty among the world's poor majority" including "starvation, hunger, and malnutrition" (Foreign Assistance Act of 1961, Chapter 1, Sections 101 and 103). Improving nutrition is vital to the overall goal of strengthening the economies of developing countries.

Nutritional well-being is a necessary and crucial *input* in the development process. Undernutrition—insufficient consumption, absorption, and biological utilization of food—can result in starvation and death in extreme circumstances, but is usually disguised as low stature and weight, low worker productivity, poor school performance, poor reproductive performance, or lethargy.

Undernourished adults have lower stamina, productivity, and attentiveness. They are sick more often and more seriously than well-nourished adults. *Undernourished women* give birth to smaller, less robust babies than well-nourished women. Low birthweight babies are at high risk of death before the age of one year. *Undernourished infants* have low disease resistance which may cause them to die from what would be minor diseases under better circumstances (measles case mortality in Guatemala in 1976, for instance, was 268 times that in the U.S.). Diarrhea and intestinal parasites (the most prevalent cause of illness in LDCs) are exacerbated by and in turn aggravate poor nutritional status of the child since the ability to absorb and effectively utilize nutrients is sharply reduced under these conditions.
Undernourished children have stunted mental and physical development that may later compromise school performance, physical capacity, and economic productivity. *Undernourished households* are less productive because of disease, human energy shortage, time losses to sickness and inefficiency, and loss of human life (high pregnancy losses and maternal mortality, high infant and child mortality, low life expectancy). *Undernourished individuals, communities, and societies* fall far short of their creative, physical and economical potentials because of losses to poor nutrition: health and education expenditures are wasted because many of the recipients of these services never reach productive age; human spirits are constrained by enervation; opportunities for national development are foregone because of undeveloped human capital; and internal security is fragile as a result of frustration or dissatisfaction with the inadequacy of one of the basic necessitites of life: food.

Better nutrition is also an essential *output* of economic development. Unless health, life expectancy, and vitality are improved as a result of economic growth, development has not achieved its true objectives. In the long run, A.I.D.'s assistance to developing countries should be reflected in improved nutritional status. This will not come about automatically, however. It will require a conscious effort to include nutrition as a basis for resource allocation in strategies, programs and projects.

Approximately 600 million people in developing countries do not have access to enough food to meet their nutritional needs. Only a small portion of those people are clinically malnourished. The preponderance of them are mildly to moderately undernourished. Others are poorly nourished on a seasonal basis. Still more are at the margins of adequacy such that major illness, increases in food prices, or decreases in real income could force them into nutritional deficit. Although the largest number of calorie-deficient people are found in Asia, it is in Africa where the largest proportion of the total population consumes insufficient energy (see table).

[5] Throughout this paper "malnutrition" is used to describe a spectrum of nutrition problems including underconsumption, overconsumption, and nutrient imbalances. "Undernutrition" is specifically inadequate consumption and biological utilization of food.

Number of people (millions) and share of population with calorie intakes below 90% FAO/WHO requirements in selected countries by region, 1973

	Millions of People with Calorie Deficient Diets	As a Percent of Regional Population %	As A Percent of Total Calorie Deficient %
LAC	92	37%	15%
Asia	448	49%	75%
NE	34	33%	6%
Africa	25	53%	4%
	599	46%	

SOURCE: Reutlinger and Alderman. **The Prevalence of Calorie-Deficient Diets in Developing Countries.** World Development 8: 406, 1980.

II. Objective of the nutrition policy and its accomplishment

The objective of this policy is to maximize impact of A.I.D. development programs on nutritional well being of poor people in LDCs. This objective will be accomplished in development sectors through including nutrition and food consumption as factors in decision-making and cost-benefit analysis concerning strategies, programs, and projects. It can be accomplished through any or all of the following mechanisms.

1) identifying projects based on analysis of the nutrition problem;
2) designing projects to overcome constraints to meeting nutritional needs;
3) targeting projects to nutritionally at-risk groups;
4) monitoring and evaluating impacts of projects on nutrition and food consumption;
5) providing technically strong nutrition programs to (a) backstop activities in all development sectors, (b) supplement sectoral efforts to ensure effectiveness in meeting nutrition goals and (c) complement sectoral programs with specific nutrition project activities to enhance nutrition impact;
6) increasing the indigenous capacity in LDCs to analyse and overcome nutrition problems through promotion of multisectoral nutrition planning and appropriate national policies.

III. Elements of the Nutrition Policy

The nutrition policy of the Agency for International Development is to improve nutrition and food consumption through sectoral programs in agriculture and health and through direct nutrition programs when they are suited to achieving Agency objectives.

Nutrition policy concerns the factors that affect human food consumption and nutritional requirements, focusing on the needs and resources of the household, including health considerations, economic demand, and food use. Reciprocally, agriculture policy pertains to the factors that influence the production of food and other crops and agricultural employment generation. Food policy, which technically links consumption-oriented nutrition concerns with production-oriented agriculture perspectives, tends to focus on prices, imports and exports, aggregate demand, and national food security, with relatively little attention to questions of nutritional needs or food distribution at the household level. A.I.D.'s Food and Agriculture Development Assistance Paper[6] details the ways in which agriculture production, food supply, and family incomes can be increased. The successful implementation of the Food and Agriculture Policy will not solve all nutritional problems, nor should it. Agricultural projects can positively affect nutrition through the mechanisms detailed elsewhere in this paper. Those nutritional problems which are not most effectively or appropriately dealt with through agricultural development must be solved through health or other sectors or through direct nutrition programs. This policy paper articulates the Agency's nutrition policies and discusses the ways in which activities in agriculture, health, and other development sectors can positively affect nutrition in developing countries.

A.I.D.'s policy emphasizes coordination among sectors and between the field and Washington to maximize achievement of nutrition goals.

Because most project officers are not nutritionists, it is essential that missions make best use of outside technical experts and improve their inherent field capacity through training and enhancing field staff with nutritional expertise.

Integration of nutrition concerns throughout A.I.D.'s program is best institutionalized in the context of project, program and CDSS reviews and by providing technical input to sectoral strategies. More particularly, if a project is likely to affect the food system, health, or household labor and time, then the potential for nutritional impacts should be given careful consideration. Special attention will be given to such projects in missions which identify food production and malnutrition as major problems in the host country.

A. Problem Identification

A.I.D.'s nutrition policy places highest priority on alleviating undernutrition—that is, inadequate consumption of food.

Undernutrition can be traced to *insufficient food supply, inadequate access to food, insufficient*

[6] A.I.D. Food and Agricultural Development Assistance, March, 1982.

purchasing power, inappropriate demand patterns (due to taste, tradition, perceptions), *inequitable distribution* of food within countries, *inequitable allocation* to individuals within families, and/or *poor utilization of food.*

Part of the problem is inadequate food supply—of the 36 lowest income countries in the world (those with GNP less than U.S. $370 per capita per annum) in 1977, eleven had a food supply that provided less than 90% of the estimated aggregate human energy requirements; nineteen other countries had between 90% and 100% of food energy needs available.[7] In subsaharan Africa, average per capita food supplies have actually been decreasing over the last decade, although elsewhere in the world per capita food supply has increased slightly. Therefore programs in agriculture and population are essential to solving the nutrition problem in the long term.

The imbalance between growth in food supply and population increase may explain undernutrition on a macro or national level, but many countries with apparently adequate aggregate food supplies have high incidence of undernutrition. Some countries which are net food exporters still have serious nutrition problems.

On the regional, household, and individual level, the nutrition problem relates to many factors in addition to food supply. *Physical access*—markets, roads, transportation, production for auto-consumption—often limits the availability of food within and between regions of a country. Futhermore, *economic access and purchasing power* are usually limiting factors for the rural and urban poor. High consumer prices, low income, low producer prices, and unreliable employment may limit economic access to food. In many cases *food availability has a seasonal component* as well—preharvest hunger is common in subsistence economies. For this reason, improved productivity, on-farm grain storage, food preservation, local food security and seasonal employment can affect nutritional status.

Intrahousehold distribution of food is another determinant of nutritional status. Frequently women and young children receive less or lower quality food while the men and economically active children are given significantly more and better food. In many cases this is due to economic pragmatism: if the wage earners are hungry, they cannot work as hard, they will not earn as much money and the family will be worse off.[8] This problem can be addressed through culturally appropriate nutrition education and through direct nutrition programs (e.g., home gardens).

In that women's income seems to be spent preferentially on food, A.I.D. might also take advantage of such existing household allocation behaviors to address nutrition problems by specifically including women in income producing projects. The ways in which household resources are allocated, who makes the decisions, and how these processes change over time are just now being studied[9] so that guidance in using such processes to improve nutrition will be generated from the field.

Undernutrition is also related to high food needs or excessive nutritional losses. Human food needs are above average in developing countries because of higher energy expenditures in work, and high proportions of growing children and pregnant and lactating women. Excessive losses are due to infectious disease, intestinal parasites, and diarrhea.

Addressing protein inadequacy and micronutrient deficiencies is also important.

Dietary protein, Vitamin A, iron, iodine, and some B Vitamins are lacking in some areas of the world and for certain population groups. Technological solutions to these problems are available, although actual delivery of the technology has proven administratively difficult in some cases. Deficiencies may be inherent in the local diet or may result from agricultural or economic changes. In some parts of the world, the

[7] If all people consumed as much energy as they needed (and no more than they needed), then a food supply equal to 100% of caloric requirements would be needed nationally. When some people consume more than they need and others consume less, however, estimates of required food supply must be inflated to compensate for skewed overconsumption. In developing countries it is estimated that 110% of dietary energy requirements is needed in the food supply to compensate for that nutrient wastage by overconsumers. In cases where distribution is very skewed, even 110% of energy requirements may be too low.

[8] Recent reviews of the literature have shown that inequitable distribution of food within the household is ubiquitous. But uneven intra-household food allocation is not the only problem. Other research has shown that even if many low income families did distribute food according to relative requirements of each household member, no one would get enough to eat.

[9] Evidence is just beginning to emerge on this point. Some studies have indicated that children of working women are less likely to be malnourished than children of non-working women. In Kerala, for instance, it was found that women's income was twice as important in determining children's nutrition status as men's income. In the Philippines women's labor force participation was positively associated with caloric adequacy among children in the lowest income group although consumption of Vitamin A was reduced. Women's working is not always best for children, however most poor women in LDCs do participate in some form of work outside the home. The positive association of women's income and nutritional status of their children is mediated by various aspects of the compatability of women's productive and nurturing roles (e.g., the availability of childcare, homemaking services, and labor saving devices).

staple diet is often too bulky to satisfy the nutritional needs of small children simply because their small stomachs will not hold enough food. For these individuals increasing the nutrients per gram of food—"nutrient density"—is of high priority.

A "modern" diet can rapidly replace a traditional one, sometimes with deleterious short-term nutritional consequences. With increasing income, for instance, some poor families buy higher status less nutritious foods: polished rice instead of brown rice, sweets and snacks instead of staple grains.

B. **Designing programs to address nutrition problems**

A.I.D.'s policy is to include nutrition as a factor in program and project design.

1. **Agriculture and rural development**

Agricultural and multisectoral rural development programs comprise the bulk of A.I.D.'s development assistance budget both because agriculture is a major source of national income and because most people in LDCs live in rural areas. Through agricultural and rural development projects, A.I.D. is simultaneously helping to improve the food supply, economic base, and employment in those countries. In order to assure that agricultural goals are achieved and that the benefits of development reach the poor, however, the nutritional needs of the rural population and the nutritional impacts of development programs must be taken into account.

To address nutrition concerns within A.I.D.'s agricultural program, it is necessary to know *how the food produced reaches the ultimate consumer and how the income generated is ultimately spent on food* and other commodities. Increased food production or higher income does not automatically mean better nutritional status especially in the short term. Problems of food distribution and storage, income distribution, intra-household control over resources, and alternative (non-food) claims on financial resources all affect the production/nutrition equation.

Rural households which are nutritionally at-risk are often those with few productive resources—land, water, labor, or capital. They produce only an occasional marketable surplus and pursue limited economic activities. They may also be least able or willing to take risks, either because they are physically inaccessible or because they have the lowest margin for absorbing setbacks. Hence, their market returns may be low, and the technology they use different from that designed for and relevant to commercially-oriented farmers. To improve the productive capacity and hence the nutritional well-being of farmers who are not currently market oriented will require a strong emphasis on development of appropriate institutions as well as agricultural research and technology that is responsive to their needs and risk situtation. Improving the productive capacity of more resource-rich and commercially-oriented farmers is also important for nutrition since these farmers are likely to be the primary producers of urban food supplies.[10]

Incorporation of nutrition concerns into agriculture programs necessitates a balanced allocation of resources among short-term production-oriented investment, investments in long-term human resource development, and medium-term investments designed to ensure access to factors of production and markets, particularly for those rural and agricultural households which are nutritionally at-risk. There are trade offs and complementarities between meeting production/employment goals and meeting nutritional goals which should be taken into account by the mission staff when making program decisions.

Agricultural projects should anticipate changes in food consumption which accompany changes in cropping patterns.

When the cropping pattern, labor or resource allocation, seasonality of harvests or income is changed by an agricultural project, alterations are usually made within the household to accommodate them. Many of these changes are benign—but where food habits are changed there is a potential for negative nutritional impact. At the very least, projects affecting these factors should monitor nutritional status or food consumption of the target population.

Additional labor requirements for a new or improved crop may cause a farmer to plant less labor intensive and less nutritious household food crops (for example, cassava is planted instead of yams because the former requires less labor and is less sensitive to timing of cultivation and harvesting).[11] By providing off-season employment or interharvest crops such labor/food supply conflicts could be avoided or minimized.

When cash crops are harvested once per year, householders may be cash short in the non-harvest season and unless they have planted a food crop, they may not be able to buy sufficient food for

[10] Innovations which keep costs of production down, no matter what the size of farm, will help to assure that the food supply is available at a reasonable cost, and will enhance overall purchasing power.

[11] This phenomenon happened in West Africa where the introduction of cocoa induced a change from yams to cassava because the women has less time to spend harvesting their subsistence crops.

their needs. Moreover, when a large number of farmers in a region convert acreage from food crops to cash crops, local food supplies may be limited and increase in price unless local transportation and marketing mechanisms are improved. Lower income farmers are particularly vulnerable to seasonal variations in food supply and income because a larger proportion of their income is spent on food and because they are most likely to have smaller food reserves. Therefore, attention should be paid to the institutions on which the household food systems depend.

The new cash crop farmer may not be able to purchase the foods in his traditional diet in the quantitites which used to be consumed from subsistence production. In order to fill stomachs, therefore, he may have to purchase less expensive and less nutritious foods. Also, when cash income replaces food income, there is a higher likelihood that non-food items will claim a portion of the household budget.[12] In commercial agricultural production projects, positive nutrition impacts can be enhanced through complementary nutrition components like nutrition education and home gardens.

Recently, attention has been directed at farming systems, particularly to the physical and temporal constraints to increasing productivity by smallholders. Because farming systems programs are inherently multi-sectoral in focus, they offer a good vehicle for adding nutrition activities where needed and appropriate.

Agricultural projects should anticipate nutritional impacts of labor requirements.

Human energy and time are frequently the scarcest resources in farm families, especially in subsistence and female-headed households. Even on commercial farms, labor is frequently scarce for peak cultivation and harvest activities. Some agricultural improvements are more labor intensive than traditional methods. For instance, new rice varieties require more time and energy to cultivate than traditional varieties. Where unemployment is high, such innovations can have positive effects on income and food consumption. On farms which cannot hire labor, energy- and time-saving technology in the form of low cost innovations which are also capital-saving (e.g., hand pumps, small-scale grain mills) can be vital elements of a strategy to improve nutritional status.[13]

Current A.I.D. policy emphasizes the importance of employment generation as a component of agricultural and rural development. For maximum nutrition impact, employment opportunities should be directed to high nutritional risk groups and spread evenly throughout the year, to assure steady income to meet food needs and discourage labor migration, or properly timed with seasonal food shortages (usually in the preharvest period) to raise income at a time that food deficits must be made up through purchases. At a minimum, wages should be commensurate with energy costs of the work. In one Latin American country it was found that the introduction of sisal into local agriculture pushed farmers into caloric deficit because their energy expenditures in sisal processing exceeded the amount of food energy they could buy with their wages. The new technology, in short, introduced an extra nutrition cost.[14]

On- and Off-farm employment can strengthen intrahousehold resource allocation patterns which improve nutrition.

When women's employment is encouraged, efforts should be taken to facilitate good child care and nutritional practices, including the encouragement of proper infant feeding practices. Frequently when rural women are employed outside the home, infants are cared for by siblings (often not much older than themselves) or elderly family members. The quality of care and food provided to the child may be inadequate under such conditions and the caretaker, often a young girl, may be missing out on educational opportunities because her services are needed at home. By providing work close to home, allowing infants to be brought to work, provision of child care facilities or services, and training caretakers in proper child care practices, potential negative effects could be minimized.

Evidence has been accumulating to indicate that *who* earns the income is almost as important as *how much* is earned. The adult male usually

[12] The impact of cash cropping on nutrition is a complex issue. Although increased income is the "long term" solution to the nutrition problem for most at-risk households, the improvement in nutrition is not automatic in the short term. Studies have shown that some income generating agricultural activities fail to improve nutrition. Frequently the benefits of additional income are undermined by time constraints of the mother, insufficient complementary health services, inadequate education of the mother resulting in poor food purchasing habits, contaminated water supplies, and seasonal or erratic receipts of income which cause money management problems in the household. Nevertheless, families frequently find it difficult to return to food crops once they have cultivated cash crops.

[13] Poorer households must use a larger proportion of their labor supply, (i.e., number of work days per family is higher than wealthier households) to satisfy their food needs. Women and children in particular have been shown to have significantly higher work loads in poor families.

[14] Gross, D. R., and B. A. Underwood. Technological Change and Caloric Costs: Sisal Agriculture in Northeastern Brazil. Am. Anthro. 73:725-740, 1971.

decides how his income will be spent and gives a portion to the female head-of-household for household necessities (mostly food) but the proportion of his income spent on food is usually lower than that of women's income. In addressing nutrition problems through employment generation, project designers should understand and take into account the ways in which different household members use their income. (See footnote 9).

Agricultural research should address food consumption patterns of at-risk groups and recognize their technological and capital constraints.

Increasing the nutritional content of crops through genetic manipulation is but a small part of the potential nutritional impact of agricultural research. Far greater nutritional improvements are likely to result from research improving productivity, reliability, and food processing characteristics of basic food crops which are grown and/or consumed by nutritionally at-risk groups and by incorporating certain technological and resource assumptions into plant breeding. Research on basic food crops like cassava and millet can have major implications for nutrition. Recent research on cassava, for instance, has focused on breeding a plant which can survive with very few leaves. Because cassava leaves are a major source of nutrients in the preharvest period in some cultures, the introduction of this new plant will enable farmers to eat both the leaves and the roots. Crops which require large amounts of fertilizer and water, those for which there are economies of scale, and those that require mechanization for cultivation, harvesting, or processing will not be well-suited to those farmers who cannot get credit and who have few available capital resources. Those are the same farmers who are probably poorly nourished and have the greatest nutritional need.

2. Health

Promotion of good health is essential to meeting the nutritional objectives of the Agency.

The interaction between nutrition and infection is well-known.[15] A poorly nourished individual has an impaired immune system which means not only that he is more susceptible to disease, but also that treatment may not be as effective. In addition, certain infections raise nutritional requirements, reduce nutrient absorption, or decrease appetite—all of which lower nutritional status. For these reasons, nutritional well-being is both a precursor and a product of good health.

Nutrition objectives should be addressed in the health sector through primary health care.

One of the main emphases of A.I.D. health policy is primary health care delivery and the nutritional aspects of good health are stressed. Preventive health care—immunization programs, environmental sanitation, parasite control, health and nutrition education, growth monitoring, prenatal care, and well-baby clinics, etc.—is the focus of A.I.D.'s health policy and an important element in its nutrition policy as well. It is extremely important, for example, to reach pregnant women and preschool children in order to avoid the permanent damage which can result from malnutrition in early life. Health care is necessary, although not sufficient, for good nutrition. Improving prenatal maternal nutrition can be an effective way of reducing infant mortality through increasing birthweights of infants and increasing maternal nutrient stores.

Growth monitoring is a low cost preventive health care measure with major nutritional significance.

Growth monitoring involves the periodic weighing of preschool children and using that information to target health care, health or nutrition education, family planning, or supplementary feeding programs to mothers of children whose growth is faltering.

Growth monitoring of preschool children carried out by community workers is an ideal way to break the downward spiral in health caused by repeated incidents of infection and malnutrition. It has been found that mothers usually do not know that their children are not growing properly until they exhibit the physical manifestations of clinical malnutrition.[16] Growth monitoring alerts the mother early that her child's health is deteriorating and enables the family to treat the problem while the solution is still within its means. In many countries, growth monitoring has proved to be effective and inexpensive. Because it depends on and tends to generate sustained community effort, growth monitoring can be a vehicle for institution-building and increasing utilization of primary health care and other basic services in the community. Proper timing of inoculations, preventive health care, proper weaning practices, home-based treatment of diarrhea (oral rehydration therapy), and family planning can all be encouraged through growth monitoring.

[15] Chandra, R. K. Immunodeficiency in undernutrition and overnutrition. Nutrition Rev. 39:225, 1981. Scrimshaw, N. S. et. al. Interactions of Nutrition and Infection. Geneva: WHO, 1968. (Monograph Series No. 57).

[16] Griffiths, M. Growth Monitoring. Washington: Am. Pub. Hth. Assoc., 1981.

It is the policy of A.I.D. to support breastfeeding and proper infant feeding practices.

Traditionally infants were breastfed for two or more years but now "modern" women bottlefeed their infants, often without knowing enough about the nutritional needs of infants. Babies fed barley water, cornstarch gruels, and diluted infant formulas, often prepared with unsafe water and contaminated utensils, may die before their mothers find out how to feed them properly. The more serious problem in rural areas is late introduction of complementary foods to breastfed infants. Proper complementary feeding of the weaning child is often a problem of dietary practices, home food preparation and preservation constraints, and other demands on women's time. A more multifaceted approach, going beyond breastfeeding promotion and food availability is therefore often required. Nutrition education, including encouragement of breastfeeding, improved child feeding practices, food fortification, and strong national nutrition policies, can avert these negative nutritional impacts.

Environmental health measures are another means of averting nutrition problems.

Other nutrition enhancing health activities are inoculations for common diseases (BCG, measles) and health education aimed at changing behavior or conditions that expose children to parasites and intestinal disease. Malaria, schistosomiasis, tuberculosis, and cholera are endemic public health problems which heavily affect nutritional status in many parts of the world. Controlling these diseases will also reinforce the nutritional impacts of improved food supply and consumption.

Provision of community water supply and installation of latrines should be encouraged as a part of the general development strategy in health project areas.

Parasites and gastrointestinal disease could be substantially reduced through improved hygiene. The preschool child's feces can be a major source of infections in the household unless the mother takes adequate precautions. Where water is not readily available, however, hygiene education may be less important than water supply. Therefore provision of an adequate water supply can be part of incorporating nutrition into health projects.[17]

[17] Intestinal parasites may consume up to 25% of dietary intake. Therefore eliminating parasites and infectious disease is a necessary element in solving nutrition problems. Unsanitary and inaccessible water supply has been shown to affect nutrition adversely in several countries. See A.I.D./PPC. Domestic Water and Sanitation Policy Paper, 1982.

3. **Food Assistance**

The Agricultural Trade Development and Assistance Act of 1954 (PL 480) provides for concessional sales of U.S agricultural commodities to LDC governments (Titles I and III) and provides food donations for famine relief, combatting malnutrition, and promoting economic and community development (Title II).

As a major resource transfer (Titles I and III), PL 480 can be used to support and encourage good development policies. (This is discussed in detail in the Food and Development Discussion Paper.[18]) In the area of nutrition, such policy reforms could include a functional national nutrition policy, nutrition monitoring systems, and manageable, well-targeted subsidized consumption system for the lowest income groups, or nutrition-responsive agricultural policies. The foods themselves can have nutritional impact if carefully programmed and targeted. If food aid had a disincentive effect on local agriculture it could adversely affect nutrition, so attention must be paid to this aspect of food aid. Furthermore, the food commodities can change tastes and cause shifts in demand for local and imported foodstuffs.

Nutrition improvement has been one of the major objectives of Title II in the past. To achieve this objective, significant changes in A.I.D.'s programs are called for, including better targeting, specifically to reach malnourished preschool children and pregnant and lactating women, appropriate ration sizes, and inclusion of nutrition education along with the supplemental food.

Title II, as emergency relief, has obvious nutritional and humanitarian importance, and it can also be used to overcome short-term household food supply shortages.

In some settings, Title II may be useful for household feeding or as a resource for health, education, family planning, and income generating activities. Title II is also one of the few means available to A.I.D. for overcoming urban malnutrition, a growing problem throughout the developing world. The Bureau of Food for Peace and Voluntary Assistance is currently reviewing the objectives and guidelines for more effective programs of Title II and will shortly be issuing guidance to the field on this issue.

[18] A.I.D./PPC, **Food Aid and Development: A Policy Discussion Paper**, Washington, D.C.: August 1981. Other papers and reports are being or will be prepared by the A.I.D. Bureaus for Program and Policy Coordination and Food for Peace and Voluntary Assistance.

4. Population

Nutrition both affects and is affected by fertility levels.

High rates of population growth tend to limit per capita development gains and overload the physical and economic infrastructure of LDCs. The direct impact of high birth rates, however, is most visible at the household level—in high ratios of non-productive to productive household members, and in the biological, physical, and temporal stresses on women caused by frequent childbearing. Infant mortality (often due to poor prenatal nutrition of the mother and postnatal nutrition of the infant) is considerably higher when birth intervals are short.

Programs which join provision of voluntary family planning with efforts to combat undernutrition can be cost-effective and culturally acceptable. In one Asian country, for instance, a growth monitoring and primary health care program has been added to the national voluntary family planning program, in large part because it is clear that further reductions in fertility may come only when parents believe that each child born will survive to adulthood.

Nutrition and family planning programs should be linked wherever possible.

Growth monitoring can be an important tool in linking nutrition and family planning programs, because the faltering growth rate of the infant indicates the need for introduction of weaning foods and the return of fertility in post-partum women. Breastfeeding reduces fertility the most when the infant is fully breastfed. Providing voluntary family planning services at a health clinic or food distribution program site will save time for the mother who seeks these services and encourage her to associate good health, nutritious food, and the conscious choice about family size. Coincidence of services can also be cost-effective by economizing on building, training and management costs, but care must be taken not to overload community workers who deliver these services.

5. Education and Training

Promotion of basic education will contribute to improved nutrition.

Although education is not considered to be a nutrition intervention per se, good nutritional status in children is frequently associated with literacy and educational attainment of the parents, particularly of the mother. In the long run, extension of basic education, particularly to females, will have positive impacts on nutrition in the household.

Nutrition education in schools can promote better food consumption in the family.

In the short term, schools can be an important avenue for improving nutrition, not only through nutrition education (e.g., home economics) but also through allied school activities (e.g., school gardens). Particular emphasis should be given to the nutritional value of local foods, purchasing foods to maximize nutritional value, storing, processing and preparing food to maintain nutritional value and hygiene education. At a minimum, schools must have basic sanitary facilities and water, since most of the content of nutrition and hygiene education involves food handling and personal and community sanitary practices. Efforts should be made to extend nutrition education to the rest of the family through nonformal education, mass media, and community demonstrations.

Training programs for community outreach workers should include basic nutrition.

In some countries, government and community outreach workers make periodic visits to the households of nutritionally at-risk groups. In setting up training programs for agricultural extension workers, social workers, medical personnel, and community volunteers, attention should be directed to how malnutrition affects the households they visit and how their activities can influence nutrition. Nutritional "first aid" and referral (e.g., in the case of oral rehydration) could also be taught. Although nutrition would be a small component of their training, its inclusion would greatly increase public consciousness of nutrition problems and improve informal nutrition monitoring of the community.

Advanced training in nutrition is needed in many LDCs.

Higher level training in nutrition is also needed. Development planners, economists, agriculturalists, educators, physicians and nurses, must be cognizant of the community's nutrition problems and of the possible nutritional implications of their work. There is a serious lack of nutrition planners in LDCs. If A.I.D.'s efforts in nutrition are to become self-sustaining, the countries must have a local capacity to assume responsibility for problem analysis and program implementation.

C. Targeting based on nutrition

A.I.D. policy is to target sectoral projects whenever feasible to households and individuals at-risk of developing nutritional problems.

Nutritional risk is the probability that someone will develop a nutritional problem. Women of

childbearing age, infants, and preschool children have traditionally been called "vulnerable groups" because they are at high nutritional risk due to their increased physical needs. In addition, certain *households* are more likely to have malnourished members than others, and these can be identified through a system of "functional classification," for instance by income groups, landholding, crop production system, or household composition. High nutritional risk has been associated with geographic isolation, small landholding, occupation (fishermen, landless workers), low or scheduled caste, household composition (polygynous and female-headed households), low income, and low socio-economic status (illiteracy, unemployment). The classification itself varies from country to country.

The method used for targeting development programs depends in large part on the type of project proposed. Primary health care programs, for instance, deal with individuals or groups of individuals; hence it makes sense to give particular attention to those **individuals** at highest nutritional risk. Agricultural programs on the other hand, tend to focus directly or indirectly on **households**, **communities**, or **regions**, and therefore can use **functional classification** of these units as the basis for targeting.

To determine nutritional risk, it is necessary to link nutrition status or consumption data to individual or household characteristics. Frequently such data do not exist in a usable form for such analysis. Low cost small-scale surveys and complementary computer software can be used to determine nutritional risk rapidly and inexpensively for small areas. Pre-existing national data can frequently be manipulated to yield useful information for targeting also.[19] Consumer price indexes, for example, are frequently based on household consumption and expenditure surveys.

An example of the uses of functional classification is the Integrated Agricultural Development Project in Palawan, Philippines. Secondary data supplemented by a small in-depth nutrition study in the project area identified highland slash-and-burn farmers and fishermen as high-nutritional-risk groups. Subsequently, the project gave particular attention to those groups and emphasized food production for the upland farmers. Decisions about provision of roads and water were based partly on consideration of these at-risk groups, and specific nutrition components were added onto the general agricultural and rural development efforts to enhance their nutritional impact.

[19] To date functional classification has been used to identify nutrition problems in Costa Rica, El Salvador, Philippines, Zambia, Sri Lanka, Kenya and Haiti.

D. Evaluating Nutrition Impacts

It is the policy of the Agency to monitor and evaluate nutrition impacts of projects that are likely to affect health, food production or food consumption.

Most agricultural and health project officers are sensitive to nutritional considerations and identify alleviation of malnutrition as a legitimate project goal. Nutritional impacts are not always measured however.

Nutrition effects can be anticipated by systematically reviewing the ways in which a project might affect nutritional status and by instituting monitoring systems for those variables most likely to be directly affected. Some obvious factors affecting nutritional status include:

— food and nutrient availability at the individual, household, and community level, especially in the preharvest period;
— response of food purchases to price and income changes;
— allocation of food among family members;
— household nutritional needs;
— food preparation, processing, procurement and storage;
— food security at the household level;
— resources necessary for food utilization (fuelwood, water, time, human energy);
— cultural food practices and beliefs;
— environmental health and parasitism;
— purchasing power of high-risk households and cost of an adequate diet.

A cost effective way to measure nutritional impact is to carry out small cross-sectional surveys of food consumption of groups or nutrition status (usually height and weight of children) of individuals or households.

Nutrition status surveys of a statistical sample of children can indicate changes in nutrition over the life of project. Measures of food consumption of groups, if carefully done by experienced scientists, will also measure impacts of projects on target households. In one African country, monthly information on food production, land, labor use, and income of smallholders has been linked to intermittent surveys of nutritional status of preschool children to monitor nutritional trends. In an Asian country the community infant weighing program has enabled monitoring of project impacts in some areas. A.I.D. is currently supporting efforts in twelve countries

to set up nutritional monitoring systems which can be used to assess project impacts.

To estimate nutritional impacts of projects, it may not be necessary to measure changes in nutritional status directly or comprehensively, although that is preferable.

Nutritional impact can be roughly estimated using non-nutrition data. For instance, monitoring local prices of major basic foods (e.g., cassava or paddy rice) can provide a relatively sensitive measure of how low-income consumers are likely to be affected by supply changes, in areas where agricultural prices are not fixed. Supplies of foods in local markets and granaries, infant mortality rates (using a base population of at least 10,000), local wages, and incomes of at-risk households can also provide evidence of probable outcomes if the linkages between indicators and causes of undernutrition are well-understood and if the indicators are of reasonable quality.

These techniques need to be supplemented by knowledge of intrahousehold economic activities including production of commodities for home consumption. Understanding the social, cultural and institutional context in which projects are implemented can help a project designer avoid potentially negative impacts and maximize positive effects of development activities. In one area, a livestock management program was designed to encourage cattle owners to sell the animals at two years of age. The project originally ignored the fact that women milked the older cows, thus providing an important nutritional supplement to their children's diet. Modification in the project design made it possible to avoid what would have been an extremely harmful secondary impact of this income generation project.

E. Complementing sectoral programs with nutrition projects

Nutrition projects should complement sectoral programs to enhance nutritional impact when they are suited to meeting Agency goals.

Nutritional projects play an essential role in extending and refining A.I.D.'s efforts at alleviating malnutrition. Food fortification, nutrition education including non-formal education through mass media, food technology development, nutrition planning, and promotion of proper infant feeding practices, have formed the backbone of technical nutrition support in the past and should continue both to address nutrition problems directly and to complement more indirect projects. For instance, where agricultural programs are focused on raising household income, a nutrition education component should assure that the household has information on the nutritional implications of alternative uses of the new income and changes in the traditional diet.

F. Utilizing the private sector

In many cases, private sector initiatives can enhance public investments particularly in the areas of agribusiness, food processing, and fortification. The private sector may also hold the key to solving problems of urban malnutrition when they are due to inadequate food marketing and distribution systems. Where possible, private sector efforts should be encouraged. The recent effort by A.I.D. to provide technical assistance to food industries in developing countries through private sector representatives is illustrative of the types of collaboration A.I.D. seeks.

G. Improving Policies

A.I.D. supports inclusion of nutrition considerations in national policies.

A.I.D. continues to endorse multisectoral nutrition policies in host countries. National agricultural planners and policy makers should consider the effects of food and agricultural policies on regional and local food supplies, producer price stability, and food consumption, especially by nutritionally at-risk groups.[20] They should also be encouraged to set up nutrition monitoring systems to facilitate such analysis. Health policy should focus on preventive health care and inclusion of nutrition components in primary health care. Education and population policies should take into account the nutrition factor as an input to and product of successful sectoral strategies.

H. Coordination

Many bilateral and multilateral donors have programs designed to improve nutrition. A.I.D. actively seeks opportunities for coordination of nutrition activities within countries. Cofinancing different components of nutrition-related programs and complementarity among programs by different donors are strongly supported. A.I.D. encourages host country policies which effectively utilize all available private, public and voluntary organizations to meet overall development goals.

---

[20] A.I.D., in conjunction with the Nutrition Economics Group at U.S.D.A., has supported and will continue to support research and technical assistance to missions in this area.

Conclusions

A number of conclusions emerge from this review of A.I.D.'s nutrition policy and objectives. First, nutritional well-being is not only a necessary input in the development process; it is also an essential output. Hence, efforts to alleviate undernutrition are an integral element of A.I.D.'s overall development assistance program.

Second, the greatest lasting improvements in nutrition in LDCs are likely to result from changes which incorporate nutritional considerations in the design of programs in other economic sectors—especially agriculture, rural development and health. Hence, this paper has devoted a great deal of attention to policy issues in the design and implementation of agriculture, health, education, family planning and other development activities. Direct nutrition projects are an important complement to such activities.

Third, the United States has a key role to play in helping developing countries overcome their nutrition problems—through its multisectoral approach to economic development, its commitment to improving food security in the Third World, its strong research and development capacity in the biomedical and operations research areas, as well as its commitment to experimentation in search of more cost-effective approaches to improvements in basic services in LDCs. Furthermore, the U.S. food industry has much to share with LDCs in promoting a safe, nutritious, and reliable food supply.

Finally, in order to maximize the impact of A.I.D.'s development programs on the nutritional well-being of the citizens of developing countries, A.I.D. will give increasing attention, through research, analysis, experimental projects, and programs to improve host country and Agency ability to:

— identify nutrition problems;

— utilize the private sector whenever feasible to implement the policy;

— design projects to overcome or minimize constraints to meeting nutritional needs of the at-risk population

— target projects to at-risk groups;

— monitor the impacts of development projects on food consumption and nutrition;

— add nutrition components or programs to enhance nutrition impact; and

— strengthen the capacity of indigenous organizations to analyze and overcome nutrition problems.

Selected Bibliography

Intrahousehold Allocation of Food and other Resources and Impact of Women's Work on the Household

Nieves, I. A Balancing Act: Strategies to Cope with Work and Motherhood in Developing Countries. Paper presented at International Center for Research on Women Roundtable, 1981.

Protein Advisory Group of the United Nations. Women in Food Production, Food Handling and Nutrition, 1977.

Safilios-Rothschild, C. The Role of the Family: A Neglected Aspect of Poverty. World Bank, 1980.

U.S. Department of Agriculture: Consumer Economics Group. Intrafamily Food Distribution, Review of the Literature and Policy Implications, 1982.

Functional Classification of Malnutrition

A.I.D., Office of Nutrition. Nutrition Surveillance: Review of Progress. 1981

F.A.O. Introducing Nutrition in Agricultural and Rural Development, Case Studies. 1982.

Omawale. Nutrition Problem Identification and Development Policy Implications. Ecology of Food and Nutrition 9:113-122, 1980.

Effect of Agricultural Development on Nutrition

Eide, W.B. and F.C. Steady. Individual and Social Energy Flows in Jerome, N.F., R.F. Kandel and G.H. Pelto (Eds.) **Nutrition Anthropology: Contemporary Approaches to Diet and Culture.** Pleasantville, N.Y.: Redgrave Press, 1980.

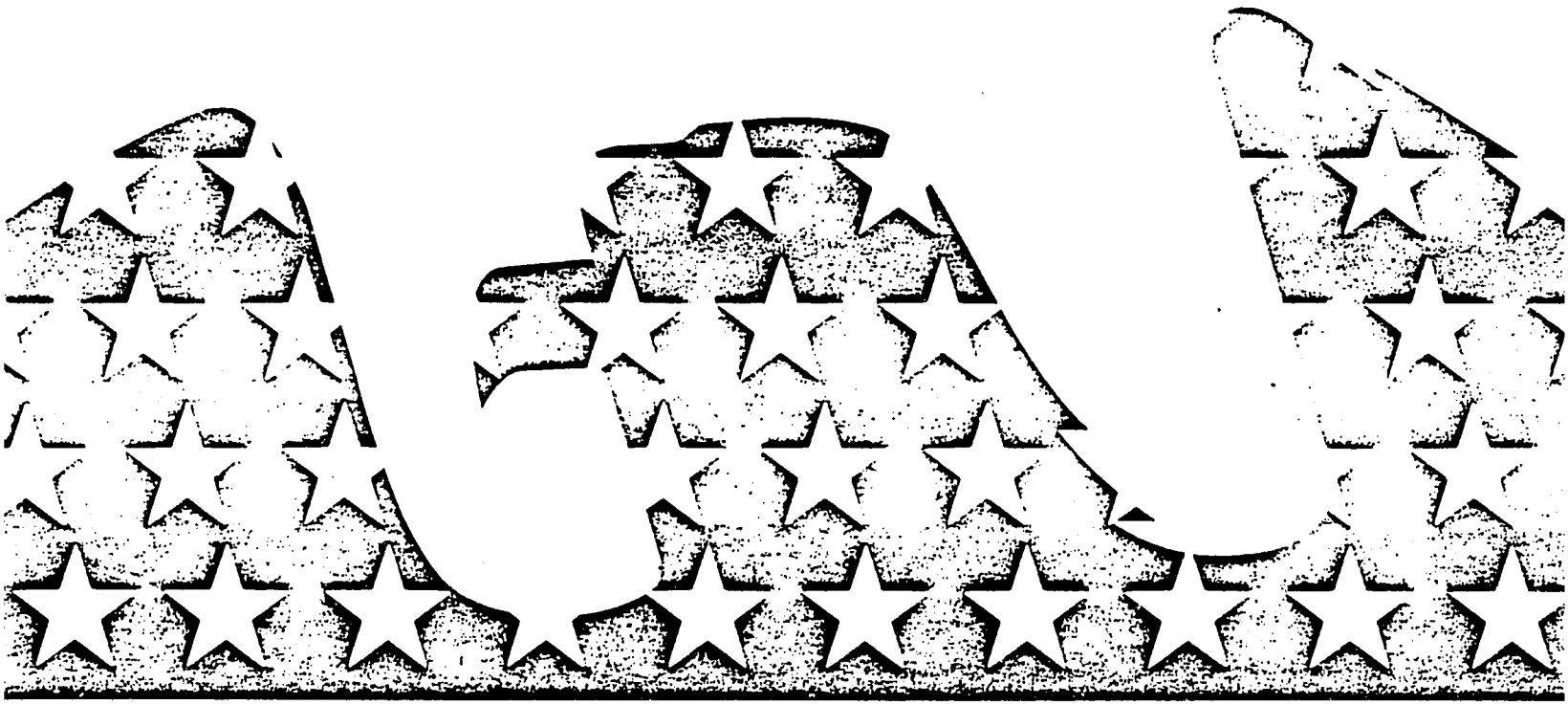
Fleuret, P. and A. Fleuret. Nutrition, Consumption, and Agricultural Change. Human Organization 39 (3): 250-260, 1980.

Pinstrup—Anderson, Per. Nutritional Consequences of Agricultural Projects; Conceptual Relationships and Assessment Approaches. Washington: World Bank, 1981. World Bank Staff Working Paper 456.

Savane, M.A. Implications for women and their work of introducing nutritional considerations into agricultural and rural development projects. Food and Nutrition Bulletin 3 (3): 1-5, 1981.

A.I.D. Policy Paper

FOOD AND AGRICULTURAL DEVELOPMENT



U.S. Agency for International Development
Washington, D.C. 20523

May 1982

2

A.I.D. Policy Paper

Food and Agricultural Development

Bureau for Program and Policy Coordination
U.S. Agency for International Development
Washington, D.C. 20523

May 1982

PREFACE

At the request of the Administrator an inter-bureau Task Force, including IDCA and BIFAD representation, was established to review A.I.D. policy on food and agricultural development assistance, and to make recommendations based on experience in developing countries and A.I.D.

This statement constitutes the report of the Task Force. It sets forth the overall objectives and policy elements of A.I.D. food and agricultural assistance funded from Development Assistance, Economic Support Fund and PL 480 budgets. It provides the basis for development of an A.I.D. Strategy Paper on Food and Agricultural Development that will delineate a strategy for linking the resources A.I.D. can draw upon for accomplishing its policy objectives.

This statement will also form the basis for discussions with other USG agencies, leading to the formulation of a U.S. Policy Statement on Food and Agricultural Development Assistance that will include policy implications for U.S. participation in multilateral organizations that provide food and agricultural assistance.

This statement supplements the A.I.D. Agricultural Development Policy Paper of June 1978 by providing a focus on major elements of A.I.D. policy.

The fulfillment of this policy requires long-term commitment from the United States and other donor nations and from developing countries, as well as from the private and public sector institutions involved. With mutual commitment to the policy, significant accomplishments can be expected over the next twenty years. Hunger and suffering will not be eliminated, but a significant number of additional countries will have become self-reliant in food and able to assure food security for their populations.

"Increasing food production in developing countries is critically important—for some, literally a matter of life and death. It is also an indispensable basis for overall development. The United States has always made food and agriculture an important emphasis of its economic assistance programs. We have provided massive amounts of food to fight starvation, but we have also undertaken successful agricultural research, welcomed thousands of foreign students for instruction and training at our finest institutes, and helped make discoveries of the high-yielding varities of the Green Revolution available throughout the world."

Ronald Reagan, PRESIDENT

Remarks to the World Affairs Council of Philadelphia,
October 15, 1981

Background

Food production and consumption prospects are seriously deteriorating in a number of low-income, food-deficit countries. The basic causes of continuing hunger and malnutrition in these countries are inadequate food availability and inability of the malnourished to purchase or otherwise acquire and consume the food they need.[1] While this chronic deficiency receives less attention than outright starvation, it has a far wider impact on human lives and productivity.

Real progress has been made toward food and agricultural self-reliance in a number of Asian and Latin American countries, but many other countries remain beset with serious and precarious problems. Millions in Asia, Latin America and the Near East are still impoverished and malnourished. A deepening food crisis with chronic famine conditions in some areas is developing in sub-Saharan Africa, where per capita food and agricultural production continue to decline in a majority of countries.

Future prospects are influenced by two major factors: population growth and income growth. About 90 percent of the almost two billion increase in world population projected for the year 2000 will occur in developing countries, many of which are unable to assure adequate food supplies even for their current populations. Continuing per capita income growth in the middle-income and advanced developing countries is expected to generate substantial increases in the demand for basic grains for direct human consumption and for livestock production. Unless the production of major staples and/or other agricultural commodities in developing countries improves significantly more than it did during the 1960–75 period, and unless the effective demand of low-income families is increased through broad-based growth, a deterioration in per capita food availability and consumption, especially in low-income countries, may occur.

This is a grim picture, but it is by no means hopeless. The experience of the last 30 years shows that carefully planned and administered economic assistance, when combined with the fundamental efforts that a government and its people must themselves undertake, can establish a dynamic, self-sustaining food and agricultural system. U.S. assistance in the form of scientific and management expertise, and food and financial aid, has made critical contributions to the creation of such systems in South Korea, Brazil and Taiwan and to emerging self-reliance in countries such as India, Thailand and the Philippines.[2]

Experience over the last three decades also shows that dynamic agricultural growth is in most countries a necessary though not sufficient condition for broadly-based overall economic growth that permits the conquest of hunger, malnutrition and sustained improvement in per capita living standards. Broadly-based and shared economic growth, along with the effective provision of voluntary family planning services, will also bring about a reduction in rapid population growth. The United States should continue sustained support of efforts by the entire donor and international community to help developing countries achieve these goals.

The President of the United States has recently highlighted the importance of developing country food and agricultural problems and the role the U.S. is prepared to play in helping countries resolve these problems.[3]

I. Objectives

The overall objective of United States bilateral economic assistance is to stimulate in developing countries broadly-based, self-sustaining economic growth that promotes international peace and stability and that assists people to conquer poverty, hunger, illness and ignorance (see Sections 101 and 531 of the Foreign Assistance Act).

The objectives of U.S. food and agricultural assistance are to enable countries to become self-reliant in food, assure food security to their populations and contribute to broadly-based economic growth.

These broad objectives entail two major sub-objectives, namely:

1. **Increased food availability**, through:

- increased agricultural production, with an emphasis on increasing and sustaining the

[1] Inadequate nutrient absorption linked to disease and poor sanitation is a significant auxiliary cause, especially among infants and children.

[2] Self-reliance in food is defined as the ability of a country to assure continuing food security to its population from a combination of domestic production and importation of food at commercial terms paid from foreign exchange earnings. Short-run food security implies the ability to maintain normal consumption levels in the face of an emergency food shortage. Long-run food security is defined as the ability of a country to assure a nutritionally adequate food supply to its population on a continuing basis. Several of the countries mentioned above have clearly not yet achieved long-run food security in terms of nutritional adequacy. See p. 7 for further discussion.

[3] Of particular relevance are the "Remarks of the President to the World Affairs Council of Philadelphia" October 15, 1981, and the President's Statement of October 24, 1981, at Andrews Air Force Base on his return from the "North-South" Summit Conference at Cancun, Mexico.

productivity, incomes and market participation of small farmers, with special attention to food production;

- greater economic efficiency in the marketing and distribution of agricultural and food production, exports and imports; and

2. **Improved food consumption in rural and urban areas**, through:

- expanded productive employment and incomes of men and women who at present lack the purchasing power to obtain adequate food;
- increased awareness and incorporation of sound nutritional principles in the design and implementation of production, marketing, health and education policies and programs, including improved access to, and utilization of, food for those at nutritional risk;
- effective direct distribution of food from domestic or external sources to those facing severe malnutrition and temporary food shortages (i.e., a short-run lack of food security).

A.I.D. will seek to concentrate assistance for food and agricultural development in countries that share these objectives and are committed to an appropriate policy framework as elaborated in the following section on "Elements of Policy."

In supporting the objective of food self-reliance, A.I.D. does not rigidly subscribe to the goal of food self-sufficiency. A.I.D. supports a balanced approach involving economically viable expansion of agricultural production, including production for export and importation of food and agricultural products where comparative advantage exists.[4] As in the case of domestic food production, the employment, consumption and nutritional implications of export expansion will also be considered.

II. Elements of Policy

A.I.D. will emphasize four major, inter-related elements to accomplish food and agricultural development objectives:

- **improve country policies** to remove constraints to food and agricultural production, marketing and consumption;
- **develop human resources and institutional capabilities**, especially to generate, adapt and apply improved science and technology for food and agricultural development, and conduct **research on developing country food and agriculture problems;**
- **expand the role of developing country private sectors** in agricultural and rural development, and the **complementary role of the U.S. private sector in assisting this expansion**; and
- **employ all available assistance instruments in an integrated manner**, including provision of PL **480 food aid in a way that contributes to the other three strategy elements** as well as meeting food security and nutritional needs.

Each of these elements is intended to increase the effectiveness of U.S. economic assistance resources. While the mix of these elements will vary according to the differing needs and problems among countries, the achievement of lasting food security requires greater attention to each of them in most developing countries.

The United States has strong technical competence in identifying and solving problems in food and agriculture. Maximum utilization will be made of this competence. A.I.D., other elements of the U.S. Government, such as USDA, cooperating universities and private sector organizations are prepared to make a **long-term commitment** to help those countries prepared likewise to make the requisite policy and resource commitments.

A main thrust of the policy is on the development of a **domestic human and institutional capacity** that permits a country to develop and apply food and agricultural science and technology. This recognizes the location-specific requirements for the effective application of improved agricultural technology. However, the policy also requires a more vigorous effort by A.I.D. to support the identification, transfer and adaptation of **existing appropriate technologies**, as well as the **carrying out of food and agricultural research** and application of improved technologies through U.S., international, regional and national institutions. These recommendations recognize that the continuing advance of agricultural technology, while not sufficient in itself, is an essential prerequisite to sustained improvement in food and agricultural performance. The policy also envisions strengthening institutional capability in other critical areas such as the management of irrigation and credit systems.

In pursuing this policy, A.I.D. will encourage countries to promote **participation** in food and agricultural development by the large majority of rural producers and workers, **men and women**, through:

- broadened access to production incentives and resources, including land and water, as well as opportunity to take advantage of education and training and other productive services;

[4] In determining a balanced approach between production for domestic consumption and export, a country will weigh the risks inherent in increased dependence on world agricultural markets. These risks can be reduced somewhat by diversified production for export.

- increased productivity, employment and incomes; and
- expanded involvement in making policy and program decisions, including those affecting the development and operation of institutions that affect their productivity and well-being.

The policy also includes an emphasis on effectively increasing the productivity, incomes and market participation of **small producers.** These producers comprise the great majority of rural economic units in most countries and are thus important for both increased food production and consumption.[5] Evidence indicates they tend to employ land and purchased inputs in an economically efficient manner relative to large farmers. Furthermore, the demand for goods and services by the bulk of small farmers and their families who participate in market sales and purchases may constitute an important stimulus to off-farm rural enterprise and the generation of employment opportunities for landless laborers and for families engaged primarily in subsistence agriculture.[6] Improvement of the employment opportunities of the landless and near-landless is a crucial requirement for improved food consumption in many countries.

A. Improved Country Policies

The success or failure or the development process in a country depends heavily on its policy framework and the determination of the country itself. External assistance, while helpful and particularly critical in low-income countries, is in no case sufficient to achieve national food and agricultural development objectives. **Sound country policies are fundamental to agricultural growth and to the effectiveness of external economic assistance.** An appropriate policy framework is one that:

1. relies largely on free markets, the provision of adequate production incentives and the provision of equitable access to resources so that the broad majority of farmers, rural private sector entrepreneurs and workers—both men and women—have productive opportunities for employment, saving and investment; and
2. gives sufficient priority to complementary public sector investments in rural infrastructure and institutions that interact effectively with rural populations and complement and encourage rather than compete with healthy private sector growth.

Incentives are affected by direct attempts by government to influence the prices of food or agricultural products and inputs, but in many countries macro-economic policies affecting exchange rates, interest and wage rates and tariffs and taxes have an even more powerful impact on incentives to produce, employ, consume, save and invest. Furthermore, a wide range of government-promulgated regulations and privileges affect equitable access to such resources and services as land, water, credit, extension and marketing facilities. **That is, distorted policies have hampered agricultural growth and have hurt the poor by excluding them from access to productive resources and employment.**

Essential public sector investments are generally those that yield substantial returns to the economy but are of such a nature that the private sector is not prepared to undertake them, especially in low-income countries (reasons include high cost, uncertain or low returns in the short run, and/or difficulty for an individual investor to capture the returns). These investments usually include such major physical infrastructure as road networks and gravity irrigation systems as well as institutions for agricultural research, training and extension and for basic education and health services and control of epidemic diseases. However, in some aspects of research and extension, health services or training, for example, there may be more scope for private sector involvement than is often acknowledged.

- As part of its development assistance programming, A.I.D. will critically examine country policies affecting food and agricultural development and will seek to concentrate assistance in those countries where an appropriate policy framework already exists or where there is commitment to improvement.
- A.I.D. will analyze the constraints to improved policies in countries where it provides

---

[5] The definition of a "small producer" will vary from country to country and region to region within countries. Influencing factors include sectoral (agriculture or industry), sub-sectoral or commodity mix, soil quality in the case of agriculture, etc.

[6] Of particular interest to A.I.D. are those small producers whose marketable surplus can be increased. It is recommended that a paper be prepared to analyze the extent to which increased production by commercial and/or semi-commercial farmers in developing countries will also meet employment and food consumption objectives through increased employment on such farms and indirectly through stimulus to off-farm rural enterprise. Although available evidence confirms the relatively high economic efficiency of small farmers, the question is complex. An analytical paper might explore further this question as well. In his Philadelphia World Affairs Council remarks, op. cit., President Reagan indicated that the focus of American food and agricultural development assistance will be on "raising the productivity of the small farmer, building the capacity to pursue agricultural research and stimulating productive enterprises that generate employment and purchasing power."

assistance and will engage in dialogue with countries on changes in policies intended to improve incentives and opportunities.

- Technical assistance and training to improve a country's policy analysis and planning capacity will also be provided.

As part of its concern for improving the quantity and quality of food consumption, A.I.D. will continue its efforts on how to integrate effectively the implications of nutritional problems and practices into the design, implementation and evaluation of projects and programs. This concern includes but goes far beyond specialized efforts to correct specific nutritional deficiencies (e.g., Vitamin A, iodine, iron). A concern for nutritional implications will be included in dialogue on agricultural policies and in the design of assistance for planning and policy analysis; agricultural research and extension; education and training; marketing and processing; and food aid and food security. It will also be included in the formulation of assistance for health services, potable water and sanitation.

The incorporation of nutritional considerations raises complex, multi-sectoral issues that will be addressed further in an A.I.D. Nutrition Policy Paper in preparation.

B. Development of Human Resources and Institutional Capacity

A major priority of A.I.D. policy is to assist countries to develop and/or strengthen private and public institutions dealing with the host of technical, administrative, economic and social problems constraining increased and more efficient food and agricultural production, marketing and consumption.

Effective institutions provide a country the self-sustaining capacity to solve critical development problems. Furthermore, they:

- enhance a country's ability to marshall its own human and financial resources for food and agricultural development;
- enable individuals to obtain access to the skills, resources and services needed to increase their productivity, incomes and well-being; and
- increase the absorptive capacity and effectiveness of external assistance, thereby fostering development that continues beyond the period during which assistance is provided.

The creation and strengthening of institutional capacity, including development of the human resources needed for effective institutions, often requires a long-term commitment and effort—e.g., ten years or more—from A.I.D., the host country, other donors and cooperating organizations (Universities, PVO's, etc.).

Missions must provide a sufficiently long-term assessment of how A.I.D. and other resources will be utilized to improve institutional capacities crucial to food and agricultural development in the host country.

Effective public and/or private institutions are required in most phases of food and agricultural development, including planning and policy analysis; construction, maintenance and operation of rural infrastructure (e.g., irrigation systems and rural roads); delivery of inputs, credit and other services; storage, marketing and processing of farm products; and other areas such as local government and taxation, and resource conservation and management.

Particularly vital to the establishment of self-reliant, sustainable food and agricultural systems are national institutions that give a country the capacity (1) to generate and apply a continuing stream of innovations designed to increase agricultural productivity and incomes; and (2) to evaluate and adapt technologies transferred from developed countries and international institutions. Advances in food and agricultural science and technology have not only increased productivity but have also facilitated the substitution of less expensive and more abundant resources for more expensive and increasingly scarce resources.

While the economic returns to agricultural research have been extremely high, it does take time to develop and test new technologies and to strengthen the national and local institutions required to adapt and apply technologies to location-specific conditions. The need to develop new technologies and strengthen institutions is especially critical for the large areas of the developing world that will continue to be dependent upon rain-fed agriculture.

In view of these considerations, A.I.D. will continue to provide direct support for food and agricultural research, training and technical assistance by U.S. and regional institutions, and by the system of international agricultural research centers. Collaborative projects with these institutions will be coordinated closely with efforts to improve national systems; networks for sharing knowledge among these institutions will be strengthened.

There are important interrelationships between country policies and institutional development. Institutions develop, implement and monitor policies that profoundly affect food and agricultural development. At the same time, the process of institutional development and of science and technology transfer, generation and application should be guided by a sound economic policy environment which reflects

market forces. If this does not happen, improved agricultural technology may not be adopted by farmers, or if adopted, it may be inappropriate to the broader economic environment. For example, in some countries distorted economic policies have made capital artifically cheap and labor artificially expensive, resulting in the introduction of excessively capital-intensive technology. By the same token, production incentives alone are not usually sufficient to yield sustained advances in agricultural production. A continuous stream of productivity increasing, cost-reducing farm technology is also required.

- A.I.D. will therefore give special emphasis, with a sufficiently long-term commitment, to helping countries develop the institutional capacity for food and agricultural planning and policy analysis; basic and adaptive research, education and training; and disseminating improved technology and related information in a cost-effective manner.
- Social scientists (e.g., economists, anthropologists, development planners and policy analysts) and physical and biological scientists and technicians from developing countries and the United States will work together to conduct applied research and to develop individual and institutional capabilities intended to increase the productivities and incomes of the broad majority of rural producers.
- U.S. universities will marshall their best talent to play a major role in implementing A.I.D. assistance for food and agricultural institutional development. Other U.S. government agencies, particularly USDA, agribusiness enterprises, cooperatives and private voluntary organizations will also play significant roles.
- Aspects of agricultural research to be considered will include: innovative research to increase the genetic capabilities of plants and animals that are used as food; research on existing and more profitable farming and marketing systems, including their social, employment, energy, ecological and nutritional implications (including multiple cropping and water management); field-testing involving farmers; research and control of debilitating human and animal diseases that constrain agricultural productivity; and regular feedback to researchers of farmer experience with improved technologies.

A.I.D. will also encourage:

- an expanded role where appropriate for private enterprise in the provision of agricultural research and the dissemination of improved technology as well as in the processing, preservation and marketing of agricultural commodities (see following section);
- research and other institutions that expand access by low-income, small producers to improved technology, productive resources and services;[7] and
- voluntary institutions that mobilize local efforts for agricultural and social development.

Local institutions, including farmer organizations and land tenure arrangements, can also be critical in assuring that the majority of farmers benefit from improved technology and infrastructure. Clarity of ownership and title is critical to stimulating increased capital investment (and therefore production) at the level of the individual farmer.

Consequently, A.I.D. will give favorable consideration to requests for assistance in the form of feasible projects and programs that:

- establish wider access to agricultural assets, including land, and in providing more secure tenure arrangements; and
- strengthen local participatory organizations of agricultural producers that help assure access by farmers to resources and services and, through farmer involvement, improve the efficiency of such activities as irrigation utilization and maintenance.

Adequate human resources development is essential if food and agricultural institutions are to be effective. This means adequate training for professional and technical staff and for farmers.

A.I.D. will support:

- in-country training of scientists, technicians, managers, extension agents, and also farmers and skilled workers in food and nutrition, and agricultural and rural development, with expansion as necessary, of in-country training facilities;
- external training, in the United States or third countries.

Important in these regards, is the special role of and concern for women, including their role as agricultural producers, workers, and family food providers. Greater efforts are therefore required to expand opportunities for women to serve as administrators, scientists, technicians, extension workers and other food and agricultural professionals. A.I.D. will provide support to promote the enhancement of the role of women through:

- research and analysis;
- planning and policy dialogue;

[7] Section 103A of the Foreign Assistance Act requires that agricultural research carried out under the Act take account of the special needs of small farmers in setting research priorities, as well as support research on the various factors affecting small farmers, and emphasize field-testing and research dissemination.

- design and implementation of institutional and human resource development and other programs; and
- A.I.D. staff recruitment, training and placement.

C. **Expanding the Role of Developing Country and U.S. Private Sectors**

Private sector business enterprises, including farmers and manufacturing, trade and service firms, account for the bulk of food and agriculture-related economic activity in many developing countries. Non-profit private and voluntary organizations (PVO's) also make significant contributions to food and agricultural development in many countries, as do universities (some developing country universities are entirely private; i.e., non-government, and others are perceived as private or quasi-government, due to their largely autonomous nature, even where mandated and funded by government).

Given an appropriate policy environment and the complementary support of public sector institutions and physical infrastructure, the private sector can constitute a **dynamic, efficient and innovative mainspring for food and agricultural development.** Furthermore, most private sector rural enterprise in developing countries tends to be relatively small-scale and labor-intensive. It thus also has the potential for generating substantial employment and purchasing power.

Realization of the full potential of the private sector to contribute to food and agricultural development requires attention to:

- government policies and regulations that encourage rather than discourage the private sector;
- programs to overcome deficiencies in management and technical skills; and
- private sector access to market and technical information, credit, infrastructure, services and materials.

In some countries long-established public enterprises or para-statal organizations dominate agricultural marketing, processing, storage and/or distribution activities. These operations are often highly inefficient and tend to discourage food and agricultural production. Avenues for improvement include: (1) policy and management reforms that give public enterprises a greater **market orientation** and put them on a commercial basis; (2) encouraging greater competition from private enterprises in the same spheres; and/or (3) turning public enterprise management and/or assets over to the private sector.[8]

A.I.D. will:

- identify private and public sector institutions, such as banks, technical institutes, and trade and marketing associations, through which technical and financial assistance can be effectively provided to private enterprise;
- engage in dialogue with governments on changes in policies and other regulations to encourage and strengthen private sector development, including small and medium-scale enterprise; and
- where appropriate, help countries improve the efficiency of public and para-statal enterprise engaged in food and agricultural-related activities. This is a complex issue that will be addressed further in a separate paper.

A.I.D. also encourages utilization of the invaluable skills and resources of the American private sector—of agribusiness enterprises, other firms and consultants, universities, cooperatives and other farmer organizations, and private and voluntary organizations—to stimulate broadly-based food and agricultural development.[9]

- A major effort will be made to involve U.S. business firms in **strengthening developing country private enterprise.**
- A.I.D. will develop mechanisms and processes to facilitate the involvement of the U.S. private business community in food and agricultural development, including technical assistance and training as well as direct and joint investment.

Private and voluntary organizations (PVOs) have a number of potential strengths for assisting food and agricultural development. PVOs can be effective in developing local institutions that organize local energies to provide both development and social services and productive inputs. Compared with the public sector, they often provide flexible, low-cost approaches that take local attitudes and conditions into account. Through their U.S. networks, they have the further advantage of mobilizing private

[8] Such enterprises were often initiated for arguably laudible motives, such as reducing sharp, seasonal fluctuations in farm prices. Performance of public enterprises in accomplishing such objectives has been spotty, however, and the cost has been high. Private sector alternatives, including increased on-farm storage capacity, need more attention.

[9] U.S. universities will be used principally in support of A.I.D. policy to develop and strengthen institutions and train people serving agricultural and rural development as set forth in section B above. Such universities may also be utilized to support and strengthen the role of the private sector, including such activities as training, technical assistance, and joint efforts with PVO's and other public or private institutions.

American resources and commitment for development.

- A.I.D. will encourage and seek to strengthen PVOs that are commited to sustained food and agricultural development consistent with A.I.D. policy, and that have indicated through performance or potential the ability to provide effective developmental assistance.

D. **Providing Food Aid and Food Security.**

Food security considerations have played an increasingly important role in international discussions of food and hunger. The concept of international food security implies assurance world-wide of regular and adequate basic food supplies.

In emergencies or dire food shortages, national food security requires adequate capacity to channel available food supplies to population groups experiencing severe food shortages so as to maintain normal consumption levels. In the longer term, the achievement of national food security requires a country to be self-reliant in food and agriculture, to be capable of assuring its population a continuing, nutritionally adequate food supply through increased domestic production, more efficient distribution, expanded purchasing power and international trade, and a healthier and better informed population.

While external assistance can help accomplish these objectives, the responsibility for food security, especially in the longer term, is fundamentally that of each country. In the short term, international food assistance—led by the United States as the world's largest food aid donor—plays a vital role in assuring food security.

The United States has agreed to back up its pledge of food aid under the International Food Aid Convention with a national grain reserve—4 million tons of U.S. Government-owned, privately-held wheat, of which 300,000 tons may be used for disaster relief in any one year regardless of U.S. domestic supply conditions.[10]

PL 480 food aid can be a valuable development resource for augmenting local production, enhancing short- and long-term food security and reducing malnutrition, providing it is made available under conditions that support rather than discourage domestic food and agricultural production. PL 480 food commodities can enhance food security through augmenting domestic food sales and distribution programs and may also be used to help build national food reserves. Local currency generated from these food sales provides financial resources to assist with development of food and agricultural institutions and infrastructure.

- A.I.D. seeks to improve the impact of both PL 480 commodities and local currency proceeds on food and agricultural development, including increasing their integration with other U.S. bilateral financial and technical assistance at both the policy and project levels. PL 480 resources should support A.I.D.'s strategic emphases to improve country policies, develop human and institutional capacity and enhance the role of the private sector in food and agricultural development.
- The negotiation of PL 480 agreements is an opportunity for discussion of these issues with country governments and for including broader policy issues such as agricultural pricing and overall policy toward the private sector. Policy dialogue on PL 480 must reach agreement on supplying and/or conditioning food aid in a way that avoids disincentives to increased food and agricultural production through food subsidies or lowered government priority to domestic production. A.I.D. will pursue such policy dialogue in the context of total U.S. assistance to the country.

PL 480 Title II programs not only directly alleviate hunger and malnutrition but also have the potential to support human resource development and self-help efforts that increase the employment and employability of the lowest income groups. A.I.D. will continue to give greater emphasis in the use of PL 480 Title II resources to programs that have been shown to have greater nutritional impact, such as maternal-child health combined with nutrition education programs, rather than school-feeding programs, and encourage PVOs to design and implement Title II programs so that governments and local communities eventually assume responsibility for them and/or replace them with programs that increase production and incomes.

[10] Under the U.S. Wheat Reserve Act of 1981. The 300,000 tons are to be used through PL 480 Title II after existing Title II resources have been committed or exhausted. In addition, access by foreign buyers to U.S. grain reserves held for commercial purposes also helps to assure food security. A related question is the extent to which it is feasible and desirable for a developing country to hold food reserves as opposed to financial reserves to meet short-term food security problems. This is a complex question that depends upon a range of factors, including the size of the country, its location relative to international sources of supply, the nature of its comparative advantage for domestic food production and production for export, the effectiveness of its import and export infrastructure, its access to the recently-established IMF Food Financing Facility and other factors. It is recommended that guidelines be prepared on this question, including on the appropriate role for A.I.D. assistance.

III. Programming Implications

United States assistance strategy at the country level requires multi-disciplinary analysis of the policy, socio-economic, institutional and private sector settings for food and agricultural development as well as a long-term commitment of the United States and host countries. These will vary according to the differing needs and problems of countries. The precise content of assistance will thus depend on the conclusions of this analysis. The modes of assistance will be a combination of technical, capital, commodity and food aid assistance.

Although the context of A.I.D.'s assistance may vary from country-to-country for the reasons indicated above, the need to utilize limited budget and staff resources as effectively as possible implies a **focused country assistance strategy**, concentrating on a limited number of core sectors and sub-sectors. Missions should think in terms of long-term efforts in a few priority areas that involve joint and collaborative efforts with host country public and/or private institutions at every stage: identification and design, implementation, monitoring and evaluation. This approach should also permit some freeing-up of USAID staff for the important but relatively neglected implementation stage. It should be recognized that long-term commitment does imply that a certain portion of A.I.D.'s portfolio will be "mortgaged" for periods of a decade or so. But this is "mortgaging" consciously undertaken because of its positive developmental impact.

Technical assistance in the form of training opportunities and technical advisors will comprise a major mode of A.I.D. support for food and agricultural development.

The main U.S. sources of technical expertise are A.I.D. staff, American universities, private sector firms and organizations (agribusiness, consultants and other firms, cooperatives, farmer and private voluntary organizations), the Department of Agriculture and other U.S. Government agencies. A.I.D. will also draw upon technical assistance from other developing countries as well as on the food and agriculture development experience of the U.N. Food and Agriculture Organization (FAO), World Food Council (WFC), International Fund for Agricultural Development (IFAD), World Food Program (WFP) and other donor agencies.

In the utilization of these technical assistance resources A.I.D. will:

- encourage and strengthen the capacities of the various sources of U.S. and developing country technical assistance to, in turn, strengthen the counterpart capacities of host countries to address and solve their own food and agricultural development problems;
- give greater emphasis and importance to the Agency's science and technology capabilities, including creation of a strong professional staff; and
- enhance the role of American university expertise, as provided for by Title XII of the Foreign Assistance Act, in the implementation of A.I.D. food and agricultural development policy.

A.I.D. will also provide, **under appropriate conditions**, capital assistance, food aid, agricultural or other enterprise credit and/or commodity assistance. Such assistance can be especially critical to the development efforts of low-income countries. Capital assistance in particular is often closely linked to policy and/or institutional improvement in a project—e.g., capital assistance to construct or rehabilitate physical structures of an irrigation system linked to technical assistance for improved water management. Similar linkages should improve the effectiveness and lasting impact of all forms of assistance—e.g., elimination of subsidies or converting to private sector distribution as part of fertilizer assistance; interest rate reform as part of assistance for agricultural credit. Therefore, A.I.D. will provide capital, food, credit or commodity assistance only when:

- a need for such assistance exists and other sources of financing have first been explored, including co-financing arrangements between A.I.D., other donors and/or private sources; and
- such assistance is linked to proposed changes or effective performance in the areas of institutional development, technology transfer or development, and/or economic policy.

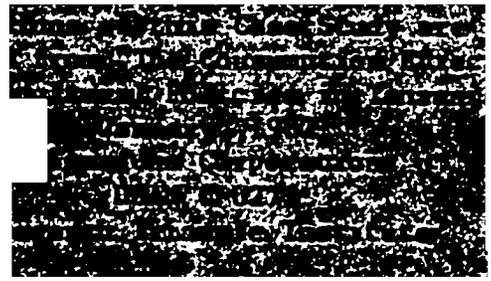
Country performance will be closely monitored and evaluated to determine whether such assistance should be continued.

For low-income countries with severe local resource constraints, A.I.D. will consider financing a **share of recurrent costs** of food and agricultural research, education, extension or related institutions during the project development phase (up to ten years under current A.I.D. procedures), providing that the policy and institutional frameworks assure effective utilization and the country is making maximum and/or increasing domestic resource mobilization efforts.

BEST AVAILABLE DOCUMENT

TANZANIA: POLICY CHOICES AND DILEMMAS

December, 1982



Training materials prepared for the United States Department of Agriculture, Office of International Cooperation and Development, Technical Assistance Division, Nutrition Economics Group under PASA STB-0000-P-AG-2103, Nutrition Strategies Training Program, and RSSA 3-77, Economic Analysis of Agricultural Policies, under agreement with the Agency for International Development's Training Division (Personnel Management) and the Office of Nutrition (Bureau for Science and Technology).

TANZANIA: POLICY CHOICES AND DILEMMAS (A)

BEST AVAILABLE DOCUMENT

Background

Tanzania, a country of some 18 million people, is located on the East Coast of equatorial Africa. The country has been independent since 1961, and its government has been led for twenty years by Julius K. Nyerere, one of Africa's best-known and most widely respected leaders.

More than 90% of the population lives in rural parts of the country, with most of the population concentrated in the coastal regions and highlands surrounding Mt. Kilimanjaro. Nearly half of the GDP is derived from agriculture, and more than 80% of the country's export is derived from agricultural products.

The country is quite diverse geographically, ranging from the highest mountain in Africa, Kilimanjaro in the North, to the Great Rift Valley sweeping through the central lowlands, and with a large highland area in the Southwest adjacent to the Livingstone Mountain range. There are three great lake systems, Lake Victoria on the Northern border with Uganda, Lake Tanganyika in the West, and Lake Nyasa in the South. Rainfall throughout the country is highly variable, and dependent on the Southward monsoons which bring rain to most of the country between December and February each year.

[illegible]

[illegible]

Figure I

MAP OF TANZANIA shows the mainland administrative regions, the islands of Pemba, Zanzibar and Mafia, the major rivers, the Great Lakes (Victoria, Tanganyika and Nyasa), the ports of Tanga, Dar es Salaam and Mtwara and the principal inland cities. Dar es Salaam, whose population was 851,522 in 1979, is the country's capital and chief industrial and financial center. By 1990 the capital will have been shifted to Dodoma.

TABLE 1: SOILS AND RAINFALL CONDITIONS BY REGION

Region	Total Land Area (1,000 ha)	Cultivated Land (%)	Land use Class 5 b/	Area with Adequate Rainfall (%) c/	Average Annual Rainfall (mm)	Number of Consecutive Months With Over 100 mm Rainfall
1. Arusha	4,110	[illegible]	10	3	941	2-3
2. Coast	3,360	[illegible]	21	10	1,178	2-3
3. Dodoma	4,110	[illegible]	12	2	556	4
4. Iringa	5,681	[illegible]	21	54	1,205	5
5. Kigoma	4,701	[illegible]	21	41	957	6
6. Kilimanjaro	4,320	[illegible]	18	24	958	3
7. Mara	[illegible]	[illegible]	[illegible]	19	1,209	2-4
8. Mbeya	8,315	[illegible]	36	24	1,444	5-6
9. Morogoro	7,510	[illegible]	53	61	1,217	5
10. Mtwara	8,475	[illegible]	34	5	1,059	5
11. Mwanza	4,965	[illegible]	19	16	926	6
12. Ruvuma	6,125	[illegible]	14	66	1,214	5
13. Shinyanga	4,024	[illegible]	9	--	862	6
14. Singida	4,805	[illegible]	11	--	648	4
15. Tabora/Rukwa*	12,300	[illegible]	21	3	940	6
16. Tanga	2,610	[illegible]	34	30	1,112	2-3
17. West Lake	2,815	[illegible]	56	44	1,088	2-4
TOTAL	88,960	[illegible]	23	22	--	

a/ Class 6: Soils of medium to high fertility with high potential.
b/ Class 5: Soils of low medium fertility with moderate potential.
c/ Adequate rainfall: as computed consists of more than 750 mm rainfall 9 years out of 10.

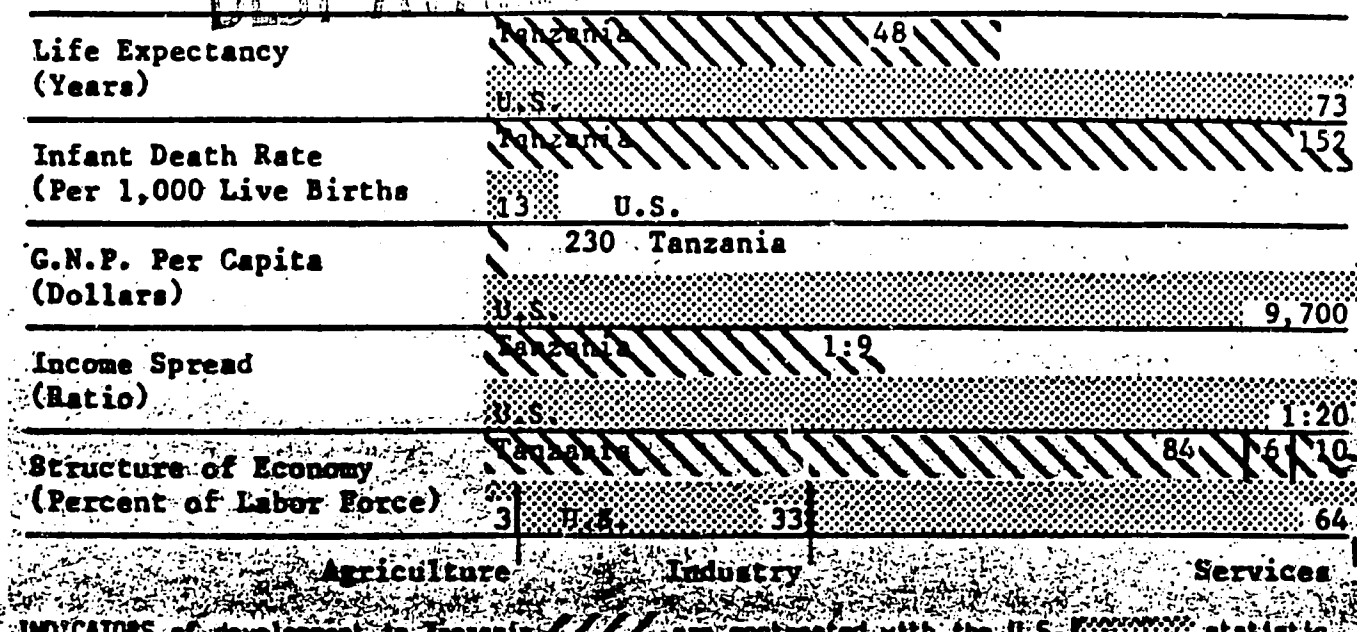
* Tabora was divided into Tabora and Rukwa Regions.

Source: Tanzania Agricultural and Rural Development Sector Study; World Bank.

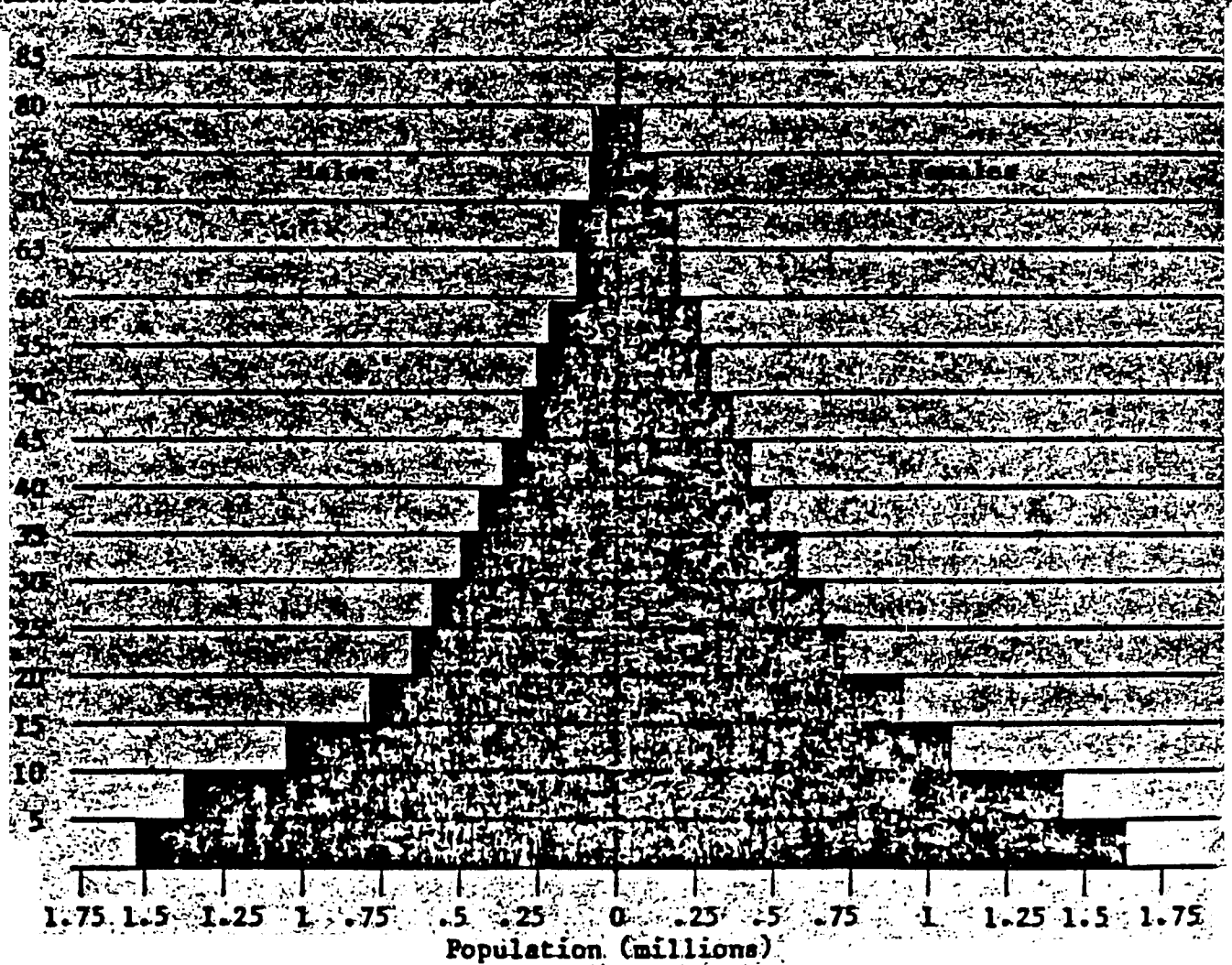
BEST AVAILABLE COPY

BEST AVAILABLE COPY

Table II



FIVE INDICATORS of development in Tanzania are contrasted with the U.S. statistic. The life expectancy in Tanzania was 48 years in 1977; it was 37 years in 1960. The infant-mortality rate was 152 per 1,000 in 1977; it was 190 per 1,000 in 1960. The G.N.P. per capita was estimated to be $230 in 1977, which is less than 3 percent of the U.S. figure. The richest twentieth of all Tanzanian households have nine times the post-tax income of the poorest twentieth. In the U.S. the richest twentieth have 20 times the pretax income of the poorest twentieth. The Tanzanian labor force is 84 percent agricultural, 10 percent service and 6 percent industrial.



POPULATION PYRAMID of Tanzania breaks down the population of 1978 by age and sex.

BEST AVAILABLE COPY

Policy Setting

The main thrust of the development strategy in Tanzania has been toward self-reliance, including the opportunity of acquiring the resources needed for development through trade and borrowing. If foreign aid provides the resources for improving Tanzania's productive capacity, it is also considered an instrument toward self-reliant development.

The domestic resource base for Tanzania is its land and its people; and agriculture is expected to provide both food for domestic consumption and foreign exchange earnings for acquiring goods and services needed to develop an industrial base. The interaction of agricultural policies with the macro-economic consequences of industrialization policies has strongly influenced food consumption and nutrition issues in Tanzania.

Tanzania's agricultural policy has not been directed at a trade-off of food versus cash-crops, but rather has been directed at generating more output from agriculture to support industrial development.

In a recent series of informal interviews with senior Tanzanian authorities and expatriate consultants involved with the formulation and implementation of agricultural and food policies, they were asked to comment on several of the issues dealt with in this case study as follows.

Interviewer: Would you agree with the observation that agricultural and food policy of your government during this period was directed at both increasing food supplies for domestic consumption and at generating more export earnings to support industrial development efforts?

Economist: [illegible] with fading. First of all, you have to keep in mind the over-all policy context in which we were working in the past decade. A massive villagization process was actually being implemented during those years, including the movement of large numbers of farmers into new locations. These villages were organized to place great emphasis on communal farming, and that was a major adjustment for many farmers to make. Also, we have had several years of general decline in our economy, which drastically affected our food production capacity.

Interviewer: Was this all accompanied by a major government thrust toward industrialization, largely to be financed by future increases in planned food exports?

Bureaucrat: There was, there was, and it did go on. And there were some mistakes made. But there was always the problem down at the village level of grassroots decision making over whether to grow crops primarily for consumption or for cash. And the disbanding of the earlier cooperative unions in the seventies, was not a universally popular or fully understood decision. There was also a lot of uncertainty about how the villagization scheme would work, and how the new marketing mechanisms — the parastatals — would work. But there certainly was the intent, at least, in the various five-year plans, that increased cash crop production would add to our export earnings over the years.

BEST AVAILABLE DOCUMENT

Ministry Official: You also have to keep in mind that we have a lot of major communication (infrastructure) problems in some of our most productive regions, particularly in Ruvumu and Rukwa Regions, in the South and West of the country.

Interviewer: But you have had those problems, infrastructure problems, prior to the seventies, and agricultural production was in better shape then. What happened? Have these new policies, villagization and the new parastatal mechanisms, simply not worked?

Expatriate Consultant: It's the "import substitution" philosophy which the World Bank, IMF and others have sold to these countries -- not just Tanzania. By persuading them to invest so much of their limited resources into these industrial schemes and to specific agricultural-consumer sectors; to lessen their dependency on imported products, they have sold their agricultural souls to the industrialization boys.

Interviewer: And now the piper's being paid?

Economist: Well, he's trying to get paid (laughter) last month, you know, we were in default to the World Bank.

Development Strategy

The Arusha Declaration in 1967 set the tone for development strategies for the country, for the seventies. The self-reliance strategy enunciated by Nyerere in that declaration was based on the following principles:

1. [illegible]
2. The equality and cooperation of man not simply as a means of [illegible] but as the main target of development.
3. Respect for one another as both producers and consumers.
4. The sharing of resources among all, regardless of specific roles.
5. Work by all and exploitation by none.

In rural areas this development strategy was initiated through the villagization process, in which farmers were encouraged to join in ujamaa (roughly translated to mean "a communal extended family") villages to live and work together, and to achieve greater agricultural productivity. Party guidelines suggested that villages be formed of no fewer than 250 farm families to provide some productive economy of scale, and non-capital intensive agricultural methods were encouraged because labor was one commodity not in short supply in Tanzania.

Between 1968 and 1972, progress was made in implementation of the villagization process, but progress was slow, so in 1972 a goal to organize all farmers in villages by 1976 was set. In 1975 the Tanzanian parliament passed the Village and Ujamaa Act giving legal status to the villages and making them the primary unit of development. Villages were encouraged to register as multi-purpose cooperatives, and they became eligible for government loans, access to extension services, and other inputs designed to increase agricultural productivity and social well-being. Through this act,

a mechanism was provided for each village to organize its own local government, which was designed to be in charge of all development activities in the village.

Communal farming, which at first was encouarged; over time, became a necessary function for each village in order to remain eligible for various forms of government assistance. Farmers also continued to cultivate their own private plots for family sustinence.

By the end of the decade, more than 8,000 villages had been organized and more than 95% of the rural population were living in villages. By that time, the average village had 400 families living in [illegible]

Decentralization

Simultaneously, the government decided to decentralize its bureaucratic support structure, to provide more grassroots support to the villagization process. This part of the strategy was intended to move decision making and planning out of Dar es Salaam, and to organize it closer to the people. The President's proclamation in 1972 announcing this strategy included political, administrative and economic objectives.

The Political objectives were:

[illegible]

Administrative objectives were:

[illegible]

The Economic objectives were:

[illegible]

Decentralization was intended to give regional authorities more autonomy to decide on their own development plans within the general context of national policies and guidelines.

BEST AVAILABLE DOCUMENT

The Prime Minister's Office was given a coordinating and control role in implementation of both the villagization and decentralized government plans.

BEST AVAILABLE DOCUMENT

Industrial Development

The industrial development of Tanzania also picked up on the self-reliant theme of the Arusha Declaration, with strong emphasis on aggressive, centralized direction of the development effort. By 1974 the previously private (more than 90% value-added in 1967) manufacturing sector had become predominantly public (more than 50% of a larger value-added) sector. Assets of private enterprises were taken over through government compensation of the owners. More than 90% of investment in new industrial enterprises since 1974 has been by public funds.

The industrial development strategy has three articulated, long range goals:

- the substitution of domestically-produced consumer goods for imported ones;
- the support of these industries by the building of primary tool and machine-manufacturing industries;
- the development of the country's mineral resources as the foundation of its industrial base.

Some progress [illegible] these industrial development goals [illegible] manufacturing had risen from 4% in [illegible] investment has been in the manufacture of [illegible] food processing, beverages, tobacco and furniture for domestic consumption.

Major surveys of mineral resources have been completed and significant coal, uranium and other precious metal reserves have been located and documented. In the past several years mineral production values have been confirmed of [illegible]

Rise of Parastatals

In an effort to streamline the marketing and distribution of agricultural products, the emergence of larger centralized parastatal organizations began with formation of the National Milling Corporation in [illegible] as the sole manufacturer and processor of agricultural products. Prior to 1976, the primary market for agricultural products was a network of regional and district level cooperative unions, who established prices and bought from villages and farmers, delivered and stored in cooperative godowns, and in turn sold to the National Milling Corporation (NMC) and other parastatal authorities being established in the seventies.

In 1975, NMC's role was expanded to include the procurement, transport and storage of all grains and stables, and in 1976 it became responsible for direct acquisition of crops from villages with the abolition of the cooperative unions. Also in 1976, the entire marketing function of other

crops was turned over to parastatal crop authorities, in an effort to reverse the trend of rising marketing costs by streamlining the marketing services provided to farmers.

For an overview of the major officially marketed agricultural products by region of the country, see Figure II.

BEST AVAILABLE DOCUMENT

Pricing of Export Crops

In considering what crops to plant, the Tanzanian farmer is influenced by pricing policies, in this instance, controlled by large parastatals such as NMC or the various parastatal crop authorities which establish and announce official prices in July of each year.

In general, official price recommendations for export crops are based on import parity pricing, calculated by subtracting unit marketing costs from world market prices expected to prevail in the forthcoming year. The assumption is that rising world market prices will lead to increased remuneration for farmers, and to reallocation of land, labor and capital to those crops for which market prospects are most favorable.

In Tanzania the Market Development Bureau in the Ministry of Agriculture recommends food crop prices based on export parity to the Economic Committee of the Cabinet, which alters the proposals considering long-term food security, foreign exchange generation, and rural income distribution [illegible]

[illegible] prices to farmers [illegible] the country.

Some Tanzanian government [illegible] performance of the agricultural sector and [illegible] crops are specific to the agricultural sector, other [illegible] crops and sometimes are seemingly [illegible]

[illegible] decisions include [illegible] restrictions on private trade and transport of [illegible] producer and retail prices, [illegible] and [illegible] of public services. Overall, governmental economic policies also have a profound effect on producer and consumer behavior.

Macro-Economic Issues

Tanzania has followed [illegible] policy since the Tanzanian shilling was issued in 1966. Some minor changes in the values were made by altering the gold content; devaluations occurred in 1973 and 1979, but since 1975 a period of managed floating has existed. The explicit policy has been to adhere to fixed official exchange rates.

The pattern of exchange rates is influenced by many factors, including inflation worldwide, sudden drops in export revenues, tight import controls, fear of nationalization, and neighboring countries political and military disturbances.

BEST AVAILABLE DOCUMENT

Figure II

Major Marketed Agricultural Products by Region

BEST AVAILABLE DOCUMENT

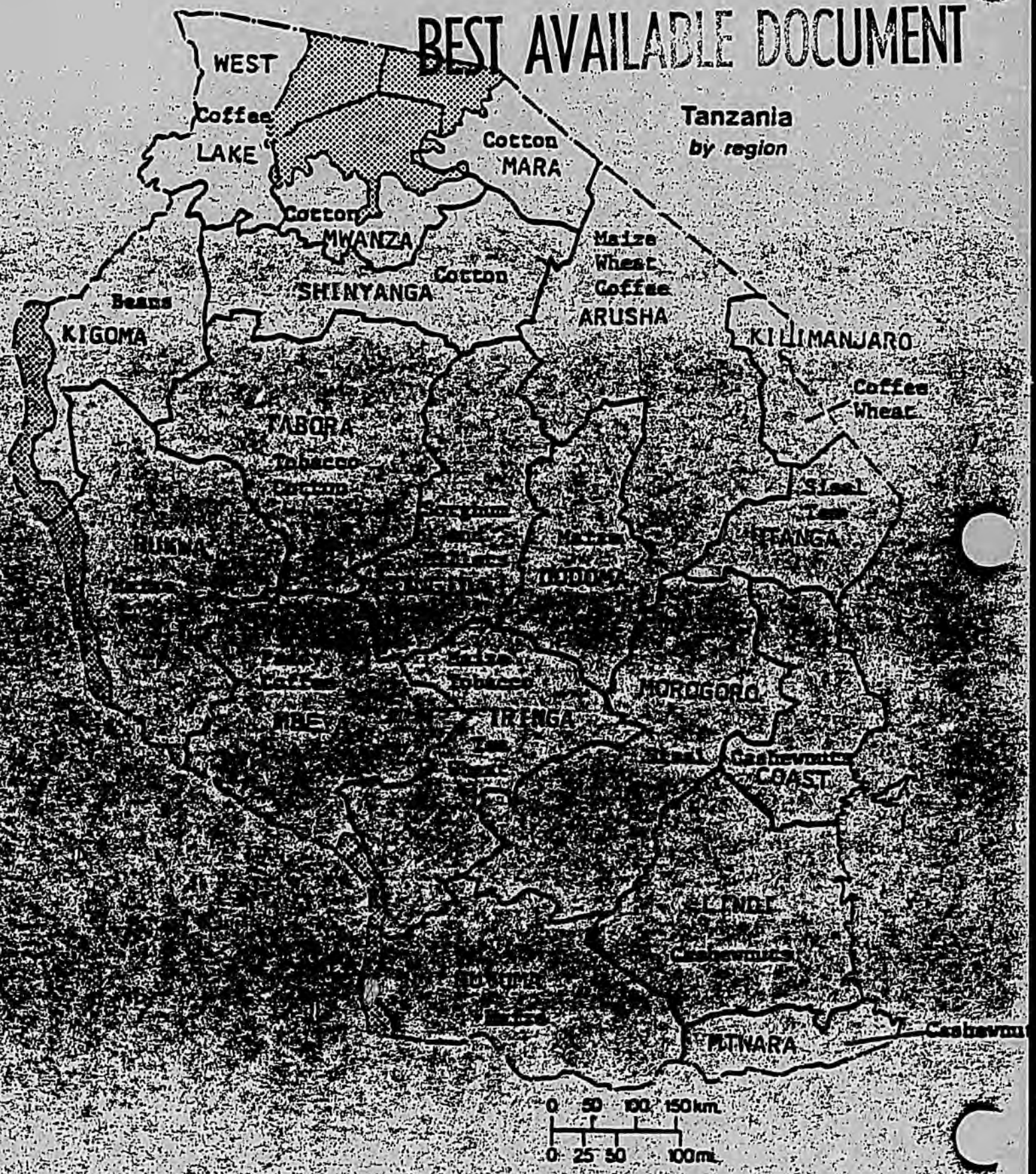


Table III. Percentage Changes in Producer Prices and Unit Export Values, 1970 to 1979

Crop	Producer Price*	Unit Export Value*
Cashew	80	256
Cotton	117	228
Tobacco	71	158
Pyrethrum	63	97
Tea	139	84

*Using nominal prices.

BEST AVAILABLE DOCUMENT

BEST AVAILABLE DOCUMENT

BEST AVAILABLE DOCUMENT

Table V illustrates Tanzania's inflation and exchange rates, based on the Purchasing Power Parity Theory - relative rates of inflation between the home country and its trading partners. Changes in exchange rates are the mechanism whereby equilibrium is restored in the demand for holdings or stocks of various assets, including foreign and domestic currencies.

Overvaluation has encouraged producers to switch resources to the production of non-tradeables and consumers to demand more traded goods. This imbalance has resulted in Tanzania taxing its export sector and stringent restrictions on imports. Producers seeking to evade the increasing export tax have shifted resources to other activities. See Table VI for the volume of exports in five major crops.

The growth of the government sector doubled in real terms in the seventies, reinforcing withdrawal of resources from the production of tradeable crops. Much of this growth was financed by increasingly large fiscal deficits, requiring borrowing from the Central Bank of Tanzania. The Bank has expanded domestic credit and the monetary base by creating claims on the government and official entities. Between 1978 and 1979, the money supply rose by 33%, further acting as a tax to release real goods and services from households to the governmental sector. The government has drawn down holdings of international reserves, now less than a fifth of their real level in the sixties. Net foreign assets have also fallen drastically. Although the growth in fiscal deficits and international borrowing was to provide resources for parastatals and other government services supporting the agricultural sector, the [illegible] resources from agriculture [illegible] government services.

[illegible]

Interviewer: Isn't a major destabilization of the Tanzanian shilling an order, or even long overdue, in order to restore some stability to the economic marketplace in the country?

[illegible]

Economist: [illegible] the heart of the argument with the IMF is [illegible] proposition that in the matter of national sovereignty, national pride is you will — to keep control over our own economic destiny.

Interviewer: But isn't the reality that this situation is wreaking havoc with your agricultural production and distribution policies?

Economist: [illegible] — but [illegible] agricultural [illegible] and while we still have some problems in getting [illegible] prices in recent years, and that should lead to increased production. (See Table VII for production indices from 1978 to 1980).*

* The official exchange rate has been adjusted in minor ways in 1982, but the explicit policy described has not been changed.

Table V. Tanzania: Inflation and Exchange Rates

BEST AVAILABLE DOCUMENT

Year	CPI 1975=100	International index of inflation[a]	Official exchange rate[b]	Parallel market rate[c]
1962	40	44	7.14	–
1963	39	45	7.14	–
1964	40	45	7.14	–
1965	42	46	7.14	–
1966	44	47	7.14	8.64
1967	47	47	7.14	8.82
1968	47	47	7.14	8.23
1969	48	48	7.14	9.10
1970	50	51	7.14	10.45
1971	53	55	7.14	15.00
1972	54	[illegible]	7.14	15.45
1973	63	72	6.90	13.45
1974	73	82	7.14	14.00
1975	100	100	8.26	25.00
1976	107	101	8.32	20.40
1977	119	106	7.96	15.05
1978	130	107	7.72	11.75
1979	[illegible]	125	8.72	13.50
1980	[illegible]	[illegible]	[illegible]	[illegible]

Sources: [illegible]

[a] Taken from [illegible]

[b] Taken from [illegible]

[c] Taken from [illegible]

BEST AVAILABLE DOCUMENT

Table VI. Volume of Exports in Tanzania
(1968-70 = 100)

Year	Coffee	Tea	Sisal	Cotton	Cashew
1934-38	31	1	47	16	
1948-52	31	8	70	15	
1956	46	27	98	47	17
1957	39	30	96	46	35
1958	47	33	104	54	32
1959	41	37	110	52	35
1960	53	44	109	66	38
1961	52	44	106	50	42
1962	54	55	116	55	60
1963	55	56	[illegible]	81	45
1964	70	[illegible]	[illegible]	75	68
1965	[illegible]	[illegible]	[illegible]	[illegible]	72
1966	107	[illegible]	[illegible]	[illegible]	81
1967	94	84	[illegible]	[illegible]	76
1968	103	[illegible]	[illegible]	105	109
1969	104	[illegible]	[illegible]	104	91
1970	[illegible]	[illegible]	[illegible]	[illegible]	100
1971	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1972	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1973	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1974	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1975	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1976	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1977	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1978	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1979	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1980	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table VII. Tanzania Indices of Production 1956-1980
1969-1971 = 100

BEST AVAILABLE DOCUMENT

Year	Total Agriculture	Total Crops	Total Food	Per Capita Agricultural	Per Capita Food
1956	72	73	76	105	110
1957	72	73	77	104	109
1958	80	82	83	113	114
1959	81	83	87	112	117
1960	73	72	73	99	97
1961	73	71	75	96	98
1962	77	76	78	99	98
1963	84	85	85	105	105
1964	86	88	85	105	103
1965	[illegible]	[illegible]	[illegible]	103	100
1966	112	103	98	116	112
1967	93	[illegible]	89	101	100
1968	96	[illegible]	[illegible]	102	101
1969	98	98	94	101	100
1970	[illegible]	97	103	102	103
1971	104	102	106	102	103
1972	[illegible]	[illegible]	105	100	103
1973	[illegible]	[illegible]	[illegible]	100	[illegible]
1974	[illegible]	[illegible]	[illegible]	99	99
1975	[illegible]	[illegible]	[illegible]	100	[illegible]
1976	[illegible]	[illegible]	[illegible]	105	115
1977	[illegible]	[illegible]	[illegible]	102	[illegible]
1978	130	[illegible]	[illegible]	103	115
1979	128	[illegible]	[illegible]	98	109
1980	[illegible]	[illegible]	[illegible]	97	105

Source: [illegible]

BEST AVAILABLE DOCUMENT

Interviewer: But aren't most of the unofficial prices for grains and other food stuffs moving faster than official prices, and won't that actually cause the amount of food crops reaching official markets to fall?

Ministry Official: That's been a problem, and of course transport has been a real problem this year in getting the crops out of some of the regions. But I think that with the move toward greater local government control, and the new cooperative legislation, which will re-constitute the cooperative unions much like we had them in the sixties, we are definitely in for a jump in production in the next few years.

Export Performance

The overall performance of the export sector is shown in Tables VIII and VIII-A. With the exception of tea and tobacco, output of all principal export crops fell in the seventies. The nominal, real and producer prices paid for two major export crops, coffee and cotton, are illustrated in Table IX. Table X illustrates the real value of export earnings in constant, 1975 Tanzanian shillings.

The interviewer asked the same group of Tanzanians and observers to comment on how they believe these policies are affecting the average consumer/producers: the Tanzanian farmer.

Interviewer: If you think about the Tanzanian farm family as a consumer unit, rather than just a producer unit, how have all of these policies affected them? Are they better off than they were ten years ago?

Expatriate Consultant: [illegible] information available to [illegible] survey data for 1976/77 comparable to the earlier survey done in 1969. Rather, hasn't seen the light of day, and I doubt it ever did. I think it is politically not [illegible]

Economist: Hope really is primary. I know about that survey and it will see the light of day. There have been difficulties with the analysts of the data, but it will come out, probably under this regime. To answer your question, I think some people are better off than they were ten years ago, and some people are worse off. I think that is true in almost any country, under almost any system.

I think we've made some solid accomplishments in the rural sector during the seventies, and I think that sometimes we fail to stop and acknowledge them. In fact, and this is particularly so in certain regions, then there are shortages of certain commodities in rural areas. Paper products, soap, and cooking oil are particularly in short supply. But on the other hand, we do not have starvation in our villages, and whatever its shortcomings, we have accomplished a national village organization program in which more than sixteen million people have been organized into a planned, national network of agriculturally productive units. And, we have made great progress in improving the over-all quality of life in those villages, roads, housing, improved water supply, health programs, and so forth.

Table VIII. Tanzania: Output of Major Export Crops

BEST AVAILABLE DOCUMENT

	Real 1980 Producer Price[a]	1970[b]	1975	1977	1980
Declining					
Cotton	AR 74 Br 69	100(13)	92	88	79
Sisal	[illegible]	100(11)	70	58	45
Cashew	59	100(7)	105	87	60
Pyrethrum	58	100(1)	205	141	61[c]
Constant					
Coffee	43	100(17)	109	98	96
Increasing					
Tea	[illegible]	100(3)	153	197	225
Tobacco	[illegible]	100(7)	117	160	218

Sources: Bank of Tanzania [illegible]

[a] 1970 = 100.

[b] Percentage of [illegible] in parentheses.

[c] For 1979.

[illegible] Agricultural Growth in Percentages

Period	Annual Average Rates of Growth		
	Agriculture	Crops	Food
1960-1969	[illegible]	[illegible]	[illegible]
1970-1980	[illegible]	[illegible]	[illegible]

BEST AVAILABLE DOCUMENT

Table IX. Unit Export Price
(1970 = 100)

Year	Coffee Unit Export Price Nominal	Coffee Unit Export Price Real[a]	Producer Price	Cotton Unit Export Price Nominal	Cotton Unit Export Price Real	Producer[b] Price
1969	75	82	102	102	111	107
1970	100	100	100	100	100	100
1971	92	87	101	110	104	101
1972	10[illegible]	88	106	127	110	95
1973	118	86	102	134	97	89
1974	131	77	69	227	113	89
1975	127	66	105	197	103	92
1976	318	164	151	273	141	87
1977	612	291	[illegible]	348	162	89
1978	367	134	[illegible]	279	117	84
1979	384	141	[illegible]	310	114	96
1980	[illegible]	192	[illegible]	192	63	74

Source: IMF, MDR

[a] Deflated by Index of International Unit Values (UNCTD)

[b] Deflated by [illegible]

Value of Export Earnings in Millions of [illegible]

Year	Cotton	Coffee	Sisal	Cashew	Main Crops	All Exports
1969	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2954
1970	[illegible]	601	[illegible]	[illegible]	1688	3171
1971	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3348
1972	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2589
1973	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4146
1974	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3158

Source: Bank of Tanzania

BEST AVAILABLE DOCUMENT

Ministry Official: And in the urban areas, we have very little serious food shortages, except for certain vital commodities such as beer (laughter) we have no real serious food problems in the cities and regional center towns.

Interviewer: But isn't the farmer in Tanzania caught in what we refer to as a "catch-22" in the States? If he grows cash crops to help out with export earnings, he will have to buy food-stuffs for his family at a higher price on the unofficial market, right?

Bureaucrat: No but, most of them still maintain family plots, for their own family food supplies, so they don't have to go to the unofficial market for their own food supplies.

Interviewer: So then, you get caught in the "catch-22" as far as official government policy is concerned, because then they will spend more energy on their family plots for personal food supply, and less energy on the village, communal plots, where most of the cash/export crops are grown, right?

Ministry Official: I think we can do both. You keep presenting it as an "either"/"or" proposition, and I do not think that is so. I think we can produce agriculturally f[illegible] both the family food needs and our national cash/crop export needs. [illegible] in a way, our friend here is correct — we do not have the information we need to answer your question. The household survey information will help. But, right now we really don't know as much as we would like to know about how the consumer — particularly the farm-family consumer, [illegible] — is doing, given the past ten years of agricultural and food [illegible]

Interviewer: So [illegible] where do we go from here? Particularly if we want to help the small-holder farmer in view of these policies and strategies [illegible]

BEST AVAILABLE DOCUMENT

TANZANIA: POLICY CHOICES AND DILEMMAS (A)

BEST AVAILABLE DOCUMENT

Small Group Task

How would your team answer the interviewers question? What would you do to help the small-holder farmer, both as a producer and as a consumer?

Using the information available in the (A) case, and drawing on your collective experience both professionally, and working in developing countries, how would your group respond to the following questions:

1. What does your group think the over-all impact of the policies described would have on Tanzanian farmers:

   i. as producers of food and other crops, and,

   ii. as consumers of food and other goods?

2. If you could make policy recommendations to the Tanzanian government, which policies would you consider most important to re-examine, with particular concern for agricultural and food policy as it will impact the Tanzanian consumer?

3. What were the most important categories of information you would hope would be determined by the household survey mentioned in the case study, in order to [illegible] the [illegible] over-all policy and development [illegible]

BEST AVAILABLE DOCUMENT

TANZANIA: POLICY CHOICES AND DILEMMAS (B)

The following observations are based on the findings of the "Consumption Effects of Agricultural Policies in Tanzania," 1982, Sigma One Corporation, DSAN C-0271, Research Triangle Institute.

Food Policy Issues

The apparent impact of policies previously discussed is that farmers in Tanzania are being induced to plant food crops first, and then are allocating resources to cash cropping and other productive activities. This is sometimes described as a "food first" strategy. This, however, was not an explicit goal of the country's overall development strategy. In per capita terms, it is resulting in less production for export, and in food crops being produced at higher real resource costs since more labor and land are being used to meet farmer's consumer food needs.

There has been continued government support for extension services through the Ministry of Agriculture. The National Maize Program has sought to bring together improved agronomic practices, purchased inputs and extension support to increase maize production. In some regions, with uncertain weather, it has been reported that increases in production have not been sufficient to recover the cost of purchased inputs.

[illegible]

Food Security

[illegible]

In many countries, farm families that produce their own food can stabilize their food security by saving surpluses from good years in the form of assets and converting these assets to food in bad years. In Tanzania, this is often not a viable option because of the unreliability of grain markets in rural areas. Furthermore, cash is not a good store of value due to inflation, and other durable goods which might be used as stores of wealth are in short supply.

BEST AVAILABLE DOCUMENT

So, when output declines in rural areas, farm families probably keep their own consumption fairly constant and reduce the marketed surplus, making volumes of food reaching markets more variable than actual food production. Also, Tanzania's unofficial market, which is unconstrained, competes more successfully for available supplies in bad production years. All of this causes further reduction of official markets. Since the government is concerned with the urban consumer, this causes the government to be forced to draw down on reserves, and to increase imports.

Markets

The great majority of grain production in Tanzania is, and always has been, consumed by the producing household. Various studies in efforts to determine what percentage of grains reach the official market make it reasonable to conclude approximately 20 percent is distributed officially.

The National Milling Corporation is the official market in Tanzania for grains. The performance of NMC as a parastatal has been hindered by one external practice, and three internal policies and practices.

The Act establishing NMC specifically directs it to act as a commercial, business-like operation. However, in actual practice, the parastatal has been called upon several times to serve as a means of government distribution and redistribution of income, including implementation of a maize flour subsidy, a transportation subsidy, and the requirement that it purchase all stock offered for sale, and in other areas of activity, to provide food to the army during the Uganda war, subsequent food aid to Uganda after the war, and famine relief activity. All have served to weaken the financial viability of the organization.

As a matter of internal policy, NMC has adopted a strategy of crop procurement at the earliest possible time after the growing season, due to the lack of storage facilities in many villages. This has led to enormous expansion of NMC's overhead base, confusion and expense around transportation, and substantially increased staffing levels.

A second matter of internal policy is the organizations policy of paying villages in advance of crop collection, based on the village's prior estimate of production. In some cases payments have been made based on overly optimistic estimates, and advances are difficult to recover after the fact.

Finally, NMC has not yet developed an organization-wide system of financial management, inventory monitoring, or a system of identifying costs in a systematic way. As a result, branch offices and managers have developed their own systems, and top management has little capability of monitoring organization performance from a cost/benefit point of view.

The cumulative result of these policies has been a 2 billion Tsh over-draft since 1976.

BEST AVAILABLE COPY

The Legal Monopsony

It is illegal to sell more than small amounts of grain to buyers other than NMC. Yet in most parts of the country, for most parts of the year, the NMC price is lower than that offered by unofficial markets. Legal enforcement of this policy varies from region to region, adding further confusion to the impact of this legal monopsony. In many cases communal production is sold to the NMC to raise village revenues, while production from private plots is sold unofficially.

By making unofficial transactions illegal, the policy has also had the effect of raising the risk of dealing unofficially causing both farmers and middlemen to charge higher prices to hedge against their legal risks.

Price-setting Process

As mentioned earlier, the technical analysis supporting all government-controlled agricultural pricing is conducted by the Marketing Development Bureau (MDB) of the Ministry of Agriculture. In general, these recommendations are based on import parity. Over the past 15 years, Tanzania has been a net importer of food in two of every three years. The average net annual imports in deficit years has been 83,000 tons, while average annual net exports in surplus years have been 20,000 tons. To the extent the official exchange rate understates the true value of foreign exchange to the Tanzanian economy, this mechanism does not reflect the true value of food crop production to Tanzania.

Based on performance during the seventies, there appears to be an unwanted but kindred policy that official prices cannot be lowered. This policy happens MDB, [illegible] which encourage the production of different crops at [illegible] levels, based on supply and demand considerations.

In addition, given the present system whereby producer prices for the coming season are announced in July there is no way of revising prices during that growing season. In a year of poor harvest, with the producers consuming more of their products, the amount of available marketable sales drive up unofficial prices. The effect of these practices is to further lessen the food available through official markets, increasing the importance of unofficial markets in meeting consumer needs.

Production of Preferred Staples

Tanzanians have shown a long-term and increasing preference for maize, rice and wheat over such staple crops as sorghum, millets, and cassava. During the seventies domestic production of these grains for the official market has been insufficient for demand, and substantial quantities of these crops have been imported. Table I shows parastatal purchases and imports of these crops for the past six years. Figure I shows the regional distribution of official marketings for these preferred staples.

Maize is the most important foodstuff in Tanzania. Maize demand has grown throughout the country, but official maize production has been increasingly concentrated to a few productive regions. Table II presents the annual purchases of the five most important maize regions.

Table 1. NMC Purchases and Imports* of Preferred Staples 1975-76 - 1980-81
(Thousand Metric Tons)

	Maize		Paddy**		Wheat		All Preferred	
	NMC Purchases	Imports (Exports)	NMC Purchases	Imports (Exports)	NMC Purchases	Imports (Exports)	NMC Purchases	Imports (Exports)
1975-76	91.0	97.2	15.0	10.7	25.0	60.2	134.0	178.1
1976-77	127.0	47.6	23.0	[illegible]	27.0	33.6	177.0	86.5
1977-78	212.7	136.2	36.7	[illegible]	53.0	45.1	302.4	133.2
1978-79	220.5	(50)	32.1	[illegible]	28.9	61.3	301.5	52.5
1979-80	160.6	28.2	46.5	[illegible]	26.6	32.5	233.4	104.0
1980-81	104.8	263.0	19.1	[illegible]	27.9	47.0	151.5	389.7
Six-year Total	916.1	421.7	213.3	242.0	170.4	279.7	1,299.8	944.0

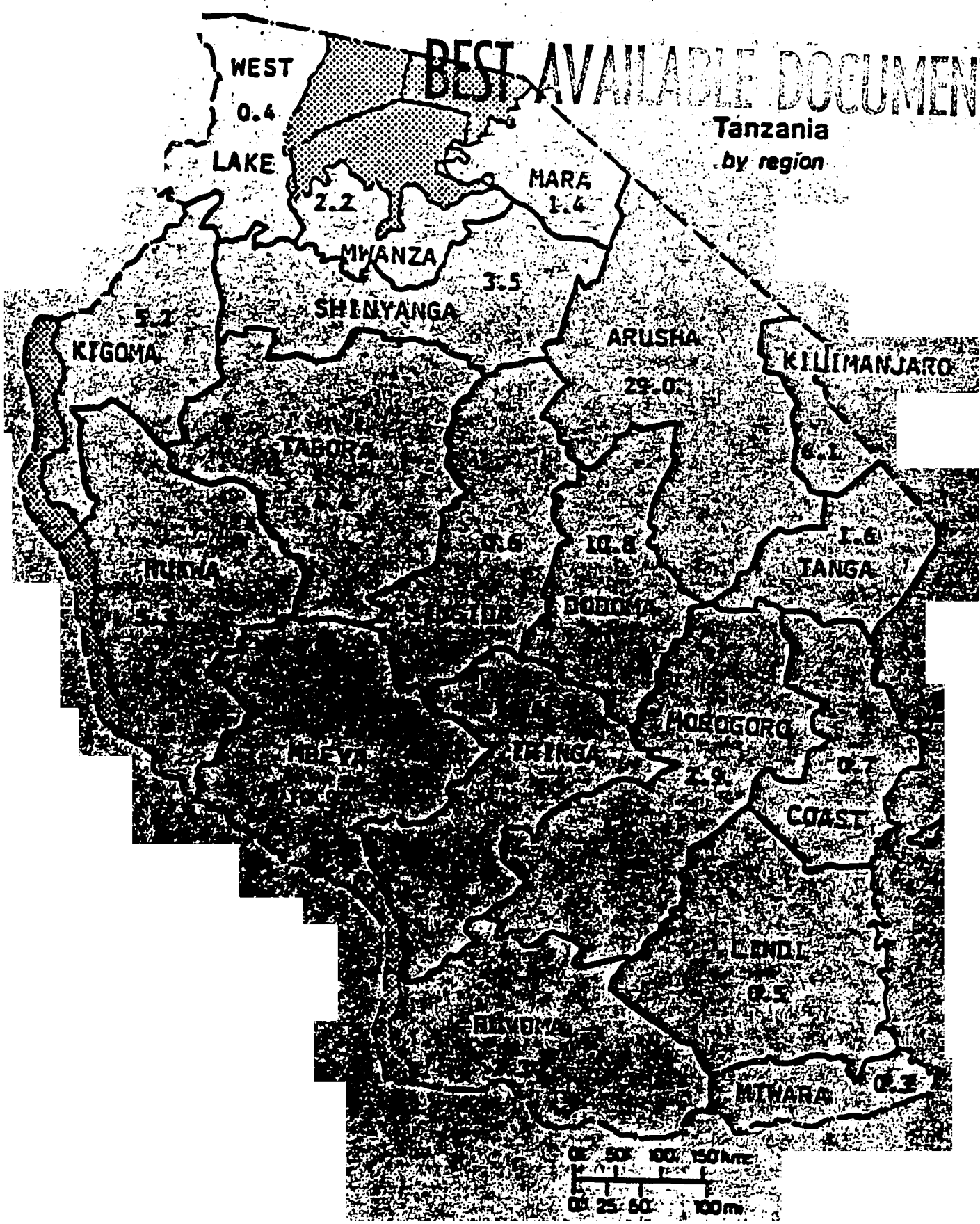
* Imports include both commercial and aid.

** NMC-purchased rice is converted to paddy at .65 kg rice = 1 kg paddy.

Source: FAO/KKDMO Early Warning/Crop Monitoring Project.

BEST AVAILABLE DOCUMENT

Figure I. Percentage of Officially Marketed
Maize, Rice, and Wheat by Region
1977/78 - 1980/81



Source: Sigma One Corp. from MDB data.

BEST AVAILABLE DOCUMENT

Table II. Percentage of Total Maize Purchases by Region

	1977/78	1978/79	1979/80	1980/81	1981/82 (est)
Arusha	28	32	30	17	10
Dodoma	9	17	17	23	14
Rukwa	5	2	10	17	18
Iringa	10	12	17	21	22
Ruvuma	8	10	11	13	18
Five Regions	60	73	85	91	82

Source: FAO/Kilimo Early Warning and Crop Monitoring Project.

BEST AVAILABLE DOCUMENT

Rice is more preferred and more expensive than maize in Tanzania's urban areas. NMC sales have consisted of roughly equal parts domestic purchases and imports. Wheat is also much more expensive than maize and is popular with urban residents. Most rice and wheat production in the heavy producer regions come from large and relatively highly mechanized National Agriculture and Food Corporation farms.

Production of Drought-resistant Staples

Much of Tanzania, particularly the central regions, are susceptible to drought. Throughout the seventies, government policies were designed to mitigate the potential effects of drought on national food security, by promoting the cultivation of drought-resistant staples: cassava, sorghum and millets.

The cultivation of drought-resistant staples has been encouraged through guaranteed markets, increased producer prices and public information campaigns. In the period 1976-7 to 1977-8 real prices for cassava rose by 79 percent, for sorghum bulrush millet by 48 percent, and for finger millet by 182 percent, as shown in Table III. Subsequent to these rapid increases, nominal producer prices were held constant from 1978 through the current season. Thus the real prices for all these crops have returned to the levels which existed at the time of the mid-decade drought years. Tanzanian farmers responded predictably, as shown in Figure II. [illegible] Therefore, it cannot be argued that the policy of promoting drought-resistant staples has resulted in farmers to plant more of them. However, it cannot be argued that consumption of these increased. The seasons in which [illegible] were also good. [illegible] Also, in some regions with more reliable rainfall, the production of these staples increased markedly as well. Thus, it appears that drought-resistant staples, when promoted, were largely raised on land formerly planted in, by direct competition with traditional export crops [illegible] and protected and preferred food crops [illegible] The National Milling Corporation was therefore forced to export the resulting surpluses at a loss for the 1978-9 marketing year.

Pan-Territorial Pricing

Before 1974 the intra-stone prices for regional gov. down were the same for all officially marketed crops, but producer prices from region to region varied, mostly dependent on transportation costs. Pan-territorial pricing was introduced to minimize the differences in returns to farmers in remote regions. This policy was introduced to equalize income differentials between farmers living in different regions, and to increase national agricultural output by stimulating production in remote regions through price incentives.

The policy has had its most noticeable affect in two remote regions, with relatively stable rainfall and good soil conditions. Rukwa and Ruvuma have become two of the major maize-surplus regions since introduction of the pan-territorial policy along with a guaranteed harvest to purchase all

Table III. Real Producer Prices for Food Grains
(1980 = 100)

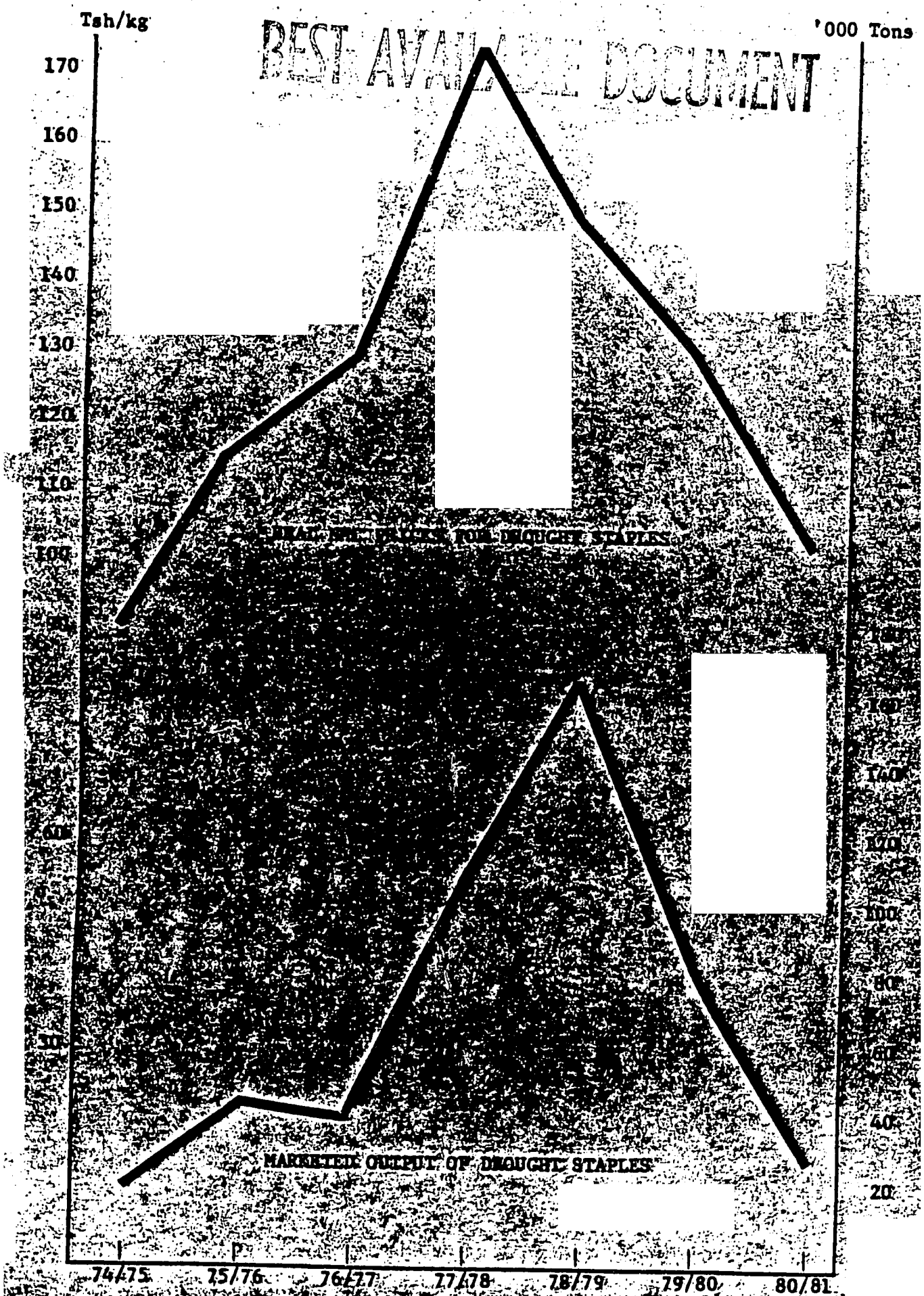
Crop	70/71	71/72	72/73	73/74	74/75	75/76	76/77	77/78	78/79	79/80	80/81	81/82
Maize	85	72	68	70	90	125/134	127	119	102	106	96	105
Paddy	189	153	145	121	112	167	159	168	144	159	167	175
Wheat	186	170	148	121	138	167	190	175	150	143	158	167
Wt. Avg. Pref. Shgs.	114	99	91	85	101	144	141	134	115	120	116	124
Sorghum	-	-	78	107	99	125	143	140	120	106	96	88
B-Millet	-	-	78	107	99	125	143	140	120	106	96	88
F-Millet	-	-	-	-	99	134/142	151	279	240	212	144	131
Cassava I	-	-	-	66	65	67	79	84	78	69	62	44
Cassava II	-	-	-	62	61	63	63	70	60	53	48	44
Wt. Avg. Dr. Staples	-	-	-	-	90	115	129	172	148	130	100	95

Source: MDB

BEST AVAILABLE DOCUMENT

Figure II

Real Producer Prices and NMC Purchases of Drought Staples, 1974/75-1980/81



BEST AVAILABLE DOCUMENT

Source: Sigma One Corp.

BEST AVAILABLE DOCUMENT

available staples. In 1980-1 the transportation (only) costs to NMC in procuring the maize grown in these two regions was 40 million Tsh, against NMC sales of this same maize for 36 million Tsh. The major current demand for maize from official markets is in Dar es Salaam and the Northeast regions - on the opposite end of the country from Rukwa and Ruvuma.

It should be noted that farmers in remote regions, such as Rukwa and Ruvuma, have fewer alternative (unofficial) markets to access, than some of the more centrally located regions with access to urban markets. As a result, the remotely located regions seem more responsive to official market incentives than other regions in the country.

The 1982-3 consumer prices announced in July of 1981 will re-introduce a form of regional price differentiation. The new system will pay bonuses to growers of maize, paddy rice, millets, sorghum and cassava in those areas which are agronomically better suited for the production of these crops. This policy seems to reflect a food security concern, repromoting drought-resistant crops and maize (including Rukwa and Ruvuma). It does not include regional price differentiation for export crops.

Official Transfers of Grain

The measure used to develop Table IV consists of the difference between the surplus or deficiencies of preferred staples bought and sold by the National Milling Corporation for each marketing year.*

On an aggregate national level the NMC bought more grain than it sold in 1977-8 and 1978-9; in their other 4 years of the period covered in the Table IV more was sold than purchased domestically. The surplus is assumed to have two components: the import/export balance and the NMC's change in stocks. It seems clear from an examination of the yearly flow of imports and exports of preferred cereals that Tanzania has been making up the difference between official sales and purchases during this period with imports.

The major recipient of inflows of grain has been Dar es Salaam. In Table V, the addition or subtraction from marketings caused by imports, exports, and changes in stocks is given in the second column. Assuming that these "external" adjustments go first to satisfy Dar es Salaam's requirements, the balance of Dar es Salaam's consumption can be thought of as a transfer from other regions. This figure is given under the heading of "Domestic Transfer." In 1974-75, the only year that the national deficit was greater than Dar es Salaam consumption, there was effectively no domestic surplus to transfer. In all other years NMC purchases were greater than sales, if the capitol is excluded from the computation.

Other regions have consistently been recipients of inflows of officially marketed gain. For example, Tanga has received more grain than it supplied in five years out of six; its average annual deficit was 10,407 tons. Kagera, Mtwara and Lindi have also shown a deficit each year.

*Milled grains sold by the NMC are converted to grain equivalents for this analysis using the following factors: 0.9 kg sembe = 1 kg maize; 0.65 kg rice = 1 kg paddy; 0.75 kg wheat flour = 1 kg wheat.

Table IV: Regional Surpluses and Deficits (-) of Preferred Grains
(Zone of Grain Equivalents)

1974/75 - 1979/80

Region	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	Average 1974/75 1976/77	Average 1977/78 1979/80	Average 1974-1980
Arusha	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2145.9	68408.6	35277.2
Iringa	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7902.9	21761.0	14832.0
Kigoma	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-1479.4	443.7	-517.8
Kilimanjaro	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6239.1	13769.1	10004.1
Mara	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-3063.6	1160.7	-951.5
Mbeya	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10636.2	28846.9	19711.9
Morogoro	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-4208.8	5287.0	539.1
Mwanza	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-11083.0	889.6	-5096.7
Mtwara	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-8771.7	-3382.1	-6076.9
Ruvuma	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-8243.1	18065.5	13154.3
Shinyanga	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-3352.3	8910.4	2779.0
Singida	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-6148.1	-851.0	-3499.5
Tabora	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-5079.8	10451.9	2686.0
Tanga	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-5770.7	-15044.0	-10407.4
Kagera	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-2779.8	-5891.6	-4335.7
Dodoma	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-9574.7	17284.8	3855.0
Rukwa	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		10102.2	10102.2
Lindi	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		-1595.4	-1595.4
Coast/Dar es Sal.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+92452.8	-137193.5	-114823.2
Tanzan Mainland	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-109101.8	43787.7	-32657.0

Source: Sigma One Corp.

BEST AVAILABLE DOCUMENT

BEST AVAILABLE DOCUMENT

Table V. Dar es Salaam Consumption of Preferred Grains

Year	DMS Consumption	National Deficit	Domestic Transfer to DSM
1974/75	94	-209	-
1975/76	86	-73	13
1976/77	97	-45	42
1977/78	115	+92	115
1978/79	152	+54	152
1979/80	143	-15	128

Source: Sigma One Corp. from MDB data.

BEST AVAILABLE DOCUMENT

At the other extreme are the regions which have consistently supplied the parastatal with surpluses. These regions are: Arusha, Mbeya, Iringa, Ruvuma, Rukwa, and Kilimanjaro. These six regions had a net overflow of 588,000 tons, or 98,000 tons per year from 1974-75 through 1979-80. The average national deficit during this period was 33,000 tons per year.

All other regions showed both surpluses and deficits for the years in questions; as a general rule there were surpluses in the good harvest years of 1977-8 and 1978-9. Inter-regional flows through official channels were particularly large in 1974-5 as imports were distributed in the national effort to alleviate the effect of serious (drought-related) food shortages.

Unofficial Markets for Grain

Unofficial markets exist because official markets for grain in Tanzania are unable to equilibrate the supply and demand for grain for large segments of the population. Many farmers are unwilling to produce grain for the official price; others cannot easily sell on official markets because of poor access to NMC buying due to the parastatal's logistical constraints. Because NMC's sales are limited by low levels of purchases, and because NMC grain is largely sold in a few urban areas, many consumers are unable to meet food requirements through the parastatal. The unofficial agricultural markets which communicate demand to farmers and supply consumers with essential food commodities are a large and essential part of the food system in Tanzania.

Urban Food Needs and the Necessity for Unofficial Markets

[illegible] The preferred product, maize meal, is cheaper than those sold on unofficial markets. [illegible] and maize [illegible] a direct subsidy from January 1980 until July 1981 [illegible] sold for [illegible] per kilo while costing NMC [illegible] the consumer price is currently Tsh 2.50 with rice and wheat flour selling for Tsh 5.35 and [illegible] respectively. All these prices are well below unofficial market prices, and all are subsidized by the country at large, through financing of NMC's operating deficit. Table VI gives the [illegible] prices of preferred staples from 1975 to the present.

Table VI: Official Retail Prices for Sembe, Rice and Wheat Flour 1975 to 1981 (Shs/kg. loaf)

Product	July 75 Nov 76	Aug 76 Oct 77	Nov 76 March 78	May 78 Aug 79	Aug 79 Jan 80	Jan 80 June 80	June 81 present
Sembe	0.80	1.25	1.75	1.75	1.75	1.25	2.50
Rice	1.65	2.00	3.00	4.00	3.50	3.35	5.35
Wheat	1.65	2.40	4.55	3.75	3.75	3.75	5.65

Source: MDB

BEST AVAILABLE DOCUMENT

Residents of different regions who are dependent on market purchases for their basic food supply have differential levels of access to NMC/RTC sales. The NMC allocates grain to the regions. However, once that central allocation decision has been made, individual Regional Trading Corporations (RTC's) decide where and when to sell. The RTC's receive little remuneration for transporting grains for sale to rural areas, and the residents of district and regional centers are more able to make the RTC's aware of their food demands. Therefore, the majority of sales are in urban areas.

The less the parastatal supplies, the greater the need for consumers to purchase food on unofficial markets. Although many rural consumers are dependents on other people's production, and some town residents provide part of their own food supply, the projected food needs of towns provide an indication of the minimum market demand for food. By comparing these food needs to the number of NMC/RTC sales in each region we can demonstrate two important facts. The first is that some regions receive much greater portions of NMC grains than others; the second is that urban consumers in many regions have no choice but to depend on unofficial sales.

Table VII presents the percentage of urban food needs met by parastatal sales over the past 6 years. The calculation depends on three assumptions:

1. The per capita consumption of grains in urban areas is 180 kg per person per year. This is the FAO standard for a cereal-based diet.

2. The RTC's sell 80 percent of their grain to district and regional centers. In some years the NMC sells maize grain in rural areas due to acute food shortages, which is the explanation for statistics of over 100 percent.

3. In Dar es Salaam/Coast regions, 100 percent of NMC sales were in urban areas.

The table shows that Dar es Salaam has met a very high percentage of its grain needs through official NMC sales. From 1974 through 1977, an average of 70.7 percent of the capital's projected demand was met through NMC sales. From 1977 through 1980 this figure rose to 90.1 percent. Dar es Salaam produced no maize for sale to the NMC during this period, yet it received an average of 46.4 percent of total national sales. Dar es Salaam also received an average of 48 percent of rice sales and 53 percent of wheat sales during this period.

Other regions where NMC has consistently been an important supplier over the six marketing years include Tanga, Kilimanjaro, Arusha, Kagera, and Dodoma. Sales relative to urban population have increased noticeably in the past three years in Kilimanjaro and Kagera, and have declined slightly in Arusha and Tanga.

Mwanza is Tanzania's second-largest urban area, and its rapid growth and increased grain needs have caused a major flow of parallel market grains from all surrounding regions.

BEST AVAILABLE DOCUMENT

Table VII. Percentage of Urban Food Needs Met by NMC Sales
1974/75 - 1979/80

Region	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Arusha	243.9	118.9	100.0	93.9	102.7	110.0
Tringa	59.9	31.5	23.4	35.5	33.3	37.9
Kigoma	11.3	52.8	15.5	15.9	9.8	40.7
Kilimanjaro	20.3	48.6	80.9	80.1	92.4	124.0
Mara	110.9	43.8	38.3	34.9	30.3	27.2
Mbeya	1.0	12.7	6.0	18.9	27.0	16.5
Morogoro	114.6	22.8	48.7	24.8	27.9	29.1
Mwanza	32.5	32.5	54.4	24.6	37.4	16.0
Mtwara	108.8	42.0	33.4	39.7	26.0	12.5
Ruvuma	23.3	27.2	17.7	17.8	15.5	15.4
Shinyanga	[illegible]	[illegible]	42.7	26.0	23.0	31.7
Singida	[illegible]	[illegible]	63.3	20.8	20.8	20.1
Tabora	[illegible]	[illegible]	30.8	[illegible]	18.1	11.7
Tanga	[illegible]	[illegible]	68.6	[illegible]	58.8	66.7
Kagera	[illegible]	[illegible]	128.6	114.9	345.3	53.6
Dodoma	[illegible]	[illegible]	103.2	71.0	50.8	91.9
Rukwa	[illegible]	[illegible]	[illegible]	21.2	18.4	18.3
Iringa	[illegible]	[illegible]	[illegible]	[illegible]	18.2	19.2
Lindi/Dar es Salaam	[illegible]	[illegible]	[illegible]	[illegible]	93.9	88.6
Mwanza/Mara	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

BEST AVAILABLE DOCUMENT

The major point of the above analysis is that in many urban areas of Tanzania many consumers are forced to depend on parallel markets for grain supplies. If these markets stopped functioning, the NMC would have to drastically expand just to meet food demands by Tanzania's urban minority.

Functioning of Parallel Markets

When residents of rural areas buy grain, they ordinarily do so directly from local farmers. The most important determinant of availability and price is the level of production in the area. These rural consumers may exhcange cash or goods produced from other economic activities for their food, or they may be forced onto the market because of their own poor harvests.

The analysis in the preceding section indicates that residents of many urban areas depend on parallel markets for their food needs. Rice is an important crop in urban markets; urban residents with higher incomes and strong preferences for rice as a staple pay high prices. Maize is still the staple food of most urban dwellers, and cassava is also commonly brought to the larger towns. Much of the flow of grains into district and even regional centers, is done in a small-scale, informal way. The expense of transportation, however, forces this trade to use vehicles and fuels efficiently. Many cars and trucks on other business carry a sack or two of grain as well. There are enough farmers with reason to go to town and enough town residents with friends or relatives in peripheral areas to account for a large part of this trade. Middlemen and their access to transportation become important in two kinds of grain markets: those that involve major one-way flows from one region to another, and those that involve illegal exports.

For example, Mwanza is a city with a fast growing population dependent on sources other than the NMC for the majority of its food supply. In the months preceding the 1980-81 harvest a considerable portion of Mwanza's demand has been met by illegally transported and sold maize from Arusha. It appears that enterprising individuals established unofficial marketing networks to realize the best possible returns from available surpluses. Trucks and petrol had to be acquired for this purpose. Even at the high parallel market cost of transport, it pays individual traders to make the trip west to Mwanza and other areas. The fact that NMC purchases in Arusha have declined drastically in the past 2 years while harvests have not suffered as badly attests to this (Table VIII).

Table VIII. NMC Purchases of Maize from Arusha, 1977/78 - 1981/82

Year	Volume (1000 Tons)
1977/78	60.3
1978/79	69.5
1979/80	47.4
1980/81	17.4
1981/82*	11.8*

*Estimated
Source: NMC

BEST AVAILABLE DOCUMENT

Grains are exported illegally from border regions to Zambia, Kenya, Rwanda, and Burundi. High parallel market exchange rates and shortages of consumer and capital goods are a major impetus to this trade. A trader who sells maize over the border can get Tsh 2.5 to Tsh 3.5 for each Kenyan shilling he brings back into the country even though the two currencies are officially almost at par with each other. The trader can also purchase cloth, batteries, or a number of other items which are scarce in Tanzania. The returns to smuggling are large, allowing those involved to offer high prices or goods to farmers in return for their maize or rice.

Prices on Parallel Markets

The available evidence on parallel market prices comes from several surveys of farm management and farm household decision-making. Price data from informal village markets in 13 villages were gathered twice a month over a 2-year period. The crops included were maize, rice and paddy, sorghum, millet, cassava, and beans. The majority of sales in these markets were thought to be for local consumption, although producers were also transported to town markets and urban centers.

These reports give clear evidence that prices on parallel markets are much higher than those offered to farmers by the NMC. This is illustrated quite clearly by the prices offered on parallel markets in the sample from the Village Survey (Table [illegible]). It shows that average prices received during the 1980-1981 marketing season on the parallel and the official markets [illegible] price for every crop [illegible]

Consumption Patterns

Policies affecting agriculture in general, and those which influence the buying and selling of agricultural products, have influenced the ability of Tanzanians in different geographical circumstances to maintain adequate food intake. Because these [illegible] are generally available, than precisely describe actual consumption patterns [illegible] this section of the case studies on major population groups and the effects of policy on their adequacy, composition and availability of their diets. When available, the results from the 1976-77 Household Budget Survey should provide corroboration or rejection of this interpretation of important trends. In the absence of these data information is presented on the food consumption patterns existing in 1969. Table [illegible] gives budget shares for food and cereals for different regions of the Tanzanian mainland. Table [illegible] presents the composition of cereal consumption for rural and urban areas in 1969. These data provide a baseline for the interpretation of the following results.

Consumption Levels in Urban Areas

Given the wide disparity between the official and parallel prices of major food grains, the availability of NMC supplies has been a crucial determinant of food consumption in urban areas. Consumption levels over the past 7 years have probably been higher and more stable in Dar es Salaam and other cities which have consistently received these supplies than in those areas which have not. About 45 percent of the urban population lives in

BEST AVAILABLE DOCUMENT

Table IX. Parallel Market Prices for 13 Villages Relative to NMC Prices

1979/80	Parallel Market Price	NMC Price	Relative Price: Parallel to NMC	Absolute Differenc Parallel and NMC Prices
Maize	3.08	1.00	3.08	2.08
Rice	6.96			
Paddy	2.31	1.50	1.54	.81
Cassava*	1.99	.65	3.06	1.34
Sorghum	2.96	1.00	2.96	1.96
Millet	4.73	2.00	2.37	2.73

1980/81	Parallel Market Price	NMC Price	Relative Price: Parallel to NMC	Absolute Differenc Parallel and NMC Prices
Maize	[illegible]	[illegible]	[illegible]	[illegible]
Rice	[illegible]			
Paddy	[illegible]	[illegible]	[illegible]	[illegible]
Cassava*	2.98	.65	4.45	2.28
Sorghum	4.68	1.00	4.68	3.68
Millet	[illegible]	2.50	4.63	5.45

*Assumed to be Grade B Cassava

Source: Sigma One Corp.

BEST AVAILABLE DOCUMENT

BEST AVAILABLE DOCUMENT

Table X. Budget Shares for Cereal Grains and Food in Tanzania, 1969

	Total Food (% of income)	Cereals (% of income)	Cereals as a % of total food
Rural			
Arusha, Kilimajaro, Tanga	53	12	23
Mtwara, Ruvuma	[illegible]	[illegible]	[illegible]
Mara, Mwanza, Shinyanga, Kagera	[illegible]	13	27
Kigoma, Tabora, Singida	[illegible]	[illegible]	[illegible]
Iringa, Mbeya	[illegible]	[illegible]	[illegible]
Coast, Dodoma, Morogoro	[illegible]	[illegible]	[illegible]
Urban			
Dar es Salaam	[illegible]	[illegible]	[illegible]
Tanga	[illegible]	[illegible]	[illegible]
Mwanza	[illegible]	[illegible]	[illegible]
Tabora	[illegible]	[illegible]	[illegible]
Central	[illegible]	[illegible]	[illegible]
Other urban	[illegible]	[illegible]	[illegible]
National average	[illegible]	[illegible]	[illegible]

Source: 1969 Household Budget Survey

Table XI. Percentage Composition of Cereal Consumption, 1969

	Rural Areas	Urban Areas
Rice	12.6	23.2
Maize	61.[illegible]	48.4
Millet	3.9	-
Sorghum	13.8	0.6
Wheat	1.6	6.0
Other (includes baked products)	3.0	20.7

Source: 1969 Household Budget Survey.

BEST AVAILABLE DOCUMENT

BEST AVAILABLE DOCUMENT

regions where the NMC provided less than half of urban food needs. Residents of Dar es Salaam have probably been able to maintain their calorie consumption over this period. The official price of sembe was at or below Tsh 1.75 per kiloe until June, 1981, making it possible for a family of four to purchase 15 kg. per person per month for Tsh 105 per month. From January 1980 until June 1981, the NMC sold sembe for Tsh 1.25 per kilo, allowing the same family to meet basic food requirements for only Tsh 75 per month. If the head of household received a minimum wage of Tsh 480 per month in 1980, the family's grain supply represented only 16 percent of total income.

Table XII shows the percentage of the urban workers' income necessary to purchase 60 kg. of maize per month at parallel market prices. The prices used for 1980 and 1982 reflect an average across the country and time of year. Further, the prices are for unmilled maize which still requires family labor or hired milling services before it can be consumed. The 1978 price is fairly low to reflect that grain was much more affordable in years of good harvests than bad. The results highlight the differences in purchasing power over food which are caused by differences in access to markets. If NMC supplies are available, between 16 and 26 percent of income is necessary; without NMC supplies, 30 to 50 percent of income is required. The difference is so great that average food consumption in towns outside of Dar es Salaam is very likely to be significantly lower than in the capital. The 1969 Household Budget Survey shows only a 9 percent budget share for cereals in Dar es Salaam (African sections) and an 11 percent share in other urban areas. Indeed, at the beginning of this decade, total expenditures on food were 31 percent in Dar es Salaam and [illegible] percent in other urban areas. These shares are almost certainly much higher [illegible] because food markets outside the NMC area [illegible] and even more importantly because the incentives to produce [illegible] have been decreased, it can be expected that food consumption [illegible] in these towns and cities than they were a decade ago.

Table XII. Cost for Cereals in Urban Areas (Based on 15 kg of sembe per person per month and a family of four with one wage earner)

Tsh	1978 Official	1978 Parallel	1980 Official	1980 Parallel	1982 Official	1982 Parallel
Sembe Price	[illegible]	2.00	[illegible]	4.00	2.50	9.00
Monthly Cost	105	120	[illegible]	240	150	300
Income	400	400	480	480	600	600
Income Percentage for Grain	[illegible]	[illegible]	[illegible]	50	25	50

The urban middle class, including merchants and government workers, have probably maintained their level of food consumption over the past decade, buying both from the NMC and on parallel markets. It is likely that this segment of the population has had preferred access to NMC stocks of

rice and wheat, either through government allotments or special influence. In 1969, cereals represented only 5 percent of the total expenditures of central (presumably higher-income) Dar es Salaam residents. Food probably represents a larger share of total income for higher-income urban residents now, largely because of the very high parallel market price for rice, the preferred urban staple, and other preferred foods.

BEST AVAILABLE DOCUMENT

Consumption Levels in Rural Areas

In years of normal and good harvests, rural Tanzanians who produce substantially all of their own food have probably maintained their food consumption levels while reducing their consumption of non-agricultural goods and services. This is due to decreased incentives to produce surpluses and to shortages of non-agricultural goods. It is also because farmers are unable to buy food from other sources when their need is greatest. In times of poor harvests these people have probably reduced their consumption because it was difficult to store previous surpluses in the form of assets, and to convert these assets to food on the markets to which they had access.

Rural people dependent on markets for part or all of their grain requirements, who rarely are able to buy NMC grain, have probably decreased their consumption due to the high prices and unreliability of unofficial markets. This group includes those growing primarily cash crops and workers on estates. It is also true for villages that have diversified away from crop production. Households in these conditions represent at least 10 percent of the population of Tanzania. Many individuals have reacted to this situation by making food crops their primary economic activity, thus reducing their dependence on food markets. This has, of course, further reduced export crop production and diversification of the rural economy. Households which have maintained their level of food consumption have done so at a higher real resource cost. Whether or not some groups in the rural population have been able to maintain their levels of consumption, the agricultural and economic policies have forced the rural majority to dedicate the bulk of their human and material resources to securing food supplies. This has undoubtedly impeded the course of rural development as conceived in the Arusha Declaration.

There is some evidence of the nutritional status of rural Tanzanians from food consumption and nutrition studies conducted in the past 6 years. These studies have been concentrated in the central areas of the country, and most are more focused on anthropometry (weight and height relative to age) than direct food consumption. They are presented here to highlight an important finding—families which produce their own food are better able to feed themselves than families who depend on exchanging cash or services for food on the market.

One study examined food consumption behavior in four Iringa Villages 1979. One village was an Ujamaa village with diversified production; one a village specializing in maize with high production; one village primarily supplied labor to nearby tea estates in return for cash; the fourth village produced onions for cash and, in times of crop failure, had come to depend on food aid for survival. All the villages were well below FAO standards for calorie consumption. The village which was the highest in consumption

BEST AVAILABLE DOCUMENT

BEST AVAILABLE DOCUMENT

of calories was the one highly dependent on food aid; 51 percent of total calories in April/May (pre-harvest) and 29 percent in October (when only reserve stocks of aid remained) came from imported soy fortified sorghum grits. Calorie consumption as a percent of recommendations decreased from 79 percent to 70 percent as the food aid was phased out. Mean calorie adequacy in the maize producing village improved from 56 percent in the pre-harvest period to 81 percent post-harvest; in both periods between 60 and 70 percent of calories were from maize. Calorie intake improved slightly after harvest from 62 percent to 68 percent of standard in the village with diversified production, where around 80 percent of total calories came from maize. The village which supplied labor to the tea estates had the lowest average calorie consumption—49 percent of standard in the first period and 44 percent in the second—of any of the villages. Seventy percent of total calories in that village came from maize.

One trend which emerges is that maize was the staple for all villages unless food aid was available; in that village the 21 percent decrease in calories from decreased aid was compensated for by a 20 percent increase in share of calories for maize. There was no evidence of substitution of "inferior" millet or sorghum grain as a staple in families with low food consumption. The more frequently families in the study consumed maize, the larger the quantity consumed per meal.

Another finding concerns the status of non-food producing villages relative to those which were self-sufficient. One village dependent on cash income was very badly off in terms of consumption, and the other was almost completely dependent on food aid. Where the primary economic activity was food crop production, people were much better able to provide for themselves. In the village which combined food production with other economic activities, calorie consumption was [illegible]. Where maize production was predominant, in the village which produced maize, it was consumed at more than 300 percent of the [illegible]. About 70 percent more per meal was consumed in the period after the harvest than preceding, suggesting that storage was difficult.

Anthropometric assessments of children found that the labor-supplying village, and the village with diversified production, had the highest incidence of malnutrition, this correlates with the low calorie consumption of these villages.

In the maize producing village and the aid-dependent village income had no effect on calorie adequacy. In the other two villages, increased cash income from sources other than food sales did correlate with improved adequacy. Again, those who sold more towards cash production did not fare as well as those producing their own grain, although income seem to have made some marginal difference.

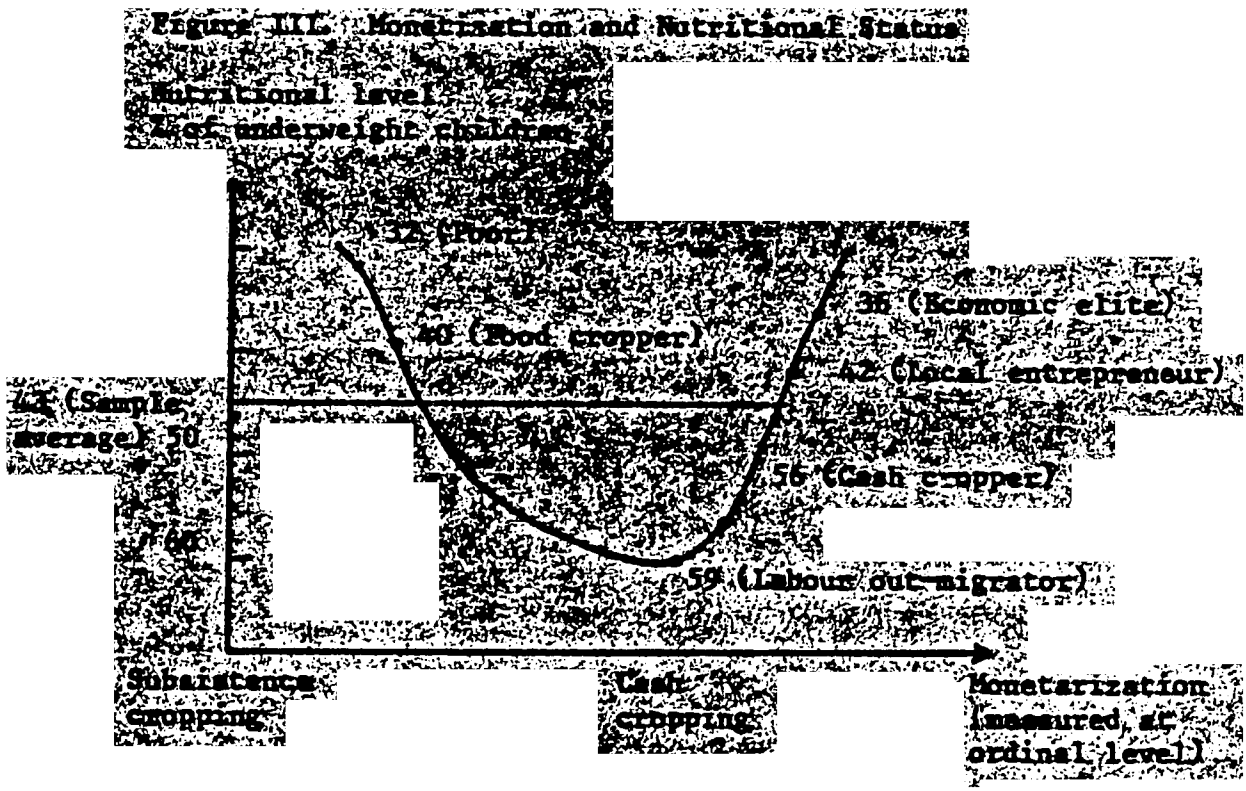
A study of a village in Morogoro was carried out in January, 1977. The village produced maize as the primary economic activity, and the anthropometric status of children under 5 years was quite good. Over 95 percent were above 80 percent of the standard in terms of weight-for-height, and more than two-thirds were above 90 percent of the standard. Classification by Gomez (weight-for-age) was somewhat lower; only 57 percent were above 80 percent of the standard and only 28 percent above 90 percent.

BEST AVAILABLE DOCUMENT

of the standard. Only 14 percent of the children were below 70 percent of the standard for weight-for-age. Ninety-five percent of the families in the village cultivated their own maize. There does not seem to be a significant correlation between size of harvest and anthropometric status. About 42 percent of the families produced some cotton as well, but there was no correlation between cash-crop production and nutritional status. There was a correlation between crop failure and malnutrition, although it was not very strong. There was also a weak correlation between increasing cash income and improved anthropometric status. Overall, the study found that in a village where people are largely growing their own staples, anthropometric status was fairly good even 6 months after the harvest.

A study of the nutritional status of children under 5 years in several villages in the Southern Highlands was also carried out in 1977. Malnutrition was measured anthropometrically and related to socioeconomic variables of the children's families. The study took place in an area where cash production was increasing; pyrethrum had displaced food crops on some land. A very strong correlation was found between the percentage of cash in the family's income and malnourished children; except for the economic elite, the children of subsistence farmers and those who raise food crops were better off (anthropometrically) by a substantial margin than children of cash crop producers or labor migrators (see Figure III).

Figure III. Monetization and Nutritional Status



BEST AVAILABLE DOCUMENT

BEST AVAILABLE COPY

In another survey of a village cassava was the main staple, but production was inadequate to meet food needs. The villagers purchased additional food with cash income, 75 percent of which was derived from charcoal production. Maize, rice, and beans were the foods commonly purchased. Anthropometric status of children was low in this village; 60 percent of children under 5 years were below 80 percent of the standard for weight-for-age.

The above studies are by no means a representative sample; they are extremely limited in area and time. They do, however, tend to confirm a conclusion from the preceding section: rural families which produce their own staple foods are retaining significant quantities for their own consumption. Families oriented toward cash-producing activities in all of these studies tend to have poorer nutritional status, measured both in calorie consumption and anthropometry.

The long-term trend toward preference for maize has continued in rural as well as urban Tanzania. The past decade has also seen a sharp increase in reliance on cassava in most areas of the country. This has been primarily due to peoples' perceptions of the necessity of keeping their own famine reserve. In urban areas, preferences for rice and wheat have continued to develop, although much of the supply must be imported. While most of the rice and substantially all of the wheat which have been imported have been sold on concessionary terms, continued demand for these commodities will place a continued

TANZANIA: POLICY CHOICES AND DILEMMAS (B)

BEST AVAILABLE DOCUMENT

Small Group Task

What would your team do in this situation? Specifically, how would your group respond to the following questions?

1. What would your team's high priority goals be to try to influence the situation?

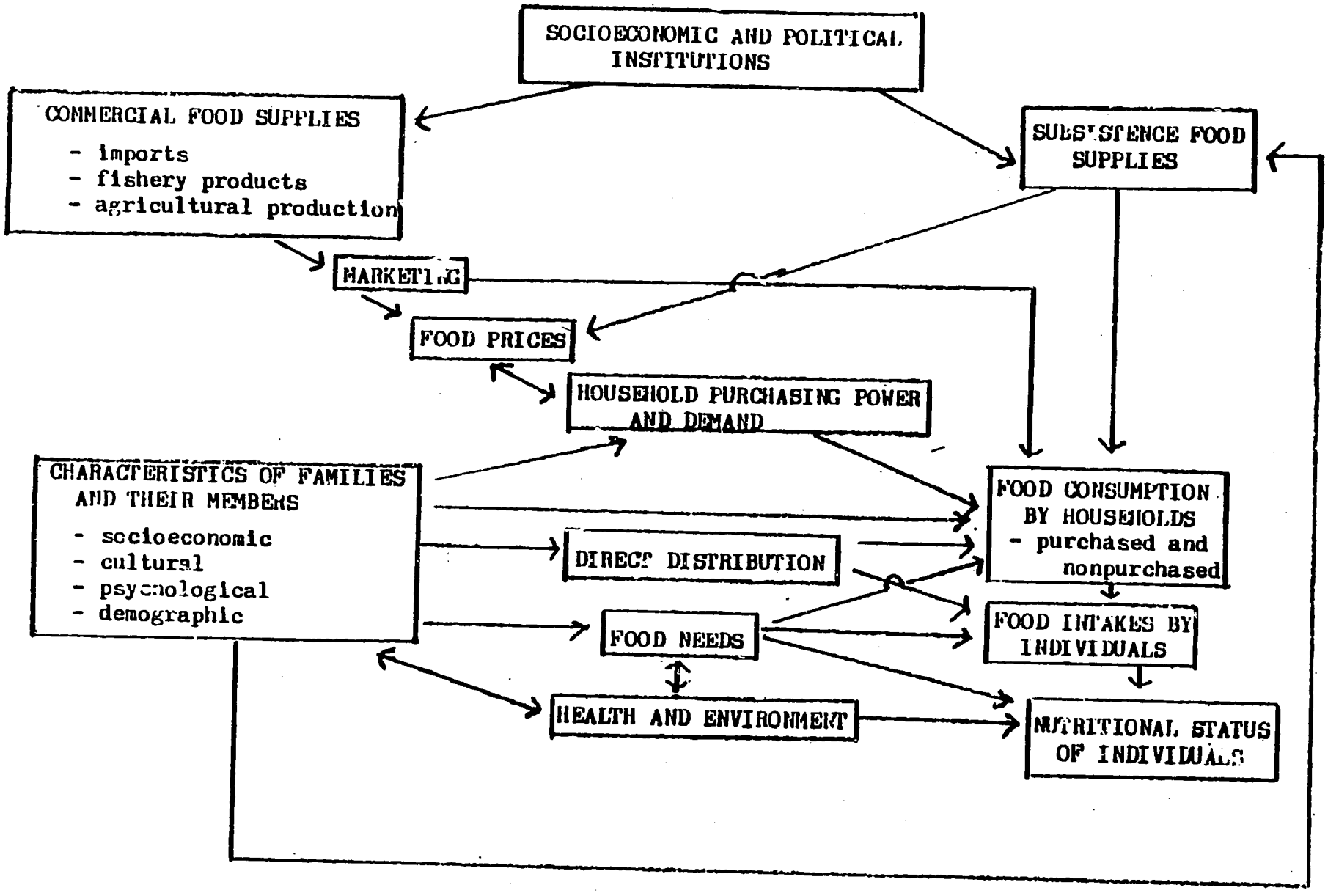
2. Who would you try to influence to change the situation (American, Tanzanian, or others)? Use your own experience in developing countries in addressing this question.

3. What additional information would your group consider most important in developing a change/influence strategy in this situation? How would you go about getting it?

BEST AVAILABLE DOCUMENT

7/15/82 M.C.Burk

GENERAL FRAMEWORK FOR ANALYSIS OF FOOD AND NUTRITION SITUATIONS



Materials for Participants Activity 1A

CONCEPTS USED IN STUDY OF FOOD AND NUTRITION SITUATIONS FOR PROJECT PLANNING

Training Materials

August, 1982

prepared by:

Marguerite C. Burk

and

Charlotte Miller

Training materials prepared for the United States Department of Agriculture, Office of International Cooperation and Development, Technical Assistance Division, Nutrition Economics Group under PASA STB-0000-P-AG-2103, Nutrition Strategies Training Program, and RSSA 3-77, Economic Analysis of Agricultural Policies, under agreement with the Agency for International Development's Training Division (Personnel Management) and the Office of Nutrition (Bureau for Science and Technology)

Introduction

This glossary was produced for the purpose of introducing terms from diverse fields which will be used in the In-Service Workshop on Food Production/Consumption Linkages. It will also serve to clarify specialized meanings of terms which have common usages but which experts in the fields of economics, nutrition, anthropology, and others use in technical ways. Some of the definitions have attempted to indicate what measures or field applicability the terms have for practical application for AID officers.

Aggregation: Adding together individual components or subsystems to form larger, composite systems; often used with reference to numerical data and socioeconomic models.

Agricultural Economist: An economist specializing in the study and analysis of the production, distribution and consumption of goods and services produced in farming regions, e.g., food crops, livestock, agro-industrial products, rural cooperatives, marketing, and credit.

Anthropologist: A specialist in the study of human beings; socio-cultural anthropologists, in the study and analysis of culture, including human behavior and the origins and interactions of human societies. Other types are linguistic anthropologists, biological (physical) anthropologists, and archaeologists.

Anthropometric measures of nutritional status: Measures of physical growth and development of the individual. The most commonly used measures are weight, height, arm circumference and skinfold thickness. Computations are often made relating two measures to one another, for example, weight-for-height (a measure of "wasting" or acute malnutrition) or height-for-age (a measure of "stunting" or chronic malnutrition). For such measures to be valid, they need to be standardized for a specific population's norms. (See "Gomez classification")

Beta-carotene: One of the carotenoid plant pigments, yellow-orange in color, from which Vitamin A is formed.

Biochemical measures of nutritional status: Biochemical tests to measure the level of a nutrient or metabolite directly or indirectly in blood or urine samples. Examples of such measures are hemoglobin concentration, serum vitamin C, plasma vitamin A, total protein, thiamin and riboflavin. Such tests require technically trained staff and appropriate facilities although some have been adapted to field situations.

Carotene: (See beta-carotene, above.)

Clinical measures of nutritional status: Measures performed in clinical examinations of individuals performed by physicians or medical personnel especially trained for the purpose. Signs of nutritional disorders considered in clinical exams are conditions of skin, hair, lips, eyes, mouth, tongue, musculature, etc. Such measures tend to be nonspecific and may result from causes other than dietary.

Commercial production: Foods produced and sold as opposed to those used in the households of producers.

Conceptual framework: A statistical model, diagram or description of interrelationships among concepts as developed for a particular objective.

Consumption: In economics, the purchase of ("final") goods and services by individuals for their utility (or usefulness) such as food, clothing, household effects, etc.

Consumption (Demand) Economist: An economist specializing in the study and analysis of the determinants of the demand for good and services; for example, such determinants under study might be the relationship between prices, incomes, and amounts of goods and services purchased by individuals and groups.

Consumption function: A statistically determined mathematical relationship linking income (either individual or national) with the value of goods and services consumed over a specified period of time (e.g. one year), assuming no changes in relative prices of the goods and services. Such a relationship can be used to forecast future levels of consumption, given desired changes in incomes; alternatively, consumption functions can be used to determine the levels of income needed to induce desired levels of consumption (e.g. of foods).

Cross price elasticity of demand: The percent change in demand for one commodity for a given percent change in the price of another commodity. The concept is meaningful only if there is a complementary relationship between the commodities (e.g. bread and butter) or a substitution relationship (e.g. apples and pears). An elasticity of zero means that a change in price has no effect on the demand for the commodity. A low elasticity (less than one) means that the change in demand is less than proportional to the change in price. In other words, despite an increase in price, more of the commodity is demanded from the market than would have been expected. A high elasticity (more than one) means that demand changes more than proportional to a change in price. For example, when the price increases, the consumer ceases to buy one commodity at all (perhaps due to the substitution of a cheaper alternative.)

Cross-sectional data: Data on such events as food consumption collected in sample surveys of households (or individuals) which are designed to reflect variations in a cross-section of a whole population during a set period of time.

Cultural factors: Aspects of behavior influenced by such factors as family, community, regional, tribal, religious or other group membership. In matters relating to food and nutrition, this concept often refers to social, historical, geographic and ecological influences on food preferences, taboos, consumption habits, production systems and social functions of food among different groups.

Demographic characteristics: Attributes used to classify populations, including such attributes as sex, age, family size, family composition, family organization, urban residence, rural residence, civil status.

Development anthropologist: A social scientist specializing in the analysis and design of intervention strategies relating to the process of socio-cultural change during economic development directed by conscious policy.

Development economist: An economist specializing in the analysis of factors giving rise of growth and changes in the production, distribution and consumption of goods and services under the impact of conscious government policies.

Diet: A specific combination of foods regularly consumed by individuals or groups at specified meals or over prescribed periods of time.

Dietician: A specialist trained in the utilization of the knowledge of nutrient contents of foods for meal preparation and scheduling which provide specific combinations of nutrients.

Disaggregation: The process of taking apart a large body of information, such as in the analysis of the segments of a market or in breaking the total consumption of a food into amounts consumed by each population group.

Disadvantaged groups: Groups defined by a criterion that indicates a relative lack of access to resources, such as low income, unemployment, or limited educational opportunity.

Eating patterns: A term used in a variety of ways to describe combinations of foods eaten together, variations in times and places of eating, social functions of meals (including eating companions), or variations in food consumption among households or individuals. There is no consensus on a single meaning.

Economic anthropologist: A social scientist specializing in the study and analysis of the culture and behavior of human beings, and the growth, development and interaction of human groups in the context of production, exchange, ecological adaptation and consumption of good and services.

Economist: A social scientist chiefly concerned with the analysis of production, distribution and consumption of goods and services.

Effective demand: The portion of total demand actually observed; for example, purchases made of goods or services.

Environmental factors: Factors external to individual physiological needs which affect food absorbtion, nutrition, food production, and social arrangements concerning food consumption, such as sanitation, pollution, water quality and availability, fuel availability and cost, housing, communication and transportation facilities, weather, climate and prevalence of disease-bearing organisms in the soil, air and water.

Expenditure elasticity: A proxy for income elasticity when all the data necessary to calculate net income for a population are not available. At low income levels, the total expenditures of a family or individual is theoretically expected to correlate closely with net income. Expenditure elasticity measures the per cent change in expenditure for a given commodity following a specified per cent change in expenditure for all commodities.

Farm gate prices: The prices farmers receive directly for their output, also known as producer prices.

Food balance sheets: Tables showing components of food supplies of a country, for either calendar or crop year, and their disposition. The U. S. Department of Agriculture uses the term "supply and distribution tables." Supplies include beginning stocks (if data are available), agricultural production, imports, and fishery products. Distribution channels are ending stocks, nonfood uses, wasteage, manufacture, seed, exports, military activities (if significant). The residual is identified as total civilian consumption. This last total is divided by the civilian population to obtain the average annual per capita consumption. (This is also known as the disappearance method of calculating national consumption.) These data indicate nothing about actual consumption, distribution of food, or effective demand for food. They do indicate quantities of aggregate food supplies, which, if distributed according to nutritional needs, might be adequate.

Food consumption: A general term which may refer to total or average amounts of food consumed by an individual or household in a specified time period. Such amounts may be measured in terms of the farm commodities as the foods are sold at wholesale or retail levels or as the foods are prepared for final consumption. Some surveys of household food consumption obtain data on the food used by the household in a specified time period, measured in the form as purchased. Other surveys subtract out the amounts of food fed to pets, lost or wasted (by trimming, spoilage or plate waste). Food consumption at the household level differs from individual food intake which is usually measured in the forms as actually eaten. (See food intake.)

Food demand: As used by economists, the quantity of food that is or will be purchased from the market at a given price, under given conditions. Such demand is generated by consumer preferences and tastes, but conditioned by income level. In this sense it differs from those consumer wants, desires or preferences for food which may be unfulfilled because of lack of purchasing power or adequate supplies.

Food distribution: A term used in three principle ways: (1) amounts of food marketed commercially; (2) channels for moving food to ultimate users; or (3) the allocation of household food supplies among individuals. "Direct distribution" usually refers to government distribution directly to consumers in specific categories.

Food energy: Fuel for the body derived from food and measured in calories. The amount consumed affects basal metabolism, physical growth, physical activity, and mental development. Food energy is not considered itself to be a nutrient, but requirements for food energy, like nutrient requirements have been developed by governments and international organizations and used extensively. The serious effect of inadequate intakes due to major shortfalls on work productivity, fertility, fetal and infant development, mental development and resistance to disease have been researched and documented, although measurement of these effects are difficult to carry out.

Food expenditures: Alternative measures, used by survey researchers, of either (1) money outlays for food, or (2) market value of food obtained without direct cash expense, as by gift, in-kind payment or home production. Because the term is used in both ways, interpretation of data requires extreme care, especially when comparing information from different sources and for different time periods, making sure that comparisons are made between like measures.

Food habits: Patterned food behavior of groups or individuals, including the kinds and amounts of foods eaten at various times and the different ways foods are prepared and served to various categories of people. Like "eating patterns", there is no consensus on a single meaning. When they choose to use it, nutritionists and social scientists prefer to specify a particular meaning for the term in a particular analytical context.

Food insecurity: A term referring to the risks of greatly reduced food supplies in a country or a specific region of a country. It is usually used to describe risk conditions resulting from weather such as drought, decrease in expected levels of rainfall, flooding, and insect infestations. It can also result from economic, geographic, political or military conditions which affect degrees of relative isolation, food storage, food production and food distribution.

Food intake: The amounts and kinds of foods consumed by an individual, both at home and away from home. (Dietary intake is a synonym.) It is usually measured in the forms as ingested, excluding plate waste. Intakes of members within a household (but including food consumed away from home) may vary widely

Food intake: (cont.) because of differences in nutritional requirements, food preferences, customs, access to resources, daily routines and activities of individuals. The related concept of "usual dietary intake" is much more difficult to measure than current or actual intake in a specified period. Selection from alternative methods for measuring current intakes depends on the objectives of the survey and the population surveyed.

Food needs: The amounts and kinds of food required for individual development and good health. The term contrasts with food demand in that it does not refer to effective economic demand for food. Few countries have developed recommended standards for amounts of major food groups by age and sex categories although many have set energy and nutrient standards which can be met by different combinations of foods. (See "Nutrition requirements" below.)

Food patterns: The combinations of foods eaten by individuals or households. These patterns vary from group to group or by time of day and season and are very closely tied to cultural patterns of the people. Knowledge of food patterns of particular populations is useful for forecasting food demand and for planning nutrition education and other intervention programs.

Food preferences: The attributes of particular foods or combinations of foods liked by groups of consumers, but not necessarily purchased or used by them. Preferences are influenced by cultural, demographic, social and economic factors.

Food prices: The prices for food measured at producer, wholesale or retail levels. In many LDC's, data on retail food prices are collected only in the capital city, by government and/or private institutions. Major variations among alternative measures may be found. Big city and rural area prices usually differ considerably because of supply, transport and marketing differences as well as consumer demand.

Food security: The ability of a country or region to be assured of getting enough food in a given time period (See "food insecurity")

Food supplies: A general term referring to available food stuffs in a specific time period. It may refer to total national food supplies for a year or at a specified time. It may refer to supplies in a particular area or supplies measured for a particular group of households. Food supplies of a country usually include imports and agricultural and fishery production, less nonfood use. Measurement of food supplied by subsistence production for home food use is inadequate in every country, including the United States. The measurement problem is especially serious in developing countries where it may amount to as much as a third of the total.

Food survey data: The information resulting from a food survey. The categories of data vary from survey to survey, depending on whether food expenditures (usually underestimated), household food consumption or individual intakes are measured. The choice among alternative measures depends on survey objectives, costs and resources. (See "Household food consumption" below.)

Gomez classification: A classification scheme developed to classify children according to nutritional status as measured by percentage of median weight-for-age. The categories were first developed in 1956 for Mexican children and later for a Boston reference population use the following distinctions: 90% or greater is considered normal; 75 to 90% is considered mild or first degree malnutrition; 61 to 75 % is considered moderate or second degree malnutrition; 60% or less is considered severe or third degree malnutrition.

Health data: Information on incidence of disease, morbidity, mortality rates and other health status factors. It can provide indications of the extent of food and nutrition problems among a particular population, especially information on nutrition-related or nutrition-magnified diseases such as diarrhea, measles and other childhood diseases. Health data are particularly important in nutrition work with infants and young children, not only in identifying nutritional needs, but also in pointing up non-nutritional sources of child health problems.

Home food production or subsistence production: The farm, garden and fishery output produced and used in the household of the producer. Such output is extremely difficult to measure except as part of a survey of household food use. In tropical countries, it is often important to include game, fruits, insects and leaves obtained in forest areas.

Household: A residential unit including a group of people who live and eat together, often related by marriage, blood or ritual kinship, sometimes including servants.

Household food consumption: The total amount of food consumed in the household, excluding that eaten away from home unless carried from home. It may be measured in terms of quantities and forms brought into the household as recalled or recorded. Inedible and edible wastes and losses may or may not be subtracted. Sometimes, food for each meal may be weighed before or after preparation. Exact precision in measurement is less important for

Household food consumption: (cont.)
many purposes than consistency in measurements of variations from one household to another. Most nutrition research requires measurement of individual intakes because of wide variations among household member intakes.

Imputed value: A money value applied to goods and/or services not commercially exchanged. For example, the imputed value of food consumed by a farm household which produces that food would be equal to the sum the family would have to pay to purchase the same amount of food in the local marketplace.

Income: Returns for labor and use of capital. In survey research, the term is used in a variety of ways: (1) gross income before taxes; (2) net income after taxes; (3) money income only; and (4) money income plus the value of subsistence food and other goods produced and used by the family or household of the producer.

Income-consumption relationships: The effects of variations in income on levels of consumption. These relationships may be considered and measured in a static mode, comparing the degree of variation in food consumption with variations in income, preferably per person but often per household. In economic theory, the dynamics of changes in food consumption as income changes are more relevant than the static mode. Both static and dynamic relationships are much more difficult to measure properly than often assumed because of failure to take variations and changes in other factors into account. Sometimes the relationship of consumption to income is measured simply by calculating the value of all food consumed (or food expenditures only) as a percentage of income. This measurement is much simpler to undertake in the field than measurement of actual income, due to respondent resistance.

Income elasticity of food consumption: The ratio of the percentage variation in food consumption (e.g. quantity of a single food or value of all food purchased or consumed) to the percentage variation in income. Problems in calculating income elasticities are touched on in the above definition of income-consumption relationships. It is important to keep in mind the fact than an income elasticity is an average affected by the prevailing conditions and population makeup which are likely to change during the process of economic development. Income elasticities are useful to predict likely changes in relative rates of consumption of specific commodities as income changes in a specified span of time.

Indicators: Proxy measures of phenomena. Factors affecting variations in food consumption are generally measured by indicators such as years of formal schooling (for education and, sometimes, for knowledge), race (for cultural patterns of ethnic groups), percentage of household members 13 years of age or older (for variation in food needs related to age), and total expenditures, usually excluding nonpurchased goods and services, (for income).

Iron deficiency: A condition related to low dietary intake of iron or organic conditions which deplete body reserves of iron. It often results in anemia, leading to both physical and mental sluggishness which can materially reduce physical performance and productivity.

Iodine deficiency: A condition related to low dietary intake of iodine. A frequent nutrition problem in developing countries lacking seafood in usual diet, leading to goiter in many individuals, and deaf mutism and cretinism in infants born to iodine deficient women. In areas of the world where foods eaten lack enough iodine to prevent iodine deficiency conditions, iodine deficiency diseases can be overcome by the distribution of iodized salt or another processed food which are widely consumed.

Kwashiorkor: The physical condition produced by extreme protein deprivation, diagnosed by the following symptoms: lassitude, wasting, edema, scaly skin, reddish hair, and easy pluckability of hair.

Lipid: A broad term used to describe fats and fatlike substances.

Macro: A term or prefix relating to large size or numbers. Often, it is used in economics with respect to highly aggregated statistics such as national income or average food consumption in a country. It is at the opposite end of the scale from the concept micro. Economists work with different sets of theory at these two levels.

Marketing: A general term applied to a wide variety of services involved in moving food from producers to ultimate buyers and consumers. The value of such services is part of retail prices and food expenditures. But such services are not required for foods produced and consumed by the producers and their households.

Maldistribution of food supplies: A term used to refer to the situation where food supplies are not distributed among households or areas which need them, as well as to the failure to match seasonal variations in food needs with supplies.

Malnutrition: The condition of the human body resulting from inadequate dietary intake in both quantity and quality. It is often used in a less technical sense to include undernutrition (low food intake) alone. Malnutrition frequently refers to the incidence of severe deficiencies of particular nutrients such as vitamin A, iron or iodine.

Marasmus: Physical wasting resulting from insufficient calories, or protein/calorie deficiency in the diet.

Micro: A term or prefix relating to small size of numbers. The concept is used in economics to refer to events and characteristics of small groups of people such as households of a specified type in an area and in analysis of food intakes of particular categories of individuals. It contrasts with macro level aggregation (see above).

Model: In the sciences, a conceptual or synthetic representation of a real world system or situation in which only the most important elements and relations among them have been preserved.

Multivariate analysis: The study of the concurrent relationships of several independent variables to the dependent variable. Typical independent variables which are used in consumption economics are income, degree of urbanization, and family size. In consumption studies, the dependent variable may be a household food consumption, food intake or nutritional status measure. Because of the complexity of factors affecting rates of food consumption and nutrition, multivariate analysis is essential for drawing reliable and valid conclusions from food survey data. Regression analysis is one type of multivariate analytical technique.

Nutrient: One of various substances which provide nourishment for the body: energy-producing substances such as fats and sugars, chemical elements and compounds governing the rate of metabolic processes (iron, sodium, potassium), structural elements (protein, calcium), and other substances required for efficient and sustained functioning of the body.

Nutrient absorbtion: The amount of a nutrient actually used by the body during a specified period of time following a given level of nutrient intake.

Nutrient intake: The quantity of one or more nutrients consumed during a specified period of time from all foods consumed by individuals or groups.

Nutrition advisor: An individual, usually a clinical nutritionist or dietician employed to provide information and counsel to individuals, institutions or nations regarding foods, diets and nutrition. AID often uses this term to refer to any professional (often social scientists with some nutritional training) with responsibilities in the nutrition program area, akin to a nutrition planner.

Nutrition effects: Changes in food consumption patterns and related nutritent intakes resulting from changes in outside factors which directly effect the determinants of food habits and consumption patterns, e.g., policies which influence incomes and/or relative prices of consumer goods, the education of consumers, the sanitary practices of a population, etc.

Nutrition intervention: A program to deal more or less directly with nutritional problems through changes in diets of target groups. Examples of intervention programs include school feeding, supplementary foods for infants and pregnant or lactating women, enrichment of particular foods, direct distribution of some foods to disadvantaged families, the sale of foods at reduced prices to such families, and nutrition education programs.

Nutrition planner: An individual charged with the responsibility for the conception, preparation and/or execution of policies, programs, and/or projects oriented towards influencing the quantities and combinations of foods and nutrients consumed by individuals and groups.

Nutritional anthropologist: A socio-biological or social scientist specializing in the study and analysis of the determinants of human individual and group behavior with respect to food and nutritional status, among which are included: food selection, food taboos, eating habits, food distribution, attitudes and myths about food, cultural influences on human nutritional status.

Nutritional adequacy: A general term referring to the relationship between energy and/or nutrient intake and recommended requirements, dietary allowances or standards.

Nutritional requirements: The amounts of food energy and nutrients needed on the average per day by each specified age and sex category to meet the needs of healthy individuals for normal functioning of the body for work, play and growth. Requirement is a physiological concept. Estimates of nutrition requirements are based on metabolic studies under varying conditions. For many uses, nutritionists

Nutritional requirements: (cont.)
urge the use of recommended dietary allowances as standards with safety margins. The setting of nutritional requirements has been a highly controversial, political activity. Thus, the use of established requirements should be undertaken with care. (See "Food needs" above.)

Nutritional standards: Recommended intakes or allowances as estimated by national or international committees of experts based on reviews of clinical, epidemiological, and experimental evidence of physiological requirements for nutrients. Except for the energy value derived from nutrients in food, standards for nutrient intakes usually include margins for safety to allow for individual variations.

Nutritional status: The condition of the body resulting from the intake, absorbtion and utilization of food. It cannot be measured directly. Several anthropometric indicators can be used to make valid and reliable inferences about variations in nutritional status of families, e.g. weights, heights and arm circumferences of young children for specified ages and sex. However, it should be remembered that these data provide direc information about children, not the family unit as a whole.

Nutritional surveillance: A system providing a regular flow of information about the nutritional conditions of a population and factors that influence those conditions.

Operational framework: A diagram or model which incorporates realistic measures or indicators for each concept or subconcept in a conceptual framework.

Policy: A broad statement of intent by governing authorities intended to serve as guidelines for future activities; also a set of activities and behaviors carried out by a government in a particular area of its control.

Population groups or groupings: Categories of people or households by level of one or more characteristics such as area/region, income, degree of urbanization, occupation, sex, age, family size and family type. The objective of using these categories is to classify, for purposes of analysis, people into groups which exhibit like behavior. Analytically speaking, it is ideal to divide data into categories which maximize homogeneity within categories and differences between categories.

Poverty: A general term implying relative deprivation, usually in relation to some standard.

Physiological factors: The body functions which affect food intake and absorption, including sex, age, height, weight, energy requirements for heavy labor, nutrient needs during pregnancy and lactation, and the presence of disease.

Price elasticity of demand: The percentage of variation in the amount of a commodity purchased for a given percentage change in the price of that commodity; i.e. it measures the responsiveness of the quantity of a good or service demanded to changes in its price. Thus, it is a dynamic concept. Price elasticities for major commodities are often computed using historical data (time series data) on prices and quantities. Analysts should always make a careful examination of concurrent changes in other socioeconomic factors before assuming that price and quantity data alone can measure this responsiveness, since many intervening variables may and do affect prices and quantities demanded. (Some economists tend to take the "ceteris paribus"--all other things being equal--assumption underlying related economic theory too lightly.) Price elasticities can be used to estimate or predict the effects on consumption of policies or projects which affect relative prices of those commodities. (See "cross-price elasticities" above.)

Protein-energy malnutrition (PEM): The major nutritional problem in developing countries, resulting from insufficient food intake of both protein and food energy. Also known as protein-calorie malnutrition (PCM).

Protein deficiency: A nutritional problem, formerly regarded as the greatest nutritional problem in developing countries. Now, most nutritionists consider insufficient food energy more serious because efficient use of protein depends of adequacy of intake of food energy. However, populations depending heavily on cassava, yams, and plantains as staples do have protein problems because of the low protein content of these staples. In populations depending on cereals, when overall cereal intakes are low, both food energy and protein become deficient. (See protein-energy malnutrition.)

Psychological factors: Psycho-social and individual feelings, mental states, and conditions affecting motivation, cognition and learning which have impact on food and nutrition such as habits, preferences, and attitudes toward food use.

Purchasing power: Ability of consumers to buy goods and services using current income and/or wealth.

Relationships: How one variable changes with variations or changes in one or more other variables, usually measuring different concepts.

Reliability of a measure: The reproducibility or repeatability of the measurement. It is affected by sampling and by any problems of the respondents in answering the survery questions.

Social analysis: A study and description of the social and behavioral factors to be considered in project analysis and design. The objectives, timing and techniques of social analysis are still evolving. Usually, these studies deal with impacts of the project on potential project beneficiaries and non-beneficiaries. Such studies may be conducted as several stages in the project cycle. They can contribute to investigations of the food and nutrition situation in a variety of ways, especially by identifying the main features of the social environment and the social, cultural and even economic characteristics of target population groups.

Social characteristics: Characteristics stemming from membership in a society or a subgroup of a society, specifically, for example, kinship and family organization and relationships (status and role behavior). Sometimes the term is used generally to refer to demographic and cultural characteristics.

Socioeconomic factors: Aspects of economic and social organization which influence both economic and social behavior, such as income, occupation, education, land holdings, race, kinship and family relationships and family size.

Sociologist: A social scientist specializing in the study and analysis of the interaction of human groups and societies.

Stunting: A physical condition referring to relative height for age, often resulting from chronic undernutrition. Stunting is believed to be one of the better anthropometric signs for use in economic development planning. Height-for-age, the indicator used for stunting, is considered a more stable indicator of nutritional status than weight-for-age of weight-for-height because it is not as subject to short term variations resulting from seasonal changes in food intake, recent weaning, or acute disease episodes.

Structure: Relationships among elements or events. Sometimes, in dealing with human behavior, structure is an analytical concept not necessarily recognized by the participants in the behavior, for example, the structure of food consumption by various population groups in an area.

Subsistence production: Production of foods or fishery products for own household use (See above "home food production").

Survey method: A set of procedures for collecting and processing data which involves sample and questionnaire design, appropriate data processing, analysis and summarizing data and findings. (It is one of several methods of data collection.)

Survey sample: A subset of the total population from which information is to be obtained about the total population (also known as the "universe") without examining all members of the population. For example, a "representative five percent sample" would be a group comprising no more than five percent numerically of the universe, chosen in such a way that the likelihood that the sample's characteristics matches those of the population is maximized. Well-designed surveys in which the samples are only a small proportion of the subject population can provide information nearly as trustworthy as a census (which is a 100% sample) at lower cost in time and money.

Survey sample frame: A systematic organization of the total population to be sampled. Sample frames may consist of lists of all individuals or families living in the region to be samples, or they may consist of small, roughly equal areas of land ("area sample frames"). In all cases, sample frames facilitate the process of selecting unbiased samples from general populations under study.

Target population: Populations selected for special attention in the design of projects and programs (those for whom principle benefits are intended).

Traditional foods: Foods usually consumed by a population for many years, often including the food crops best adapted and native to the region.

Time series data: An historical series of economic data including statistics such as annual income per capita; annual or monthly series of farm, wholesale or retail prices; annual per capita averages of the consumption of particular foods or overall indexes of food consumption. They usually pertain to large areas such as a country, but price series data may be collected and maintained for only one city (if for retail prices) or one rural area (if for farm prices).

Twenty-four hour recall method: A food intake survey method in which the respondant is asked to provide information on all foods consumed in a specified, recent twenty-four hour period. When undertaken by a skilled interviewer who is able to elicit near accurate quantitities and who understands the dietary patterns and food behavior of the respondant, twenty-four hour recall method can provide useful data

Twenty-four hour recall method: (cont.)
for program planning. However, since it covers only a twenty-four hour period, interviews must be planned to cover all seasons of the year when food intake varies, and holidays and weekends, when food intakes frequently are dramatically different. It is a method hardest to use in a culture with an eccletic, varied diet, and easiest to use in a culture with a relatively unchanging diet.

Undernutrition: A condition, also referred to as starvation, resulting from low food intakes, and creating short supplies of food energy. It is the most common food problem in developing countries and is particularly relevant to planning development projects. Except when found in infants and young children, undernutrition is seasonal in many developing countries due to the lack of food supplies in preharvest periods or during times of severe weather conditions. For very young children, when food is in short supply, undernutrition is often chronic.

Urbanization: A process of increasing the degree of incidence of social, economic and political factors associated with city life, such as population density, diversity, occupational specialization, institutional complexity, secondary relationships, and central administration.

Validity of a measure: The appropriateness and accuracy of the measurement in terms of relevance to the concept which the data purports to measure. In other words, does the measure measure what it is supposed to. A valid measure is directly relevant to the concept selected for analysis. A valid measure also serves as an accurate indicator for the concept.

Variance: A measure of the amount by which observations of a particular variable (e.g. the height of individuals) differ from the mean (average) value for that variable in the universe.

Variations: Differences in single variables among different households, people or areas at a particular time or at specified times and places.

Vitamin A deficiency: A nutritional problem common in developing countries due to lack of consumption of fruits and vegetables rich in vitamin A. Lack of sufficient Vitamin A in the body affects growth, the severity of infectious diseases and vision. A serious and continuous deficiency in vitamin A intake can cause total blindness. Vitamin A deficiency is a common cause of blindness in most developing countries, in both rural and urban areas.

Wealth: The cumulative value of goods and services commanded by an individual or group over time. Wealth is somtimes considered to be an important determinant (together with income) of individual and group consumption levels.

Welfare: A branch of economics dealing with measures and determinants of an individuals's "well-being," generally defined in terms of utility; in applied social science, welfare is interchangeable with "well-being" in terms of such concepts as ownership of material goods, levels of food consumption, and state of health and nutrition.

Well-fed people: A term referring to a population which has generally adequate food and nutrient supplies (as opposed to undernutrition and malnutrition.)

Weighing method: Instead of asking respondents to report on their food consumption, (as in the twenty-four hour recall method), the weighing method measures foods as they are brought into the household, as they are prepared for eating and as they are served. Often plate and other waste is weighed also. Some researchers prefer this method, since it measures actual behavior rather than recollections of behavior.

Weighting: A computation often used in processing survey data so that the distribution of the final sample is in proportion to the universe (the whole population). Another type of weighting is used in calculating index numbers such as quantity weights aplied to individual commodity prices in deriving an overall price index and price weights to calculate an index of overall food consumption.

The proportions of the population in particular subgroups can be altered to match changes expected during development and combined with food consumption averages for such groups to derive approximations for future overall food averages for the population. This is called a reweighting procedure for projecting food consumption.

Acknowledgments

The following people reviewed this glossary and offered their professional comments to the author and editor for its improvement:

Roberta van Haeften
Gary Smith
Laura Jane Harper
Judith McGuire
Bonni van Blarcom
Patricia L. Rader

NUTRITION, CONSUMPTION, AND AGRICULTURAL CHANGE

A Review of Community-Level Trends and Policy Implications

July 1979

prepared by:

Patrick Fleuret

Materials for Workshop Members

Instructions for Monday Night Preparation

Activity 3: Independent Reading

Workshop members are asked to read and be prepared to discuss the following documents, prior to the first session of the workshop on the second day: (Number and letter designations are found on the title page of the article.)

a. Reading. "Malnourished People", Chapters 1-3. The purpose of reading these chapters is to gain a better understanding of the nature, costs, and consequences of nutritional problems in developing countries. Berg emphasizes the urgency of the problems and the inadequacy of the standard growth-oriented solutions.

b. Reading. Patrick Fleuret, "Nutrition, Consumption and Agricultural Change." This reading points out some of the
9A problems of inducing changes in traditional social and economic organization in societies of developing countries because of changes in food distribution towards less equitable means.

c. General Frankwork for Analysis of Food and Nutrition
3A Situations, by Marguerite Burk. This one-page chart is found in the red looseleaf notebook in the section labeled "Concepts".

NUTRITION, CONSUMPTION, AND AGRICULTURAL CHANGE

A Review of Community-Level Trends and Policy Implications

SUMMARY

Malnutrition in developing nations is a growing problem. Calorie deficits among the poor are not necessarily reduced by improving agricultural productivity, raising incomes, or enlarging aggregate food supplies. Indeed, nutritional status among the poor has often declined in the wake of planned agricultural change, due to altered dietary practices and reduced food intake.

Within the Agency there is much debate about whether and how policy and programming should address these issues. Planners are hampered because there is no general understanding of how particular agricultural development projects may affect consumption and therefore nutritional status. This is partly because of the complex "multi-factoral" etiology of nutritional disease itself, and partly because it is hard to identify the effect that a particular development initiative may have on nutritional status when there are many other coincident and possibly relevant factors. Nevertheless, several hundred community level studies of nutrition and agriculture have identified consistent patterns of interaction among social, economic and nutritional variables, with profound implications for development policy.

This paper reviews a large portion of the available material, to isolate a set of community level factors that influence the nutritional impact of agricultural change. Such impacts are predictable and this fact allows us to define a number of policy and program issues to be considered carefully by those who plan and implement agricultural development.

U.S. bilateral development assistance is intended to "enable the poor...in developing countries to meet their basic human needs on a sustainable basis" (122). One of the most basic needs of the poor in LDCs is adequate nutrition, (134), a goal to which A.I.D. has made a strong commitment. Most A.I.D. programs are intended directly or indirectly to improve the nutritional status of disadvantaged populations (123), but the gap between intent and accomplishment is often very wide. Although there is some evidence that direct health and nutrition interventions can significantly improve the nutritional status of the poor at minimal cost (51), there is growing uncertainty about the impact of indirect means of raising nutritional status. Such indirect approaches—including employment generation, development of infrastructure, land reform, and raising the productivity of smallholder agriculturalists—have in the past been thought to have a generally positive effect on nutrition among the poor majority by raising income and improving food consumption. But Berg (8), Reutlinger and Selowsky (106), and others have suggested that, because of maldistribution, certain aspects of malnutrition can persist - especially among the poor - in the face of otherwise successful general development programs.

These findings imply that current awareness of the "malnutrition problem" is deficient. There is no general understanding of how specific development programs (apart from direct interventions) may affect consumption patterns and therefore nutritional status, largely because inadequate attention has been directed to the ways in which specific

development programs affect community-level social and economic conditions, which, in turn, may affect nutritional status. As an initial, perhaps oversimplified illustration, consider the following sets of circumstances under which consumption-related malnutrition may arise.[1/]

1. Food production is inadequate, due to lack of land, labor, capital, or any combination of these;
2. Food production is adequate, but some people cannot afford enough food or the right kind of food;
3. Food production is adequate, but cultural factors (e.g., food preferences and intra-household distribution) cause unhealthy consumption patterns;
4. Both aggregate food production and overall income levels are adequate, beliefs and values are nutritionally neutral, but certain categories of the population are constrained by other social and economic factors (outlined below) to make consumption decisions that are inconsistent with good nutrition.

Situation (1) has often been amenable to well-planned programs of agricultural technical assistance; situation (3) can be ameliorated through careful programs of nutrition education (provided that income levels are high enough to allow people to act upon the new information [4]); income redistribution, food subsidies, price ceilings and the like may

---

This paper focuses on the consumption component of malnutrition, since this is most directly affected by changing agricultural patterns. Agricultural change can also change the prevalence of conditioning infections and infestations, but these relationships are not examined here.

improve the nutritional status of communities trapped in situations (2) and (4), but definition of target populations and program implementation have presented many difficulties. Moreover, there is reason to suspect that many communities which ten years ago were successfully aided to increase their food production or to abandon deleterious cultural practices have now become subject to the nutritional constraints summarized in situations (2) and (4). Equally disturbing is the evidence (reviewed below) that programs of agricultural or economic development have induced or exacerbated malnutrition among populations that were nutritionally self-sufficient under traditional circumstances. This cannot be considered a failure of policy; policy-makers have been unable to give adequate consideration to the nutritional implications of general development programs because little research has been directed at such issues and our fund of knowledge is poor. Furthermore, the work that has been done is often poorly publicized.

It has always been difficult to demonstrate the existence of precise relationships between socio-economic development and nutritional status. This difficulty is partly due to the complex "multi-factoral" etiology of nutritional disease itself (64), partly because it is hard to identify the effect that a specific development program may have on nutritional status when there are many other coincident and possibly relevant factors (68), and partly because the research methodologies used to examine interactions among social, economic, and nutritional variables are often deficient (32, 131). Nevertheless, many recent and several older community-based studies of nutrition and society have made important contributions in such directions, and the conclusions reached have much significance for development policy.

Community-level studies of the relationship between society and nutrition may take several directions. Perhaps the most common approach is to identify what Jelliffe (63) has called "cultural blocks," that is, local beliefs and practices that influence dietary intake and which may thus affect the nutritional status of a population or some portion of it. Wilson's review of food habit research (130), though now out-dated, shows the breadth of work which has been done along these lines. Such materials, which are often designed to demonstrate the place of traditional cultural patterns in the etiology of nutritional disease, (see p. 7-8), shed little light on an issue of more immediate relevance to development policy: what happens to nutritional status in the course of economic change? There are many studies, from all parts of the world, which show how traditional communities (or specific categories of people within them) are placed at risk nutritionally through cultural patterns of food production, distribution, and consumption; but there are comparatively few studies which show how modernizing communities (or specific categories of people within these) become malnourished through the introduction of novel methods of food production, distribution and consumption. This paper reviews the findings of much of this latter category of literature and identifies some important implications for development policy.

Traditional food production and consumption arrangements often constituted rational, well-balanced adaptations to limitations of environment and technology. For example, a diet consisting of maize, beans and squash, found throughout the New World, is generally conceded to be nutritionally

adequate, insofar as protein, vitamins, and mineral deficiencies present in each component singly are largely overcome by compensatory qualities in the other components (36, 52). In addition, indigenous modes of maize preparation (involving the addition of lime water or wood ashes) raised the nutritional value of this staple by increasing the biological availability of niacin (71, 132). Indigenous staple preparation cannot universally be said to be nutritionally appropriate; native milling of grains is sometimes wasteful, for example (22), or may lead to phytate imbalance through the inclusion of excess fiber and bran (105). Nevertheless, there are studies of rice-based food regimes (53, 70), of cassava-based regimes (9, 58, 67), of yam-based regimes (31), of sorghum-based regimes (47), and of banana-based regimes (7, 116) which show that when these indigenous food production systems are undisturbed by exogenous forces they can be quite capable of producing the correct assortment of nutrients in sufficient quantity to meet the requirements of human populations.

Nutritional sufficiency is achieved under traditional circumstances by supplementing staple consumption with small-game hunting, and, perhaps more importantly, through a wide-ranging and sensitive exploitation of available non-staple food plants. This includes species that are cultivated, species that are foraged in the wild, and other species that are neither cultivated nor foraged but whose germination and maturation are fostered by patterns of land-clearance and plot-weeding. These include leafy green plants, fruits, roots, and mushrooms.

The most important aspect of this exploitation centers on the harvest of leafy green plants. The most commonly consumed are leaves of Manihot, Vigna, Ipomea batatus, Diascorea, and Colocasia that is, cultivated species, but dozens of less well-known wild species are consumed too. Edible greens, incorporated into the diet as relishes, soups, or in close combination with the staple (5, 20, 65), frequently provide significant amounts of nutrients in the form of leaf protein, calcium, iron, and vitamins. This circumstance was recognized by some at a very early date (21, 37, 43, 94) and many studies have demonstrated the specific nutrient content of commonly-consumed green leaves (56, 82, 99, 114), which are often more valuable in this regard than the exogenous vegetables development officials would like to see produced (77). Not until relatively recent times, however, have attempts been made to assess the extent to which such foods form a consistent element in the diet. Wild plants are often viewed as producing important famine reserves (12, 13, 47, 60), but in fact dozens of different species of green leaves are consumed on a day-to-day basis by people in widely separated parts of the developing world. Important work along these lines has been done in East Africa (12, 33, 112), West Africa (119, 133), Southern Africa (48), Latin America (9, 85), and the Philippines (31). In all cases it is seen that these plant materials supply essential—not supplemental—dietary components.

There are other ways in which traditional diets reflect well-balanced adaptations to nutritional needs. Although the question is somewhat controversial, geophagy (consumption of earth) may be a valuable technique for acquiring iron and mineral supplements; around the world it is associated primarily with the onset of pregnancy and lactation (46, 52).

Among the Ewe of Ghana, for example, average daily consumption of mineral-laden earths is 13 grams for males and 30 grams for females (125, 126). Elsewhere indigenous salts are obtained from natural (and heavily mineralized) pans and outcrops (18, 94), or by burning and leaching the ashes of swamp grasses, which contain many valuable minerals, particularly phosphorous and chlorine (94) Indigenous methods of food preparation or storage may also contribute positively to the nutritional status of a population. The addition of lime water to maize has already been noted, as has the widespread practice of steaming staples in green leaves. In parts of the New World pre-mastication of coarse grains for infants was nutritionally valuable (41), and this practice is widespread elsewhere; in parts of Africa foods are preserved by soaking in vegetable oil or by mixing with mineral-rich ant-hill soil (79); in many other places fermentation of staples or beverages derived from staples adds to the value of basic foods and helps to prevent pellagra, scurvy, and beri-beri (38, 87, 95).

On a rather different level, there have been several attempts to associate specific behavioral disorders with aspects of traditional dietary habits. Perhaps the most persuasive material comes from Andean Peru, where researchers have suggested that chewing coca leaves may counter hypoxia-induced hypoglycemia (with attendant aggression), protect against cold stress, and serve as a source of vitamins and minerals (10, 11, 19, 54). The consumption of this mildly-narcotic leaf, frowned upon by outsiders and Peruvian authorities, may thus be a nutritionally and socially valuable practice. Elsewhere, endemic goiter, cretinism, and other neurological dysfunctions have been seen to emerge when indigenous sources of iodine are disrupted (18, 45).

Much of the foregoing material challenges the prevailing assumption that indigenous food production systems in developing countries were largely unable to meet the nutrition needs of the people depending upon them. Traditional agricultural systems in many parts of the world were for the most part adequate in terms of overall production; shortcomings were however evident in methods of storage and distribution, but even these did not often assume significance until the introduction of western curative medicine and consequent high rates of population growth. Although some cultures have evolved low-technology means of storing significant quantities of food (90, 113), much of the developing world undergoes a more or less debilitating "hunger season" (annually or at lesser frequencies), that can cause widespread morbidity and mortality among young children whose nutritional status may have been marginal at the outset (74). This brings up a point mentioned earlier: that throughout much of Africa, Asia, and Latin America women and young children are placed at a nutritional disadvantage through indigenous food distribution practices. It is particularly noteworthy that these "cultural blocks" to adequate nutrition work against those who are especially in need of superior nutritional status; but it is also necessary to consider that the distribution of these deleterious practices is balanced by other features of traditional social organization that encourage equitable distribution of food on a more inclusive level. A close relationship between features of social or political organization and nutritionally advantageous redistribution of food among kin groups, villages, or tribes has been specifically described in the Orinoco Delta (55), in the Amazon Basin (49), among tribesmen in the

New Guinea Highlands (100, 101), in East Africa (42), West Africa (60), Southern Africa (47), and in Latin America (15, 29); many other studies have mentioned the food distribution aspect of social organization but studied the process less thoroughly.

What these materials tell us is that features of traditional social organization in many parts of the world encouraged equitable distribution of food among communities and families, at the same time that other cultural factors encouraged inequitable distribution within families or households. The implication, most evident in work done by Kolata (75), Wilmsen (129), and others (52), is that systematic nutritional deprivation of pregnant and lactating women and children under five (especially female children), observed in traditional societies around the world, can be regarded as a cultural mechanism of controlling fertility and population growth.

To summarize: there is reason to believe that traditional systems of agricultural production in the developing world were largely adequate in terms of productive capacity; this adequacy was based on an extensive exploitation of non-staple plant foods but undermined by technological shortcomings that prevented the development of sufficient food storage capacity. Traditional systems of food distribution, linked closely with political organization, appear to have been oriented toward maintaining the viability of the society as a whole; this was achieved by equitable distribution among separate units of production (households, kin groups, villages, etc.) and inequitable distribution within units of production (especially households.)

We turn now to a consideration of the steps taken by foreign aid donor organizations to improve the nutritional status of Third World populations. These programs have included:

1. Nutrition education, aimed at removing cultural blocks to adequate nutritional status;
2. Food supplement programs, aimed at eliminating critical deficiencies among specific populations;
3. Nutrition rehabilitation programs, which combine elements of both these;
4. Improved agricultural production.

The advantages and disadvantages of nutritional education, food supplement programs, and nutrition rehabilitation programs are important topics, but will not be considered here. This paper focuses on the nutritional consequences of improved agricultural production schemes.

The relationship between agricultural change and nutritional change is sometimes direct, but more often not. This is because a large number of intermediate or subsidiary changes are set into motion when traditional modes of agricultural production are altered. Regional and international markets, indigenous dependency ratios, systems of land tenure, the organization of agricultural labor, and ecological balances can all be changed by novel agricultural inputs, and may all in turn cause changes in the consumption patterns and nutritional status of subject populations. The discussion of the nutritional consequences of agricultural change which follows, therefore, is likely to be suggestive rather than definitive; qualitative rather than quantitative; and forsakes

the rigorous examination of all contingent factors in particular settings for a less detailed, but more comprehensive, review which is meant to show the multiplicity of ways in which consumption and therefore nutritional status may be affected by general development policy. The review will consider these concomitants to agricultural change:

1. Changes in crop inventories;
2. Changes in agricultural labor requirements;
3. Changes in market relationships.

1. Change in Crop Inventories

That commercial production often leads to a decline in nutritional status has long been recognized (25, 78, 82). Further investigation has led to clear understanding of some of the agrarian processes involved.

The multi-plot and multi-crop production strategies typical of subsistence agricultural regimes are aimed at reducing the levels of risk to which producer households are exposed (12), and also smooth out irregularities in the food supply (89, 110), so far as this may be possible with limited technology. Commercial production in developing countries, on the other hand, nearly always exaggerates seasonal cycles of plenty and want. The money obtained through crop sales, which ordinarily arrives in one or two lumps during the course of the year, should in theory allow food purchases to dampen cycles of scarcity, but is often inadequate to the task. This can happen because the sudden arrival of cash has a tendency to drive up food prices, or because of inequities in the structure of agricultural credit and savings facilities (76), or because the food available for purchase is scarce or of inferior nutritional quality (1, 73, 98), or because scarce cash income must be allocated among many competing non-food needs (35, 88).

Another consequence of commercial agriculture is a decline in crop diversity; as single households place increased amounts of land into production for the market, the range of possibilities for food production is reduced (53), with rare exceptions (39, 84). When supplementary non-staple foods are deleted from crop inventories in favor of commercial varieties, the peasant household becomes less self-sufficient and, more importantly, less able to withstand seasonal variations in the supply of staple foods. This decline in the variety of foods available is critical in other ways as well, for dietary diversity has been shown to be a close analogue for dietary sufficiency (28, 109), and the nutritionally complementary dietary associations common in traditional settings are easily upset by novel cultigens, to the detriment of nutritional status among peasant consumers (85). Even more deleterious may be the replacement of traditional staples with exogenous staples (e.g. maize, wheat). Pellagra, for example, is more frequently found among populations introduced to the use of maize than among populations where maize is the traditional staple, because the necessary diet complements (chiefly legumes) are not introduced simultaneously (96).

2. Change in Agricultural Labor Requirements

Throughout the developing world, commercial agricultural production has placed increased demands on the labor time of women, who are often overburdened in traditional production systems and who may already be skimping on nutritionally relevant activities (91). Often there are changes in cooking habits, as women substitute quicker but often less nutritious

techniques for traditional methods of preparation (74). When less time is given to food preparation and child feeding, the deleterious nutritional consequences can outweigh those due to either lack of food or lack of cash income (115). In other cases the labor demands of commercial production result in the selection of less labor intensive food crops, and these (often manioc or other tubers) are relatively poor in nutritive content (61).

More subtle—but equally deleterious—consequences of changes in labor relations become evident if we consider the energy costs of food production. Recent calorimetric work from Colombia (118), northeastern Brazil (50), the Philippines (31), New Guinea (102), and the Amazon Basin (49) suggests that the introduction of market agriculture may increase the amount of human energy needed to obtain necessary nutrients (chiefly calories), and may also engender nutritionally deleterious patterns of intra-family food distribution. The populations undergoing these disadvantageous shifts in energy allocation and the efficiency of energy expenditure are the least able to withstand the negative nutritional consequences.

3. Changes in Market Relationships

Commercial agriculture directly influences dietary intake and nutritional status in developing countries by changing cropping patterns and the caloric productivity of labor; more indirect dietary changes follow upon the incorporation of peasant producers into regional and international markets. Elite urban populations, well-rewarded through participation in bureaucracies or trade networks, are able to bid up the price of scarce, highly nutritious foods, thus removing them from the diets

of the urban poor and rural populations in general. This may be seen in the flow of animal protein to urban areas from the rural areas in which it was formerly consumed, which can take place continually (104, 111) or only in response to temporary rural shortages in staple foods (60). It may also be seen in the development of rural productive enterprises that meet the nutritive needs of wealthy townspeople while neglecting the needs of the producers themselves (23, 128).

A common contributing factor to all these processes is that the prices offered to growers of commercial crops are marginal, or subject to annual fluctuations (34, 117), which makes it difficult for commercial producers to assemble needed cash. When cash-short producers enter a dependency relationship to obtain agricultural inputs (whether public or private), they often begin a downward cycle of diminishing productive resources that is most visible in consumption declines at the household level but which can impoverish whole regions (14). The deleterious consequences of agricultural dependency may also emerge in the context of food imports; when food imports were restricted in Jamaica, nutritional status in rural areas improved as producers responded to the price incentive of increased demand for domestic food (80).

What emerges from this discussion is that there is no necessary relationship between a shift to commercial agriculture and improved nutritional status in the developing world. On the contrary, there is reason to suspect that unless extraordinary precautions are taken to develop a distributive network and a pricing mechanism that will provide modernizing peasants with both the chance and the incentive to exchange new-found

cash for nutritious food, absolute declines in nutritional status can be expected. It is important to note that the discussion has been of "commercial crops" in general—no distinction has been drawn between crops grown solely for export, such as coffee, fiber, rubber, and the like, and commercial crops which may be consumed domestically, such as maize, cassava, or vegetables. This is because the processes which work to the disadvantage of peasant producers are not commodity-dependent. Whenever crop diversity is lowered, peasant producers are placed at risk; whenever regional price mechanisms impinge on allocative decisions that were formerly structured by risk aversion, a steady supply of food to peasant producers is endangered; whenever additional demands are placed on household labor resources, nutritional status may be undermined; and whenever changes are made in the array of calorie capture strategies open to peasant producers, the opportunity for inefficient energy expenditure (guided by commodity prices, wages, and taxation) will emerge. The disadvantageous ramifications of agriculture change are many, and the complexity of the issue has led Brown and Parisier (17) May (81) and others to recommend that, in the best interests of Third World producers, Western technology should be applied to improve the productivity of existing crop regimes and staple foods, rather than to introducing exogenous cultigens and methods of production. These cautions may be unrealistic; in any event they have been largely ignored. Further ramifications of these issues are examined below in a detailed discussion of the relationship between income, inequality, consumption, and nutritional status in LDC communities.

In the developing world there is a significant correlation between low income and low nutritional status (2, 3), especially in regard to protein deficiencies (111). This relationship has been most evident in urban areas, where low wage rates (92), lack of access to well-understood traditional foods (66, 72), the need to prepare quick fuel-efficient meals (62), and nutritionally inefficient cash expenditure (35) may separately or in concert undermine the nutritional status of the poor majority. Some of these aspects of urban poverty can also influence nutritional status in rural areas, either directly (4) or indirectly through the effects of long and short term labor migration (40, 107, 108). The importance of income in determining nutritional status is highlighted by the frequent observation that, even where "cultural blocks" to good dietary practice are most strongly in evidence, it is rare to find malnutrition among the wealthiest segments of a population. This has led to an emphasis on raising income as a necessary prelude to improving nutritional status, and more often than not, "raising income" has meant introducing commercial agriculture. The value of such an approach is open to question, for there is no necessary link between commercialization and growth in real income or improved nutritional status. Indeed, it can be shown that even when rural income rises nutritional status may not change (26). To understand why these very discouraging circumstances exist, and to understand what policy-makers may do to counter them, it is necessary to take a closer look than we have so far at specific processes of agrarian change. Three aspects of the relationship between nutritional status and agricultural change will be examined:

1. Declining nutritional status during the transition from subsistence to commercial cropping;
2. Variation in landholdings, income, consumption and nutritional status;
3. Nutritional change in association with overall economic advance.

1. Declining Nutritional Status During Agrarian Transitions

There is a limited amount of encouraging evidence that the worst nutritional declines experienced in rural areas happen when households are changing from subsistence to commercial production. In a cocoa growing area of West Africa (24), it was observed that

> [Some] farmers appear to sell enough cocoa to be able to buy reasonable quantities of food for their families, but [other] families have much younger cocoa which has to be cared for with cash from the sale of their food crops. Hence they have a lower food intake....

Similar conclusions emerged in a study of coffee farming among the Chakaka Poka of Malawi. Coffee begins to bear only after three years have passed, so those who invest in coffee trees must either have surplus land and labor to produce the necessary staple foods or be prepared to experience food shortages during the interim. When prices were high, established commercial farmers could afford to buy sufficient staples to replace the food they no longer grew (90). Evidence that the concept of "transitional malnutrition" may have more general significance comes from circumstances observed in the Caribbean, where the transition was not

to new cultigens but to new employment strategies (6). Unfortunately, it is rather rare for malnutrition following upon the introduction of new income strategies to be transitory; much more frequently attendant institutional changes embed malnutrition in the new patterns of production, distribution and consumption. How this happens is outlined below.

2. Variations in Landholdings, Income, Consumption, and Nutritional Status

Pelto and Jerome (97) have recently stressed that to understand variation in nutritional status one must be sensitive to rather small variations in income in rural areas.

> Even among seemingly homogeneous [farmers] there can be significant differences in economic status, based on access to paying jobs [and] differences in agricultural productivity....
>
> assumptions [regarding dietary intake] about the same social stratum are not warranted when households are examined more closely.

One or two studies have been able to show, by focusing very closely on household income strategies, that variations in economic status which are all but invisible to outside observers can have significant implications for nutritional status. Desai et al., (27), working in Jamaica, conducted a household survey that took into account number of rooms, construction materials and methods, the ratio of earners to dependents, principal occupation of the household head, and other similar factors. All these are approximate analogues for real household income, which is difficult to measure directly. They conclude that

> the relationship between [child] growth and income was quite apparent... in spite of the relatively narrow range of socio-economic status found within the study area.

Similar results were obtained by DeWalt and Pelto (28) in a Mexican community, where it was found that

> The most powerful predictor of nutritional adequacy... is material life-style or general economic well-being.

Of the total variance in nutritional status observed in this study, 30% was explained by a household analogue for real income, and 11% was explained by livestock holdings. No significance could be attached to either women's educational level or women's beliefs about what constitutes nutritious food.

There is much other evidence that women's education and "modern" attitudes contribute positively to nutrition in rural households (86), but it is possible that this is a largely spurious association achieved through a more general coincidence of household wealth and expansion in the scale of women's opportunities. In those few nutritional studies which have been able to make use of data on landholdings in rural areas, the linkages between inadequate land, constriction of opportunity, and malnutrition become very clear. Rawson and Valverde (103), working in Costa Rica, found that children from the 45% of all households with less than 1.4 ha. of land were significantly more likely to be malnourished than children from families with larger landholdings. The critical causal link had to do with off-farm employment. Adult males from such households often took low-paying casual jobs to supplement their income-in-kind with

cash. The resultant income would have been insufficient to meet consumption needs even had it been allocated entirely to food, which it was not; and the absence of the traditional farm manager from the household lands caused staple food production to suffer. Adult women from such households were also often constrained to take wage-paying jobs, which were poorly rewarded, but which demanded a great deal of time. Serious consequences followed as cooking and child care were neglected, and poorly maintained houses multiplied the chances of infection among children.

Equally compelling results were obtained by Valverde et al. (124) in Guatemala, where it was found that among families with 1.5 ha. of land or less 38% of all children were malnourished; among families with more than 1.5 ha. but less than 3.5 ha. of land, 31% of all children were malnourished; and among families with more than 3.5 ha. of land only 17% of all children were malnourished. The authors conclude:

> land availability was significantly associated with nutritional status of young children and may thus be used as an indicator of health and nutritional status of the family.

Similar factors played a role in a study done near Hyderabad (69), where wealthy households (with much land) were observed to include

> pulses in the diet daily or on alternate days while the other sections of the population used pulses twice a week or less frequently.

What conclusions may be drawn from studies such as these? The clearest lesson is that the land allocation effects of economic development programs must be carefully watched to make sure that inequities in

landholdings are not encouraged. Unfortunately this is not often done. Dewey (30), reviewing materials from Latin American and Asia, has observed that

> A major effect of agricultural development in many parts of the world has been drastic changes in the distribution of land and in land tenure relations. Very often the result has been less land for small farmers.

Irrigation, mechanization, the introduction of fertilizers and hybrid seeds, and other novel technologies that lead more-or-less directly to economies of scale, lead simultaneously to inequitable land redistribution. It cannot be assumed that the landless laborers and small farmers created by this process will be able to make up consumption shortfalls by taking up new (adequately remunerative) jobs made available through technological advance.

We are now familiar with the disadvantageous nutritional concomitants of inadequate landholdings in rural areas. Inadequate land implies inadequate income (in kind or in cash), and this has a negative impact on patterns of consumption. One implication is that where overall economic advance has taken place, nutritional status should improve. It is then very disappointing to discover that, even where agricultural development has been successful in terms of traditional measures, such as overall growth in income, there is no necessary improvement in general nutritional status.

3. Nutritional Change in Association with Overall Economic Advance

The most complete studies of nutrition change in the wake of successful agricultural change have been done in the part of Tabasco, Mexico affected by the Plan Chontalpa (57). A major rural development project involving

some redistribution of land, resettlement, and the introduction of commercial agriculture was initiated in the 1950s. By the early 1970s, the value of agricultural production in the area had increased by a factor of six, while population had only doubled. By this objective measure, then, the material well-being and nutritional status of the affected populations should also have improved; indeed it was found that total food intake had increased, and, on the average, the composition of the diet had improved as well. Unfortunately, the overall improvement was due to vast changes in the resources available to wealthy households; the poorest 30% of families showed improvement in neither dietary intake nor nutritional status.

A later, more detailed study of the same area (29) reveals some of the reasons for such discouraging results. During the land reallocation process, in which private holdings were collectivized, government and financial institutions directly or indirectly acquired the authority to make productive decisions on all but a fraction of the available land; the decisions which followed, aimed at maximizing crop exports and returns on investment, ultimately stunted growth in food supplies. Furthermore, a close relationship was noted between reduced crop diversity and lowered nutritional status. The new settlements also took shape in a fashion that increased the risk of infestation and infection among children. The most positive aspect of the Plan resulted from health clinics; children living near to these were significantly healthier than children living elsewhere.

Rather different but equally discouraging circumstances have been observed in another Mexican setting (15). Resettlement following the filling of a large dam affected people from four different types of community: Indian maize farmers, plantation workers, participants in collective agricultural schemes, and workers on cattle estates. In a comparison of affected and unaffected communities of all four types, it was uniformly observed that overall economic well-being was higher in the affected (i.e. resettled) communities than in the unaffected communities. This was attributed to liberal credit programs, sensitive administrative procedures, and the like. Nevertheless, the absolute variation in nutritional status between well-off households and relatively poor households was much greater among the affected communities than among the unaffected communities—and this happened independently of productive strategy. The disappearance of traditional mechanisms of food redistribution in resettled communities, coupled with the unequal impact of economic opportunity under rapidly changing circumstances, resulted in deleterious nutritional changes among low income segments of the population even when overall nutritional status was improving and economic development was taking place.

This review of the community-level factors which may influence the nutritional impact of agricultural development allows us to define a number of policy and program issues which should be considered carefully by those who determine and implement agricultural development policy.

1. A great deal of discussion has taken place in recent years on means of insuring that "technological packages" for increasing rural productivity are suited to the community-level social and economic situation. The material presented here suggests that another design consideration should be added: analysis of current and projected dietary intake among various segments of the affected population, perhaps along the lines proposed by the FAO Committee on Agriculture (120, 121). Agricultural changes will affect the consumption patterns of some or all members of the community, and it cannot be assumed that these changes will be nutritionally advantageous.

2. Many development technicians and designers assume that all rural producers in the Third World are poor in resources and in income. This attitude results in projects aimed at helping the "poor majority" of countries or regions, who are not nearly as homogeneous a group as this term implies. Minute differences in the quality and quantity of productive land, combined with small variations in off-farm income strategies, can have major consequences for levels of household income and nutritional status. Insensitivity to such variations in income on the part of those who design and implement development projects can exacerbate economic differentiation as benefits flow to those with greater investment capacity—and this nearly always has major implications for nutritional status among the poor <u>minority</u> who are truly disadvantaged.

3. Careful consideration should be given to any project which entails a decline in crop diversity among peasant producers. Declining diversity will lead to declining nutritional status unless care is taken to insure that nutrients formerly grown by rural consumers are made available on the market in a form and at a price that will be acceptable.

4. The extent to which traditional non-staple foods can contribute to the nutritional status of rural populations should not be overlooked. It may often be more effective, in terms of nutrition and in terms of cost, to encourage expanded output and consumption of indigenous vegetables and fruits before undertaking a program of agricultural change that introduces new vegetables and new fruits.

5. Virtually all agricultural development projects, particularly those that entail changes in the technology of production (e.g., irrigation, mechanization, or the replacement of root crops by grain crops), cause major realignments in the allocation of labor responsibilities by sex and age in affected communities, and are likely to lessen the control peasant households have over the process of production. Seldom will such changes be nutritionally neutral, and care must be taken to insure that the critical activities of subsistence food production, distribution, processing, and child feeding are not unnecessarily disrupted.

6. Macro-economic decisionmaking, with respect to relative factor prices, import-export pricing policy, levels and incidence of taxation, and development of agricultural infrastructure, often imposes a penalty on

small rural producers who leave off subsistence production to enter the market in agricultural commodities. Sometimes it is possible to express this penalty in terms of declining returns to labor and land; much more frequently the only evidence of such institutionalized disadvantage takes the form of decreasing levels of consumption and malnutrition in rural areas. The future of the Third World lies for the most part in agrarian development, but, despite much controversy, most governments of developing countries and many foreign aid donor organizations continue to have an urban bias embedded deeply in development policy.

7. Since agricultural change may endanger nutritional status, and since it is often difficult to predict what form the nutritional threat may take, more agricultural projects should incorporate nutrition and health status monitoring components. If deleterious trends then emerge, appropriate action to change elements of the project or to initiate specific nutrition/health interventions could be taken.

In the long run, there is little doubt that the food needs of the world will have to be addressed through increasing productivity, which will inevitably involve greater specialization and capitalization of agricultural production in the developing world. But development efforts that focus narrowly on production without considering distribution and consumption unfortunately tend to alter access to resources of all kinds in ways that can have a deleterious impact on nutritional status among the rural poor and which reduce the likelihood of meeting long-run goals. These unfortunate consequences are not inevitable. If greater attention is given to refining definitions of the rural poor; if greater respect is

given to the value of traditional production and consumption practices; if greater heed is paid to the widely-ramifying community level consequences of change in agricultural production; and if care is taken to upgrade the efficiency of markets in staple and non-staple foods before rural producers are encouraged to begin purchasing nutrients they formerly grew, then it should be possible for effective long-range and long-lasting agricultural development to take place without undermining the health and nutritional status of poor people in rural areas.

References Cited

1. Adams, R.
1974 Some observations on the interrelations of development and nutrition programs. Ecol. Food Nutr. 3: 85-88.

2. Adrianzen, B. et al.
1973 Growth of Children from extremely poor families. Am. J. Clin. Nutr. 26: 926-930.

3. Banik, N. et al.
1970 Longitudinal growth patterns of children during pre-school age and its relationship with different socio-economic classes. Ind. J. Ped. 37: 438-447.

4. Bantje, H.
1977 Sociological aspects of nutrition education in Jamaica. In T. Fitzgerald, ed., Nutrition and Anthropology in Action, pp. 94-105. Assen: Van Gorcum.

5. Bascom, W.
1951 Yoruba cooking. Africa 21: 125-137.

6. Beaudry-Darisme, M. et al.
1972 The application of sociological research methods to food and nutrition problems on a Caribbean island. Ecol. Food Nutr. 1: 103-119.

7. Bennett, F. et al.
1965 An inventory of Kiganda foods. Uganda J. 29: 45-53.

8. Berg, A.
1973 The Nutrition Factor. Washington, D.C.: The Brookings Institution.

9. Berlin, E. and E. Markell
1977 An assessment of the nutritional and health status of an Aguaruna Jivaro community, Amazonas, Peru. Ecol. Food Nutr. 6: 69-81.

10. Bolton, R.
1973 Aggression and hypoglycemia among the Qolla: a study in psychobiological anthropology. Ethnology 12: 227-258.

11. Bolton, R.
1976 Andean coca chewing: a metabolic perspective. Am. Anthro. 78: 630-634.

12. Brokensha, D. and B. Riley
1978 Mbeere wild foods. Paper presented at AAA meeting, Los Angeles.

13. Brooke, C.
1967 Types of food shortages in Tanzania. Geogr. Rev. 57: 333-357.

14. Brookfield, H.
1973 Full circle in Chimbu. In H. Brookfield and E. Arnold, eds., The Pacific in Transition, pp. 127-160. London.

15. Brown, A.
1978 The impact of economic development in the Papaloapan. Paper presented at the AAA meetings, Los Angeles.

16. Brown, J. and R. Brown
1977 Finding the causes of malnutrition in a community. J. Trop. Ped. Env. Child Health 23: 247-

17. Brown, N. and E. Parisier
1975 Food science in developing countries. Science 188: 589-593.

18. Buchbinder, G.
1977 Endemic cretinism among the Maring: a by-product of culture contact. In T. Fitzgerald, ed., Nutrition and Anthropology in Action, pp. 106-116. Assen: Van Gorcum.

19. Burchard, R.
1975 Coca chewing, a new perspective. In V. Rubin, ed., Cannabis and Culture, pp. 463-484. The Hague: Mouton.

20. Calloway, D. et al.
1974 The superior mineral content of some American Indian foods in comparison to federally donated counterpart commodities. Ecol. Food Nutr. 3: 203.

21. Carr, W.
1956 The preparation and analysis of some African foodstuffs. Centr. Afr. J. Med. 2: 334-339.

22. Carr, W.
1961 Observations of the nutritive value of traditionally-ground cereals in Southern Rhodesia. Br. J. Nutr. 15: 339-343.

23. Cattle, D.
1978 Nutritional consequences of cash: case of the Miskito Indians. Paper presented at the SWAA meetings, San Francisco.

24. Collis, W. et al.
1962 On the ecology of child health and nutrition in Nigerian villages, parts I and II. Trop. Geogr. Med. 14: 140-163, 201-229.

25. Culwick, A. and G. Culwick
1939 A study of factors governing the food supply in Ulanga, Tanganyika Territory. E. Afr. Med. J. 16: 42-61.

26. Dema, I.
1969 Nutrition and agriculture. In Proc. of the Eastern African Conf. on Nutrition and Child Feeding, Nairobi, pp. 201-205. Washington, D.C.: U.S.G.P.O.

27. Desai, P. et al.
1970 Socio-economic and cultural influences on child growth in rural Jamaica. J. Biosocial Science 2: 133-143.

28. Dewalt, K. and G. Pelto
1977 Food use and household ecology in a Mexican community. In T. Fitzgerald, ed., Nutrition and Anthropology in Action, pp. 79-93. Assen: Van Gorcum.

29. Dewey, K.
1978 The impact of agricultural change on diet and nutrition in Tabasco, Mexico. Paper presented at the AAA meeting, Los Angeles. (As revised in March, 1979.)

30. Dewey, K.
n.d. Agricultural development, diet and nutrition. Ecol. Food Nutr., in press.

31. Eder, J.
1978 The caloric returns to food collecting: disruption and change among the Batak of the Philippine tropical forest. Human Ecol. 6: 55-69.

32. Ernster, M. et al.
1976 Social research methods applied to nutritional assessment. Ecol. Food Nutr. 5: 143-151.

33. Fleuret, A.
n.d. The role of wild foliage plants in the diet. A case study from Lushoto, Tanzania. Ecol. Food Nutr., in press.

34. Fleuret, P.
n.d. Ujamaa rural development policy and agricultural produce marketing in the northeastern highlands of Tanzania. In unpublished Ph.D., dissertation, Univ. of Calif. at Santa Barbara.

35. Florencio, C. and V. Smith
1969 Efficiency of food purchasing among working-class families in Colombia. J. Am. Diet. Assn. 55: 239-245.

36. Food and Agricultural Organization (United Nations)
1953 Maize and Maize Diets. Nutritional Studies No. 9. Rome.

37. Fortes, M. and S. Fortes
1936 Diet in the domestic economy of the Tallensi. Africa.

38. Fox, F. and W. Stone
1938 The anti-scorbotic value of Kaffir beer. S. Afr. J. Med. Sci. 3: 7-14.

39. Freed, R. and S. Freed
1979 Shanti Nagar: The effects of urbanization in a village in North India. 3. Sickness and Health, Authr. Papers of the Am. Museum of Natural History, Vol. 55, part 5, New York.

40. Freedman, R.
1973 Nutrition problems and adaptation of migrants in a new cultural environment. Int. Migr. 11: 15-31.

41. Freedman, R.
1977 Nutritional anthropology: an overview. In T. Fitzgerald, ed., Nutrition and Anthropology in Action, pp. 1-23. Assen: Van Gorcum.

42. Gerlach, L.
1964 Socio-cultural factors affecting the diet of the northeast coastal Bantu. J. Am. Diet. Assn. 45: 420-424.

43. Glegg, C.
1945 Native foodstuffs in Tanganyika. Trop. Agr. 22: 2-32.

44. Graham, C.
1972 Environmental factors affecting the growth of children. Am. J. Clin. Nutr. 25: 1184-1188.

45. Greene, L.
1973 Physical growth and development, neurological maturation, and behavioral functioning in two Ecuadorian Andean communities in which goiter is endemic. Am. J. Phys. Anthro. 38: 119-134.

46. Grivetti, L.
1978 Culture, diet, and nutrition: selected themes and topics. BioScience 28: 171-177.

47. Grivetti, L.
1978 Nutritional success in a semi-arid land: examination of Tswana agro-pastoralists of the eastern Kalahari, Botswana. Am. J. Clin. Nutr. 31: 1204-1220.

48. Grivetti, L.
1979 Kalahari agro-pastoral-hunter-gatherers: the Tswana example. Ecol. Food Nutr. 7: 235-256.

49. Gross, D.
1975 Protein capture and cultural development in the Amazon Basin. Am. Anthro. 77: 526-549.

50. Gross, D. and B. Underwood
1971 Technological change and caloric costs: sisal agriculture in northeastern Brazil. Am. Anthro. 73: 725-740.

51. Gwatkin, D. et al.
1979 Can interventions make a difference? Report to the World Bank. March, 1979. Mimeo.

52. Haas, J. and G. Harrison
1977 Nutritional anthropology and biological adaptation. Ann. Rev. Anthro. 6: 69-101

53. Hanks, L.
1972 Rice and Man. Arlington Heights, Ill.: AHIM Publishing Corp.

54. Hannah, J.
1974 Coca leaf use in southern Peru: some biological aspects. Am. Anthro. 76: 281-296.

55. Heinen, H. and K. Ruddle
1974 Ecology, ritual, and economic organization in the distribution of palm starch among the Warao of the Orinoco Delta. J. Anthro. Res. 30: 116-138.

56. Hennessy, E. and O. Lewis
1971 Anti-pellagragenic properties of wild plants used as dietary supplements in Natal (South Africa). Plant Foods Hum. Nutr. 2: 75-78.

57. Hernandez, M. et al.
1974 Effect of economic growth on nutrition in a tropical community. Ecol. Food Nutr. 3: 283-291.

58. Houston, R.
1973 Sickle cell anemia and dietary precursors of cyanate. Am. J. Clin. Nutr. 26: 1261-1264.

59. Hughes, C. and J. Hunter
1970 Disease and "development" in Africa. Soc. Science Med. 3: 443-493.

60. Hunter, J.
1967 Seasonal hunger in a part of the West African savannah: a survey of body weights in Nangodi, north-east Ghana. Trans. Inst. Br. Geogr. 41: 167-185.

61. Idusogie, E.
1969 A critical review of the role of cashcropping in the nutrition of Nigerian peoples. Ph.D. thesis, Univ. of London.

62. Idusogie, E.
1973 Centuries of changing food consumption patterns in African communities. Special Paper No. 8, published by the Regional Food and Nutrition Commission for Africa, FAO/WHO/OAU.

63. Jelliffe, D.
1957 Social culture and nutrition. Cultural blocks and protein malnutrition in early childhood in rural West Bengal. Pediatr. 20: 128-138.

64. Jelliffe, D.
1966 The Assessment of the Nutritional Status of the Community. Geneva: WHO Monograph Series No. 53.

65. Jelliffe, D. and I. Maddocks
1964 Ecologic malnutrition in the New Guinea Highlands. Clin. Ped. 3: 432-438.

66. Jelliffe, D. et al.
1963 The health of Acholi children. Trop. Geogr. Med. 15: 411-421.

67. Jones, W.
1959 Manioc in Africa. Stanford: Stanford University Press.

68. Joy, L.
1973 Nutrition intervention programs: identification and selection. In A. Berg et al., eds., Nutrition, National Development, and Planning. Massachusetts: MIT Press.

69. Jyothi, K. et al.
1963 A study of the socio-economic, diet, and nutritional status of a rural community near Hyderabad. Trop. Geogr. Med. 15: 403-410.

70. Katsura, E. and T. Olso
1976 Beriberi. In G. Benton and J. Bengoa, eds., Nutrition in Preventive Medicine, pp. 136-145. Geneva: WHO.

71. Katz, S. et al.
1974 Traditional maize processing techniques in the New World. Science 184: 765-773.

72. Keyter, C.
1971 Feeding Customs and Food Habits of Urban Africans. Johannesburg: South African Institute of Race Relations.

73. King, K.
1971 The place of vegetables in meeting the food needs in emerging nations. Econ. Bot. 25: 6-11.

74. Knutsson, K.
1972 Malnutrition and the community. In B. Vahlquist, ed., Nutrition: a Priority in African Development, pp. 46-61. Uppsala: Dag Hammarskjold Foundation.

75. Kolata, G.
1978 !Kung hunter-gatherers: feminism, diet, and birth control. In M. Logan and E. Hunt Jr., eds., Health and the Human Condition. North Scituate, Mass.: Duxbury Press. (pp. 118-122.)

76. Lappe, F. and J. Collins
1977 Food First: Beyond the Myth of Scarcity. Boston: Houghton-Mifflin.

77. Latham, M. and F. Stare
1967 Nutritional studies in Tanzania (Tanganyika). World Rev. Nutr. Diet. 7: 31-71.

78. Levy, L. et al.
1936 The food value of some common edible leaves. S. Afr. Med. J. 10: 699-707.

79. Maletnlema, T. et al.
1974 Family food consumption surveys in rural Tanzania. Tanz. Notes Rec. 73: 43-53.

80. Marchione, T.
1974 Food and nutrition in self-reliant national development: the impact on child nutrition of Jamaican government policy. Med. Anthro. 1: 57-79.

81. May, J.
1974 The geography of nutrition. In J. Hunter, ed., The Geography of Health and Disease, pp. 32-45. Chapel Hill, N.C.: Univ. of North Carolina.

82. McCulloch, W.
1929 An inquiry into the dietaries of the Hausa and Town Fulani of Northern Nigeria, with some observations of the effects on the national health, with recommendations arising therefrom. W. Afr. Med. J. 3:

83. Mclaren, D.
1961 Sources of carotene and vitamin A in Lake Province, Tanganyika. Acta Trop. 18: 78-80.

95. Osborn, T. and J. Noriskin
1937 Data regarding native diets in Southern Africa. S. Afr. J. Sci. 33: 605-610.

96. Patwardhan, V. and W. Darby
1972 The State of Nutrition in the Arab Middle East. Nashville, Tenn.: Vanderbilt Univ. Press.

97. Pelto, G. and N. Jerome
1978 Intracultural diversity and nutritional anthropology. In M. Logan and E. Hunt Jr., eds., Health and the Human Condition, pp. 322-328. North Scituate, Mass.: Duxbury Press.

98. Picon-Reatagui, E.
1976 Nutrition. In P. Baker and M. Little, eds., Man in the Andes, pp. 208-236. Stroudsberg, Pa.: Dowden, Hutchinson, and Ross, Inc.

99. Platt, B.
1962 Tables of Representative Values of Foods Commonly Used in Tropical Countries. Medical Research Council Special Report Series No. 302. London: HMSO.

100. Poole, F.
1977 The ethnosemantics of Yemen. Paper presented at the AAA meetings, Houston.

101. Rappaport, R.
1967 Pigs for the Ancestors. New Haven: Yale Univ. Press.

102. Rappaport, R.
1971 The flow of energy in an agricultural society. Sci. Am. 224: 116-129.

103. Rawson, I. and V. Valverde
1976 The etiology of malnutrition among preschool children in rural Costa Rica. J. Trop. Ped. Envir. Child Health 22: 12-17.

104. Read, M.
1964 The role of the anthropologist. In J. Yudkin and J. McKenzie, eds., Changing Food Habits, pp. 46-61. London: Macgibbon and Kee Ltd.

105. Reinhold, J. et al.
1973 Zinc, calcium, phosphorus and nitrogen balances of Iranian villagers following a change from phytate-rich to phytate poor diets. Ecol. Food Nutr. 2: 157-162.

84. Messer, E.
1972 Patterns of "wild" plant consumption in Oaxaca, Mexico. Ecol. Food Nutr. 1: 325-332.

85. Messer, E.
1977 The ecology of vegetarian diet in a modernizing Mexican community. In T. Fitzgerald, ed., Nutrition and Anthropology in Action, pp. 117-124. Assen: Van Gorcum.

86. Munoz de Chavez, M. et al.
1974 The epidemiology of good nutrition in a population with a high prevalence of malnutrition. Ecol. Food Nutr. 3: 223-230.

87. National Academy of Sciences
1977 World Food and Nutrition Survey. Supporting Papers Vol. III.

88. Newman, J.
1970 The Ecological Basis for Subsistence Change among the Sandawe of Tanzania. Washington, D.C.: National Academy of Sciences.

89. Nietschman, B.
1973 Between Land and Water: The Subsistence Ecology of the Miskito Indians, Eastern Nicaragua. New York: Seminar Press.

90. Ogbu, J.
1973 Seasonal hunger in tropical Arica as a cultural phenomenon. Africa 4: 317-332.

91. Ojiambo, J.
1967 A background study of the food habits of the Abasamia of Busia District—Western Province, Kenya. Nutr. 22: 216-221.

92. Okeahialam, T.
1975 Non-nutritional aetiological factors of protein-calorie malnutrition (PCM) in Africa. J. Trop. Ped. Environ. Child Health 21 (1B) 20-25.

93. Oomen, H.
1971 Ecology of human nutrition in New Guinea: evaluation of subsistence patterns. Ecol. Food Nutr. 1: 1-16.

94. Orr, J. and J. Gilks
1931 The Physique and Health of Two African Tribes. Medical Research Council Special Report Series No. 155. London: HMSO.

106. Reutlinger, S. and M. Selousky
1976 Malnutrition and Poverty: Magnitude and Policy Options. World Bank Occasional Papers No. 23. Baltimore: Johns Hopkins Univ. Press.

107. Richards, A. and E. Widdowson
1936 A dietary study in northeastern Rhodesia. Africa.

108. Robson, J. et al.
1962 The district team approach to malnutrition, Maposeni nutrition scheme. Afr. Child Health Dec.: 60-75.

109. Robson, J. and G. Wadsworth
1977 The health and nutritional status of primitive populations. Ecol. Food Nutr. 6: 187-202.

110. Rutishauser, I.
1963 Custom and child health in Buganda. Trop. Geogr. Med. 15: 138-147.

111. Sai, F.
1969 The problems of food and nutrition of West Africa. World Rev. Nutr. Diet. 10: 77-99.

112. Scudder, T.
1971 Gathering Among African Woodland Savannah Cultivators. Univ. of Zambia Inst. of African Studies: Zambian Papers No. 5.

113. Shack, W.
1971 Hunger, anxiety and ritual: deprivation and spirit possession among the Gurage of Ethiopia. Man 6: 30-43.

114. Shanley, B. and O. Lewis
1969 The protein nutritional value of wild plants used as dietary supplements in Natal (South Africa). Plant Foods Hum. Nutr. 1: 253.

115. Sharman, A.
1970 Nutrition and social planning. J. Dev. Stud. 6: 77

116. Simmonds, N.
1966 Bananas. London: Longmans.

117. Stavenhagen, R.
1978 Capitalism and the peasantry in Mexico. Latin Am. Persp. 5: 27-37.

118. Taussig, M.
1978 Peasant economics and the development of capitalist agriculture in the Cauca Valley, Colombia. Latin Am. Persp. 5: 62-90.

119. Teitelbaum, J.
1977 Human vs animal nutrition: a "development" project among Fulani cattlekeepers of the Sahel of Senegal. In T. Fitzgerald, ed., Nutrition and Anthropology in Action, pp. 125-140. Assen: Van Gorcum.

120. United Nations Food and Agriculture Organization
1978 Guidelines for the introduction of nutritional considerations into development projects. Food Policy and Nutrition Division. Rome, November 1978 (mimeo).

121. United Nations Food and Agriculture Organization
1979 Nutrition in Agriculture. (Agenda Item 6, fifth session of the Committee on Agriculture, Rome, 18-27 April 1979 (mimeo).

122. USAID
1978 A Strategy for a more Effective Bilateral Development Assistance Program.

123. USAID, Office of Nutrition
1977 AID's Responsibilities in Nutrition. AIDTO Circular A-198, April 25.

124. Valverde, V. et al.
1977 Relationship between family land availability and nutritional status. Ecol. Food Nutr. 6: 1-7.

125. Vermeer, D.
1969 Geophagy among the Tiv of Nigeria. Ann. Assn. Am. Geogr. 56: 197-204.

126. Vermeer, D.
1971 Geophagy among the Ewe of Ghana. Ethnology 10: 56-72.

127. Wharton, C.
1972 Risk, uncertainty and the subsistence farmer. In G. Dalton, ed., Economic Development and Social Change, pp. 566-574. New York: Natural History Press.

128. Williams, A.
1973 Dietary practices in three Mexican villages. In C. Smith Jr., ed., Man and His Foods. pp. 51-74. University: University of Alabama Press.

129. Wilmsen, E.
1978 Seasonal effects of dietary intake on Kalahari San. Fed. Proc. 37: 65-72.

130. Wilson, C.
1973 Food habits: a selected annotated bibliography. J. Nutr. Educ. 5: Supple. 1: 39-72.

131. Wilson, C.
1977 Research methods in nutritional anthropology. In T. Fitzgerald, ed., Nutrition and Anthropology in Action. Assen: Van Gorcum.

132. Wilson, C.
1978 Contributions of nutrition science to anthropological research. Fed. Proc. 37(1): 73-75.

133. Woolfe, J. et al.
1977 The value of the Ghanaian traditional diet in relation to the energy needs of young children. Ecol. Food Nutr. 6: 175-181.

134. World Bank
1978 Nutrition and Basic Needs. Mimeo.

HANDOUT: Activity 5

"A Syllabus of Errors in Collecting Dietary Data"

by Johanna Dwyer

The 24 Hour Recall: Its Pros and Cons

Pros - The great advantage of the 24 hour recall accompanied by suitable probes, food models, and a careful protocol is that it is relatively well accepted by most subjects or patients. That is, respondent burden is low; the burden is on the interviewer to help the person to remember. Because respondent burden is relatively low time and effort wise (about 30-40 minutes at maximum) most people will agree to submit to the procedure and it is relatively easy to get a representative sample if in fact one has taken the trouble to draw a probability sample of the population. Because it is possible to meet the requirements for probability sampling the predictive validity of the sample to the total population tends to be quite high. Costs are also quite low, particularly if one can use an interactive computer terminal which "interviews" the subject. Of course, there are some subjects who cannot read or write or who are for some other reason leary of computers. Then the nutritionist or some other highly trained interviewer needs to take the recall, code it, and analyze results, which may be more costly in the end then the more highly mechanized procedure. Another advantage of the 24 hour recall method is that since it is a retrospective method it is somewhat less likely to promote bias introduced by subjects changing their food consumption because they know they are being studied. However, they may still change their responses when being interviewed.

Cons - The difficulty with 24 hour recalls stems from the fact that they often do not represent usual food intakes of individuals. If large groups of subjects are studied and only means are used it is usually assumed that the "highs" reported on one day by one individual will be cancelled out by the "low" day someone else may have reported, and that group averages are in fact reliable. That is, while individuals' intakes would vary, if the group survey were done on a different day, results would be similar. Thus for large groups the 24 hours recall may in fact be sufficiently reliable to be useful.

On the other hand, even very large groups do not allow one to get around the other problem plaguing 24 hour recall data. This is the very real problem of whether the person can really remember the kinds and amounts of all the foods he has eaten over 24 hours. In general, this technique tends to underestimate intakes. The most usual reason for this is that sufficient probing is not done to jar the subject's memory. This is a particular problem in dealing with children or the very elderly, who may have poor memories. Mothers estimates of what their children eat often include only what they themselves feed them, and careful probing is necessary to get at snacks and food eaten outside the home. The forgetting of liquids, including alcohol, and underestimates of portion size are also probably contributors to the underestimates of a 24 hour recall.

On the other hand, in some instances the dyadic relationship and conver

... so. Even skilled interviewers have trouble concealing signs of approval or disapproval, and applied nutritionists whose usual role is to praise patients whenever compliance is good have even a more difficult time. Even when the interviewer is totally objective, it is hard to imagine that patients who have gotten certain foods or supplements from a clinic for many months are not aware of the fact that the "food study" is likely to have something to do with the foods and advice they have received. Thus positive responses are likely.

When questions are framed in such a way that it is easier to say yes than no,overestimates will also probably occur.

Conclusion

Twenty-four hour recalls of dietary intake collected on individuals rarely reflect their usual food or nutrient intake patterns in any but the grossest manner. For example, if it is a "usual" day, it may be possible to ascertain that the patient eats a fairly high amount of animal foods and thus probably a fairly high amount of animal protein. Statements of this type are probably safe to make. A statement that the patient ate 82.8 grams of animal protein, on the other hand, would be risky because it implies that the patient usually eats this amount. Caloric intakes are even more subject to error than are protein intakes for reasons which are dealt with at great length elsewhere in this paper. In brief, calorie intakes fluctuate widely from day to day and the food components (such as fats, sweets, alcohol etc) are the very ones which are the most difficult for patients to recall accurately. Since only a few calories (e.g. 30 or so) in excess or deficit can at least theoretically place an infant or young child in a dynamic state of weight gain or loss, it is very difficult to pick up such small differences on dietary recall over such a short period of time. The proof of the problem is in the growth chart and skinfolds. The reason for collecting the dietary data clinically is not to ascertain precisely the caloric intake to check it against some standard for the individual but to find out how it will be easiest to instruct the mother (in the case of an infant or child) or the person himself to increase or decrease his caloric intake, whatever it may be, to bring it more in line with energy output, which is also unknown. While the recall may be sufficient to do this, it is insufficiently precise or varefully checked in most cases to provide research quality data on calories.

Twenty-four hour recalls on individuals should similarly be interpreted very cautiously with respect to vitamin and mineral intakes. In view of the enormous variability of foods from one sample to the next in vitamin and mineral content the best and safest statement again one can make is probably that the diet appears to be low, adequate, or high with respect to a particular vitamin such as vitamin A or C, or a nutrient such as iron. But to state that the diet provided 72.2 mg. of ascorbic acid again exceeds the data.

Is it possible, then, to get to nutrient statements if instead of having a single record one has a thousand clinic records? Probably not,unless the original 24 hours recalls were collected with a research purpose in mind and very clear protocols and probes were established in advance.

Assuming that such protocols are established, it makes more sense, at least to this observer, to draw a random or representative sample of patients and to carry out careful 24 hour recalls on them using nutritionists who are especially trained and who are likely to take the care necessary to probe in depth. Thus one may end up with 100 carefully collected records which are

worth subjecting to nutrient analysis. The results obtained will provide useful information on the total population. However, if such a study is contemplated the assistance of a research nutritionist and statistician should be enlisted in the planning stages to save needless work and useless types of data analysis. It is often discovered in discussing such research with specialists that the questions which need to be answered do not require this type of data at all, and a few simple items added to usual clinic protocols may come much closer to the mark. For example, take a nutritionist who wants to find out the average age at which whole milk is introduced to infants in the population she sees. The sample question "When did you first start feeding Johnny whole milk?" would be far easier to collect on 1000 women than analysis of 100 charts for 24 hour recalls of what the mother fed the baby.

BIBLIOGRAPHY ON FOOD SURVEY METHODS

RE: ASSESSMENT OF METHODOLOGY FOR DIETARY STUDY METHODS

Beal, N.A. — A Critical View of Dietary Study Methods (Parts I and II), Food and Nutrition News - National Livestock and Meat Board, 40 (No.3 and 4), 1968-1969.

Hankin, J.H., Huenemann, R. — A Short Dietary Method for Epidemiological Studies, J.Am. Diet.A., 50: 487-492, 1967.

Huenemann, R.L., Turner, D. — Methods of Investigation, J.Am. Diet. Assoc., 18: 562-568, 1942.

Marr, J.W., — Individual Dietary Surveys: Purposes and Methods, World Rev.of Nutr. and Diet., 13: 105-164, 1971.

Pekkarinen, M., — Methodology in the Collection of Food Consumption Data, World Rev. of Nutr. and Diet., 12: ;45-171, 1970.

Trulson, M.F., — Assessment of Dietary Study Methods. I. Comparison of Methods for Obtaining Data for Clinical Work, J. Am. Diet. A., 30: 991-995, 1954.

Trulson, M.F., — Assessment of Dietary Study Methods. II. Variabili of Eating Practices and Determination of Sample Size and Duration of Dietary Surveys, J.Am.Diet.A., 31: 797-802, 1955.

Young, C.M., Hogan, G.C., Tucker, R.E., Foster, W.D. — A Comparison of Dietary Study Methods. II.Dietary History vs. Seven-Day Record vs. 24-Hour Recall, J.Am.Diet.A., 28: 218-221, 1952.

Young, C.M., Trulson, M.F., — Methodology for Dietary Studies in Epidemiological Surveys, II. Strengths and Weaknesses of Existing Methods, A.J.P.H., 50: 803-814, 1960.

RE: NUTRITIONAL HISTORY

Beal, W.A., The Nutritional History in Longitudinal Research, J.Am.Diet.A., 51: 426-432, 1967.

Burke, B.S., A Dietary History as a Tool in Research, J.Am.Diet.A., 23: 1041-1047, 1947.

Moore, M.C., Judlen, B.C., Kennemur, P.McA., Using Graduated Food Models in Taking Dietary Historie J.Am.Diet.A., 51: 447-450, 1967.

RE: 24-HOUR RECALL

Balough, M., Kahn, H.A., Medalie, J.H. — Random Repeat 24-Hour Dietary Recalls, Am.J.Clin. Nutr 24: 304-310, 1971.

Beaton, G.H., Milner, J., Corey, P., et al, — Sources of Variance in 24-Hour Dietary Recall Data: Implications for Nutrition Study Design and Interpretation, Am.J. Clin. Nutr., 32: 2546-2559, 1979.

Gersonitz, M., Madden, J.P., Wright, H.S., — Validity of the 24-Hour Dietary Recall and Seven-Day Record for Group Comparisons, J.Am.Diet.A., 73: 48-55, 1978.

Madden, J.P., Goodman, S.J., Guthrie, H.A., — Validity of 24-Hour Recall, J.Am.Diet.A., 68: 143-147, 1976.

RE: INTERVIEWING

46

Burk, M., Pao, E., Methodology for Large Scale Surveys of Household and Individual Diets, Home Economics Research Report #40, Agricultural Research Service, U.S.D.A., 1976, Stock #001-000-03620-3, U.S. GPO, Washington, D.C.

Matthews, L.I., Principles of Interviewing and Patient Counseling, J.Am.Diet.A., 50: 469-474, 1967.

Young, C.M., The Interview Itself, J.Am.Diet.A., 35: 677-681, 1959.

HANDOUT No. 5

SAMPLE USDA FOOD COMPOSITION TABLES

48

NUTRITION, CONSUMPTION, AND AGRICULTURAL CHANGE

A Review of Community-Level Trends and Policy Implications

Patrick Fleuret
PPC/PDPR/HR
July 20, 1979

Background Paper

TABLE 1.—COMPOSITION OF FOODS, 100 GRAMS, EDIBLE PORTION—Continued

[Numbers in parentheses denote values imputed—usually from another form of the food or from a similar food. Zero in parentheses indicates that the amount of a constituent probably is none or is too small to measure. Dashes denote lack of reliable data for a constituent believed to be present in measurable amount. Calculated values, as those based on a recipe, are not in parentheses]

Item No. (A)	Food and description (B)	Water (C)	Food energy (D)	Protein (E)	Fat (F)	Carbohydrate: Total (G)	Carbohydrate: Fiber (H)	Ash (I)	Calcium (J)	Phosphorus (K)	Iron (L)	Sodium (M)	Potassium (N)	Vitamin A value (O)	Thiamine (P)	Riboflavin (Q)	Niacin (R)	Ascorbic acid (S)
		Percent	Calories	Grams	Grams	Grams	Grams	Grams	Milligrams	Milligrams	Milligrams	Milligrams	Milligrams	International units	Milligrams	Milligrams	Milligrams	Milligrams
	Cornbread mix and cornbread baked from mix:																	
841	Mix, dry form	5.7	422	7.0	12.0	71.0	0.3	3.0	28	474	[illegible] 2.5	1,156	81	[illegible] 320	[illegible] 0.23	[illegible] 0.21	[illegible] 2.6	0
842	Cornbread, made with egg, milk	48.8	233	6.1	8.4	33.9	.3	1.8	85	248	[illegible] 1.3	744	127	[illegible] 270	[illegible] .18	[illegible] .20	[illegible] 1.2	Trace
	Cornmeal, white or yellow:																	
843	Whole-ground, unbolted	12.	355	8.3	3.9	73.7	1.8	1.3	20	256	2.4	(1)	(284)	[illegible] 510	.28	.11	2.0	(0)
844	Bolted (nearly whole-grain)	12.	362	8.0	2.4	76.5	1.0	1.1	(17)	(223)	1.0	(1)	(248)	[illegible] 480	.30	.08	1.9	(0)
	Degermed, enriched:																	
845	Dry form	12.	364	7.0	1.2	78.4	.0	.5	0	90	[illegible] 2.0	1	120	[illegible] 440	[illegible] .44	[illegible] .28	[illegible] 3.5	(0)
846	Cooked	87.7	80	1.1	.2	16.7	.1	.2	1	16	[illegible] .4	110	16	[illegible] 60	[illegible] .06	[illegible] .04	[illegible] .5	(0)
	Degermed, unenriched:																	
847	Dry form	12.	364	7.0	1.2	78.4	.0	.5	0	90	1.1	1	120	[illegible] 440	.14	.05	1.0	(0)
848	Cooked	87.7	80	1.1	.2	16.7	.1	.2	1	16	.2	110	16	[illegible] 60	.02	.01	.1	(0)
	Self-rising:																	
	Whole-ground:																	
849	With soft wheat flour added	11.3	347	8.0	3.0	71.0	.9	5.3	[illegible] 301	624	[illegible] 1.6	1,380	[illegible] 212	[illegible] 380	[illegible] .25	[illegible] .07	[illegible] 1.7	(0)
850	Without wheat flour added	11.3	347	8.5	3.3	71.6	.9	5.4	[illegible] 300	641	[illegible] 1.7	1,380	[illegible] 234	[illegible] 450	[illegible] .28	[illegible] .08	[illegible] 1.6	(0)
	Degermed:																	
851	With soft wheat flour added	11.3	340	7.7	1.1	75.1	.5	4.0	[illegible] 282	424	[illegible] 1.0	1,380	[illegible] 100	[illegible] 350	[illegible] .13	[illegible] .05	[illegible] 1.0	(0)
852	Without wheat flour added	11.3	340	7.5	1.1	75.5	.6	4.0	[illegible] 280	424	[illegible] 1.0	1,380	[illegible] 113	[illegible] 420	[illegible] .13	[illegible] .05	[illegible] .9	(0)
853	Cornsilk, raw	63.8	27	1.0	.4	3.6	.0	1.2	—	—	—	—	—	—	—	—	—	—
854	Cornstarch	12.	363	.3	Trace	87.6	.1	.1	(0)	(0)	(0)	Trace	Trace	(0)	(0)	(0)	(0)	(0)
	Cottage pudding. See Cakes, items 638-639.																	
855	Cottonseed flour	6.1	366	48.1	6.6	33.0	2.0	6.2	283	1,112	12.6	—	—	60	1.21	.84	6.5	—
	Cottonseed oil. See Oils, item 1461.																	
	Cowpeas, including blackeye peas:																	
	Immature seeds:																	
856	Raw	64.8	127	8.0	.8	21.0	1.8	1.6	27	172	2.3	2	541	370	.42	.13	1.6	29
857	Cooked, boiled, drained	71.8	100	8.1	.6	16.1	1.0	1.3	24	146	2.1	1	370	350	.30	.11	1.4	17
858	Canned, solids and liquid	81.0	70	5.6	.8	12.4	.7	1.3	16	112	1.5	[illegible] 23	312	60	.06	.05	.5	3
	Frozen (blackeye peas only):																	
859	Not thawed	65.0	131	9.0	.4	23.0	1.5	1.3	28	170	3.1	[illegible] 54	387	170	.45	.12	1.4	13
860	Cooked, boiled, drained	68.1	116	8.0	.4	20.5	1.5	1.1	25	145	2.8	29	337	170	.40	.11	1.4	9
	Young pods, with seeds:																	
861	Raw	86.0	44	3.3	.3	9.5	1.7	.9	66	65	1.0	4	215	1,600	.15	.14	1.2	33
862	Cooked, boiled, drained	89.5	34	2.6	.3	7.6	1.7	.6	55	48	.7	3	196	1,400	.09	.09	.8	17
	Mature seeds, dry:																	
863	Raw	10.5	343	23.9	1.6	61.7	4.4	3.5	74	426	8.8	35	1,624	30	1.05	.21	2.2	—
864	Cooked	68.8	78	5.1	.3	13.5	1.0	.8	17	96	1.5	(1)	230	10	.16	.04	.4	—
	Crab, including blue, Dungeness, rock and king:																	
865	Cooked, steamed	78.5	93	17.3	1.0	.0	—	1.8	43	175	.8	—	—	3,170	.16	.08	2.8	2
866	Crab, canned	77.3	102	17.4	2.5	1.1	—	1.8	45	152	.8	1,600	110	—	.08	.09	1.8	—
867	Crab, deviled [illegible]	63.3	186	11.4	8.4	14.3	—	2.6	47	127	1.9	867	166	—	.06	.11	1.5	6
868	Crab imperial [illegible]	71.0	147	14.6	7.6	3.0	—	2.8	66	164	.8	725	131	—	.06	.13	1.1	5
869	Crabapples, raw	81.1	66	.4	.8	17.5	.6	.4	(0)	15	(.3)	(1)	(110)	(40)	(.03)	(.03)	(.1)	8
	Crackers:																	
870	Animal	3.0	420	6.6	9.4	79.0	.1	1.1	52	114	.5	803	96	130	.04	.10	.3	Trace
871	Butter	4.0	455	7.0	17.0	67.3	.3	1.0	148	246	.8	1,083	113	220	.01	.04	1.0	(0)
872	Cheese	2.0	479	11.5	31.5	50.4	.3	3.3	336	300	.9	1,039	100	300	.01	.10	.8	(0)
	Graham:																	
873	Chocolate coated	1.0	476	5.1	23.8	67.0	.0	1.6	112	204	2.6	407	320	60	.07	.20	1.2	(0)
874	Plain	4.0	384	8.0	9.4	73.8	1.1	2.0	46	149	1.5	575	324	(0)	.04	.21	1.5	(0)
875	Sugar honey coated	2.3	411	5.7	11.4	76.4	.6	2.3	88	329	1.6	504	270	—	.03	.03	1.6	(0)
876	Jubilee	4.3	415	6.0	15.0	71.8	.4	2.3	21	98	1.2	(1,100)	(120)	(0)	.01	.04	1.0	(0)
877	Sandwich type, peanut-cheese	2.4	461	15.3	22.0	54.1	.5	3.4	56	179	.6	982	226	40	.03	.07	2.5	(0)
878	Soda	4.0	430	9.2	12.1	70.6	.3	3.1	22	80	1.5	1,100	120	(0)	.01	.05	1.0	(0)
879	Whole-wheat	6.0	400	8.4	15.6	62.3	2.6	2.7	22	190	.3	547	—	(0)	.04	.04	.9	(0)
	Cracker meal. See Crackers, soda: item 878.																	
	Cranberries:																	
920	Raw	87.0	46	.4	.7	10.9	1.4	.3	16	10	.5	2	83	40	.03	.02	.1	11
921	Dehydrated, unsweetened	4.0	340	2.0	6.0	84.3	5.7	1.6	52	32	2.4	18	644	300	.17	.13	.8	33
922	Cranberry juice cocktail, bottled (approx. 33% cranberry juice).	82.3	68	.1	.1	16.8	Trace	.1	5	3	.3	1	18	Trace	.01	.01	Trace	(**)
	Cranberry sauce, sweetened:																	
923	Canned, strained	62.1	168	.1	.2	37.5	.2	.1	6	4	.2	1	30	30	.01	.01	Trace	2

TABLE 1.—COMPOSITION OF FOODS, 100 GRAMS, EDIBLE PORTION—Continued

[Numbers in parentheses denote values imputed—usually from another form of the food or from a similar food. Zero in parentheses indicates that the amount of a constituent probably is none or is too small to measure. Dashes denote lack of reliable data for a constituent believed to be present in measurable amount. Calculated values, as those based on a recipe, are not in parentheses]

Item No.	Food and description	Water	Food energy	Protein	Fat	Carbohydrate: Total	Carbohydrate: Fiber	Ash	Calcium	Phosphorus	Iron	Sodium	Potassium	Vitamin A value	Thiamine	Riboflavin	Niacin	Ascorbic acid
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)	(S)
	Beef [1]—Continued	Percent	Calories	Grams	Grams	Grams	Grams	Grams	Milligrams	Milligrams	Milligrams	Milligrams	Milligrams	International units	Milligrams	Milligrams	Milligrams	Milligrams
	Retail cuts, trimmed to retail level—Continued																	
	Flank steak:																	
	Choice grade:																	
	Total edible:																	
243	Raw (100% lean)	71.7	144	21.6	6.7	0	0	1.0	13	201	3.2			10	0.09	0.19	5.2	—
244	Cooked, braised (100% lean)	61.4	196	30.5	7.5	0	0	.8	14	150	3.8			10	.08	.23	4.6	—
	Good grade:																	
	Total edible:																	
245	Raw (100% lean)	72.1	139	21.0	6.1	0	0	1.0	13	203	3.3			10	.09	.19	5.2	—
246	Cooked, braised (100% lean)	61.0	191	30.3	6.6	0	0	.8	14	151	3.9			10	.08	.23	4.7	—
	Sirloin:																	
	Choice grade:																	
	Total edible:																	
247	Raw (57% lean, 33% fat)	57.6	300	18.3	23.4	0	0	.8	11	168	2.8			50	.08	.16	4.4	—
248	Cooked, simmered (60% lean, 34% fat)	48.1	361	25.1	26.1	0	0	.7	11	125	2.2			50	.06	.19	3.9	—
	Separable lean:																	
249	Raw	72.7	134	21.7	4.6	0	0	1.0	13	203	3.3			10	.09	.19	5.2	—
250	Cooked, simmered	63.5	184	30.7	5.9	0	0	.8	14	151	3.9			10	.08	.23	4.7	—
	Separable fat:																	
251	Raw	27.0	662	11.1	61.5	0	0	.4	6	100	1.7			120	.05	.10	2.7	—
	Good grade:																	
	Total edible:																	
252	Raw (71% lean, 29% fat)	63.3	230	18.7	17.3	0	0	.8	12	182	3.0			30	.08	.17	4.7	—
253	Cooked, simmered (70% lean, 30% fat)	51.0	307	27.3	21.1	0	0	.7	12	136	2.6			40	.06	.21	4.2	—
	Separable lean:																	
254	Raw	72.6	136	21.0	5.7	0	0	1.0	13	203	3.3			10	.09	.19	5.2	—
255	Cooked, simmered	63.4	176	31.0	6.8	0	0	.8	14	151	3.9			10	.08	.23	4.7	—
	Separable fat:																	
256	Raw	34.6	617	14.5	58.4	0	0	.5	8	132	2.2			100	.06	.13	3.5	—
	Loin or short loin:																	
	Porterhouse steak:																	
	Choice grade:											(*)	(*)					
	Total edible:																	
257	Raw (53% lean, 37% fat)	48.3	390	14.0	36.2	0	0	.7	8	136	2.2			70	.06	.13	3.6	—
258	Cooked, broiled (57% lean, 43% fat)	37.2	485	18.7	42.2	0	0	.9	9	163	2.6			70	.06	.16	4.2	—
	Separable lean:																	
259	Raw	68.7	184	21.1	8.3	0	0	1.0	13	196	3.2			20	.09	.19	5.1	—
260	Cooked, broiled	57.9	234	30.3	10.8	0	0	1.4	15	242	3.7			20	.08	.23	5.9	—
	Separable fat:																	
261	Raw	11.5	777	4.2	84.1	0	0	.2	2	33	.6			170	.02	.04	1.0	—
	Good grade:																	
	Total edible:																	
262	Raw (54% lean, 36% fat)	50.2	370	15.2	33.0	0	0	.7	8	140	2.3			70	.06	.14	3.7	—
263	Cooked, broiled (58% lean, 42% fat)	38.0	463	20.5	38.7	0	0	1.0	9	172	2.6			70	.06	.17	4.3	—
	Separable lean:																	
264	Raw	72.0	141	21.0	6.0	0	0	1.0	13	200	3.2			10	.09	.19	5.2	—
265	Cooked, broiled	60.3	197	31.1	7.1	0	0	1.4	12	247	3.7			10	.08	.24	6.0	—
	Separable fat:																	
266	Raw	11.6	775	4.3	83.0	0	0	.2	2	34	.6			170	.02	.04	1.0	—
	T-bone steak:																	
	Choice grade:																	
	Total edible:																	
267	Raw (52% lean, 38% fat)	47.5	397	14.7	37.1	0	0	.7	8	135	2.2			70	.06	.13	3.6	—
268	Cooked, broiled (56% lean, 44% fat)	36.4	472	19.5	43.3	0	0	.9	8	166	2.6			80	.06	.16	4.1	—
	Separable lean:																	
269	Raw	68.7	164	21.3	8.1	0	0	1.0	12	197	3.2			20	.09	.19	5.1	—
270	Cooked, broiled	57.9	223	30.4	10.5	0	0	1.4	12	243	3.7			20	.08	.23	5.9	—
	Separable fat:																	
271	Raw	11.7	774	4.3	83.6	0	0	.2	2	34	.6			170	.02	.04	1.0	—
	Good grade:																	
	Total edible:																	
[illegible]	Raw (54% lean, 36% fat)	50.6	366	15.4	33.3	0	0	.7	8	142	2.3			70	.07	.14	3.7	—
								1.0	9	175	2.7			70	.06	.17	4.3	—

TABLE 2.—NUTRIENTS IN THE EDIBLE PORTION OF 1 POUND OF FOOD AS PURCHASED—Continued

[Numbers in parentheses denote values imputed—usually from another form of the food or from a similar food. Zero in parentheses indicates that the amount of a constituent probably is none or is too small to measure. Dashes denote lack of reliable data for a constituent believed to be present in measurable amount. Calculated values, as those based on a recipe, are not in parentheses]

Item No. (A)	Food and description (B)	Refuse (C)	Food energy (D)	Protein (E)	Fat (F)	Carbohydrate total (G)	Calcium (H)	Phosphorus (I)	Iron (J)	Sodium (K)	Potassium (L)	Vitamin A value (M)	Thiamine (N)	Riboflavin (O)	Niacin (P)	Ascorbic Acid (Q)
		Percent	Calories	Grams	Grams	Grams	Milligrams	Milligrams	Milligrams	Milligrams	Milligrams	International units	Milligrams	Milligrams	Milligrams	Milligrams
	Reindeer, raw, with bone:															
1856	Skin, 64% lean, 12% fat	30	787	74.4	52.3	0	—	—	—	—	—	—	—	—	—	—
1857	Forequarter, 67% lean, 7% fat	30	887	72.3	31.6	0	—	—	—	—	—	—	—	—	—	—
1858	Hindquarter, 67% lean, 10% fat	16	890	78.7	71.0	0	—	—	—	—	—	—	—	—	—	—
	Remain products:															
1859	Tablet (salts, starch, rennin enzyme)	0	485	.5	4.5	116.3	16,921	907	—	101,153	—	0	0	0	0	0
	Dessert mixes:															
1861	Chocolate	0	1,755	12.7	15.0	415.0	753	565	—	318	—	—	—	—	—	—
1863	Other flavors (vanilla, caramel, fruit flavorings)	0	1,737	Trace	Trace	428.1	[illegible] 531	[illegible] 615	—	27	—	—	—	—	—	—
	Rhubarb:															
1865	Raw:															
a	With full tops (freshly harvested), (refuse: ends, full leaves).	55	33	1.2	.2	7.6	196	37	1.6	4	612	300	(.06)	(.14)	(.6)	18
b	With partly trimmed tops (refuse: trimmed leaves, ends, trimmings).	25	64	2.0	.3	12.6	327	61	2.7	7	854	340	(.10)	(.23)	(1.1)	30
c	Without leaves (refuse: ends, trimmings)	14	62	2.2	.4	14.4	374	70	3.1	8	979	390	(.12)	(.26)	(1.2)	34
1867	Frozen, sweetened	0	360	2.7	.0	88.0	422	84	3.6	18	947	290	.08	.22	1.6	34
	Rice:															
1869	Brown, raw	0	1,633	34.0	8.6	351.1	145	1,602	7.3	41	971	(0)	1.52	.24	21.4	(0)
	White (fully milled or polished):															
	Enriched:															
1871	Common commercial varieties, all types, raw	0	1,647	30.4	1.6	364.7	160	426	[illegible] 13.0	23	417	(0)	[illegible] 2.0	([illegible])	[illegible] 16.0	(0)
	Long-grain (dry form):															
1872	Parboiled	0	1,674	33.6	1.4	368.0	372	667	[illegible] 13.0	41	650	(0)	[illegible] 2.0	([illegible])	[illegible] 16.0	(0)
1873	Precooked (instant)	0	1,664	34.0	.0	374.3	33	266	[illegible] 13.0	5	—	(0)	[illegible] 2.0	([illegible])	[illegible] 16.0	(0)
	Unenriched, raw:															
1877	Common commercial varieties, all types	0	1,647	30.4	1.0	364.7	160	426	2.6	23	417	(0)	.22	.13	7.2	(0)
1878	Glutinous (Mochi Gomi)	0	1,637	35.4	4.1	362.0	163	454	0.1	48	560	(0)	.23	.20	6.3	(0)
1880	Rice bran	0	1,383	69.3	71.7	226.4	345	6,307	66.0	Trace	6,781	(0)	10.25	1.14	135.4	(0)
1881	Rice polish	0	1,302	54.0	55.1	261.7	319	5,017	72.0	Trace	2,230	(0)	8.55	.82	127.8	(0)
	Rice products used mainly as hot breakfast cereals:															
1883	Rice, granulated, added nutrients	0	1,737	27.2	1.4	380.6	41	435	24.5	—	—	(0)	1.02	.48	26.4	(0)
	Rice products used mainly as ready-to-eat breakfast cereals:															
1884	Rice flakes, added nutrients	0	1,760	30.0	1.4	387.0	122	500	7.3	4,477	816	(0)	1.50	.22	24.4	(0)
1885	Rice, puffed, added nutrients, without salt	0	1,810	27.3	1.0	404.0	91	417	6.2	6	454	(0)	2.00	.18	28.0	(0)
	Rice, puffed or oven-popped, prepreakfast:															
1886	Honey and added nutrients	0	1,760	18.1	3.3	411.0	200	326	4.1	3,202	—	(0)	1.60	—	20.0	(0)
1887	Honey or cocoa and added nutrients including fat	0	1,819	20.4	10.1	383.3	221	272	15.0	1,624	277	(0)	1.08	.20	22.4	(0)
1888	Rice, shredded, added nutrients	0	1,778	22.0	1.4	402.0	64	431	6.2	3,857	—	(0)	1.76	—	22.0	(0)
	Rice with protein concentrate, mainly—															
1889	Casein, other added nutrients	0	1,733	181.4	.0	348.0	721	1,442	79.0	2,722	—	(0)	7.71	9.53	79.0	240
1890	Wheat gluten, other added nutrients	0	1,781	90.7	1.4	327.8	360	848	54.2	2,629	—	(0)	6.35	7.71	77.1	159
1892	Rockfish, including black, canary, yellowtail, rosy-head, and bocaccio; fish only, raw.	0	400	85.7	5.2	0	—	—	—	272	1,760	—	.28	.54	—	—
	Roe:															
	Raw:															
1894	Including carp, cod, haddock, herring, pike, and shad	0	500	110.7	10.4	6.0	—	—	2.7	—	—	—	.45	3.45	6.3	64
1895	Including salmon, sturgeon, and turbot	0	620	114.3	47.3	6.4	—	—	—	—	—	—	1.71	3.28	10.4	82
1897	Canned, including cod, haddock, and herring, solids and liquid	0	535	87.6	15.7	1.6	68	1,500	6.4	—	—	—	—	—	—	10
	Rolls and buns:[9]															
	Ready-to-serve:															
1898	Danish pastry	0	1,914	33.6	100.0	204.0	227	494	4.1	1,660	506	1,610	.30	.67	3.4	Trace
	Hard rolls:															
1899	Enriched	0	1,415	44.5	14.6	268.0	213	417	10.4	2,835	440	Trace	1.17	1.06	12.2	Trace
1900	Unenriched	0	1,415	44.5	14.6	268.0	213	417	2.6	2,835	440	Trace	.23	.29	3.0	Trace
	Plain (pan rolls):															
1902	Enriched	0	1,263	37.3	25.4	240.4	324	396	6.0	2,296	431	Trace	1.26	.52	10.1	Trace
1903	Unenriched	0	1,263	37.3	25.4	240.4	324	396	6.2	2,296	431	Trace	.26	.61	2.4	Trace
1904	Raisin rolls or buns	0	1,247	31.5	12.3	255.0	240	413	6.3	1,742	1,111	Trace	.26	.44	2.1	Trace
1905	Sweet rolls	0	1,433	38.6	41.3	223.0	206	455	3.6	1,[illegible]45	542	320	.31	.67	3.0	Trace
		0	1,166	45.4	12.7	237.2	481	1,275	10.9	2,558	1,325	Trace	1.84	.60	12.4	Trace

HANDOUT: ACTIVITY 5

EXAMPLES OF DIETARY INTAKE FORMS

Name Catherine O. Age 11 years Date 5-19-63 Interval 3 mos.

Usual meal times 7:30 11:30 5:30 (Sunday 2 meals)

Between meals a.m.-0 p.m.- milk - cookies or banana b.b.- milk or fruit

Appetite Good consistently Tries to eat even foods she does not like.

Likes meat - fruit - cookies Dislikes rice - liverwurst - cottage cheese - butter

No special attention at meals Packs lunch to school

Milk Whole Vitamin D Brk. 4 oz. 1x mo. 4 oz. on dry cereal only Lunch 8 oz. 7 x wk.

Dinner 7 oz. 7 x wk. Mid-p.m. 6 oz. 5 x wk. b.b. 6 oz. 3 x wk.

Cream None of any kind Pizza — —

Cheese Cheddar 9 oz. total Cottage 1/4 c. total Cream 1/4 c. total

Meat Dinner 3 oz. 6 x wk. Lunch 2 oz. 3 x wk. Chic. thigh + leg 1 x wk. P-H 4 oz. 8 x total

Liver (incl. chic.) 6 oz. total Hamb. 1/4-1/5 lb 1-2 x wk. Turkey 3 oz. 2 x only

Fish Tuna 1 1/2 c. total 8" Trout 4 x total 1/4 c. perch or sole 4 x total

Prepared meat Frk. 3/mo. L.M. 4 sl./mo. S. 7-8 oz. total Canned — —

Eggs 3 whole / wk. 6 extra at Easter Fr. toast 4 sl. total with 2 eggs

Fruit
- Citrus 4 oz. O.J. 2 x wk. 4 oz. P.J. 2 x mo. 4 oz. T.J. 1 x only 1/4 Cant. 1 x only
- Orange 2/wk. past 6 wks. - prev. 1/wk. 4 oz. Apricot nectar 3 x total
- Dried R. 1/2 c. total 4 Prunes total Olives 10 total Fr. cock. 1/2 c. 2 x wk.
- Other Apple 2/wk. Banana 2/wk. Strawb. 1 c. total Peach 1/2 c. 2 x wk. Pear 1 c. only

Vegetables
- Legumes 1 c. S. B. 1 x in 2 wks. Chili 1 1/2 c./mo.
- Potato 2 med./mo. Sweet 4 sm. total Chips 4 c. total Fritos 1 c. only
- Cooked 1/2 c. 5 x wk. Peas 2 x wk. Gr. B. 1 x wk. Corn 6 x total Asp. 2 x only
- Raw Tom. 1/2 /wk. Let. 2 med. l./wk. Cab. 1 c. total Avo. 1/4 total Cel. 6 st. total
- Leafy-yellow Sp. 4 L.T. 2 x mo. Car. 1 med. raw/wk. + with peas 1/2 c. 2 x mo. No other

Cereal 1/2 c. 6 x wk. Cheerios or Corn Fl. past 2 wks. Prev. Maltomeal

Bread 1/2 dark Brk. 1 sl. 2-3 x wk. Noon 1 sl. 5 x wk. Dinner 1 roll /wk. Betw. 3 sl./mo.

Mac., spag., rice, noodles 1 c. / wk. Brownies 6 total 2" x 2"

Crackers Gr. 4/wk. Soda 2/wk. Oyster 1 c/mo. Cookies 10/wk. past 3 wks. - Prev. 3/wk.

Butter or margarine 1 T. Butter / wk. Bacon 2 sl./wk.

Mayon. 1 T./wk. Oil Dress. 1 T./wk. Gravy 1/4 c. total Catsup 1 T./wk.

Popcorn 2-3 c. total Nuts — — Peanut butter 4 L.T./wk. — gradual increase

Pudding — — Custard — — Jello 1/2 c. 3 x wk — gradual increase

Pie 1/6 of 8" Fruit 2 x + Cream 3 x total Cake 4 med. pc. total - sheet - 1/2 frosted

Ice cream 1/2 c. 8 x total Sherbet 1 c. total Doughnuts 4 total Sweet rolls — —

Candy 5-cent bar 1 x only 6 c. sugar candy total Gum 1/2 st. 5-7 x wk.

Sugar 1 1/2 tsp. on cereal 4 T. total on fruit Jam or jelly 2 L.T. / wk.

Waffle 4" x 4" 4 sq./mo. Pancake 4" diam. 3/wk Syrup 4 T. 5 x mo. Honey 3 T. total

Soup 1 c. Veg.- beef 4 x total Tea or coffee Iced tea 20 oz. total

Cocoa 2 level tsp. Quik 8 x wk. Chocolate syrup — —

Popsicle 6 total Soft drinks 6 oz. 1 x wk. av. Koolaid — —

Supplements Unicap 3-4/wk. except none 1 week

FIG. 1. *Form used for recording the nutritional history.*

NUTRITION HISTORY - CHILD RESEARCH COUNCIL

Name _____ Age _____ Date _____ Interval _____ Months

Usual meal times

Between meals

Appetite

Likes Dislikes

Milk

Cream

Cheese Cheddar Cottage Cream

Meat, poultry P-H

Liver (incl. chicken)

Fish

Prepared meat

Eggs

Fruit: Citrus; Dried; Other

Vegetables: Legumes; Potato Sweet Chili Chips; Cooked; Raw; Leafy; yellow

Cereal

Bread

Mac., spag., rice, noodles

Crackers Cookies

Butter or margarine

Bacon Mayonnaise Oil dressing Gravy

Popcorn Nuts Peanut butter

Pudding Custard Jello

Pie Cake

Ice cream Doughnuts Sweet Rolls

Candy

Sugar Jam or jelly

Waffles, pancakes Syrup Molasses Honey

Soup Tea or coffee

Cocoa Chocolate syrup

Popsicles Soft drinks Koolaid

Concentrates

et Ch _____ ID# _____ Form# _____

Day _____ Date _____

Day

What did _____ have to eat or drink yesterday starting from the time he/she woke and got up in the morning?

Record amounts in informant's measuring standard

ime	
Betw. meal-time	
ime	
Betw. meal-time	
ime	

What foods does he/she · r to eat or like?

What foods does he/she refuse to eat?

In your opinion does he eat - too much__

just right amt__

Too little__

Has there been a change in his appetite these past 2 months? Yes__ No__

Is this day typical - is it more or less than usual? typical__

more __

55

Name of pondent AGE

Interviewer

Name of Interviewer Dat

Milk	D.S.M.	
	Whole-Vit D	
	EVAP	
	FR. Stim	
	Ice Cream	
	Yoghurt	
Cheese	Cheddar	
	Cottage	
	Cream	
Eggs		
Peanut Butter		Dried Peas Beans
	Nuts	
Fish Poultry	Meat	Chix
	P.-H.	Liver (Inc. Chix)
	Hamburg	Turkey
	Fish	
	Prepared Meat	
Fruit	Citrus	
	Dried	
	Juices	
	Canned	
	Other	
Vege-tables	Potato	Sweet
	Cooked	
	Raw	
	Leafy-Yellow	

Meals away from Home:

Bread + Cereals	Wh.	
	Dk.	
	Cereal - Ready to eat	
	Ckd.	
	Mac, Srach, Noodles	
	Rice	
	Crackers	
	Waffle, pancakes	
Grains	Grits	
	Cracked wheat	
Sugars + Sweets	Sugar	Jam Jelly
	Honey	Pan syrup
	Choc. Syrup	Molasses
Fats + Oils	Marg/Butter	Cream/Substitute
	Mayonnaise	Oil Dressing
	Gravy	Bacon
Desserts	Pudding	Jello
	Custard	Pie
	Cake	Sw. Rolls
	Doughnuts	Sherbert popsicle
Snack Foods	Pot. Chips	
	Corn Chips	
	Popcorn	
	Cookies	
	Koolaid	
	Soft Drinks	
	Beverage Mixes	
	Candy	
	Soup	
	Supplementation	

EVENI EAL Time _____ P.M.

Main ..ish: Kind _____ Amount _____

Potato: How cooked _____ No. and size _____

Vegetables: Kind _____ Amount _____

_____ Amount _____

_____ Amount _____

Bread: Kind _____ No. Slices _____

Butter (on bread, potato, vegetables) _____ tsp.

Gravy _____ Tbsp.

Salad dressing: Kind _____ Amount _____

Milk: Amount _____

Other beverage: Kind _____ Amount _____

Milk _____ oz. Cream _____ oz. Sugar _____ tsp.

Dessert: Kind _____ Amount _____

Other foods _____ Amount _____

_____ Amount _____

BETWEEN EVENING MEAL AND BEDTIME:

Foods eaten _____ Amount _____

_____ Amount _____

Time _____ p.m. Regular _____ Irregular _____

Is this day's intake usual ___ more than usual ___ less than usual ___ ?

Vitamin concentrates: Kind _____ Amount _____

RECORD OF FOOD EATEN IN ON

CHILD RESEARCH COUNCIL

Name _____

Age _____ Date _____

Suggestions for recording information:

Milk, fruit juice and other liquids: Record in terms of measuring cup or ounces (1 measuring cup = 8 oz.).

Butter: Record as level teaspoons (1 average pat - 1 level teaspoon).

Sugar: Record as level teaspoons.

Egg: Note whether whole egg or yolk or white only.

Cereal and vegetables: Record in terms of measuring cup or tablespoons. (1/2 measuring cup = 4 heaping tablespoons = 8 level tablespoons.) If using tablespoons, be sure to note whether heaping, rounding or level tablespoons are meant.

Fruit: If whole, give size (small, medium, large). If sliced or canned, express in terms of measuring cup or tablespoons as above.

Meat: Record as ounces or level tablespoons, if possible (1 ounce = 2 level tablespoons). If not possible, describe clearly the size as, for example, 1 small pork chop.

Other foods: Record as accurately as possible in terms of ordinary household measures.

COMPLETE RECORD OF ONE DAY'S FOOD

BREAKFAST: Time _____ a.m.

Fruit: Kind _____ Amount _____

Cereal: Kind _____ Amount _____

Milk ____ oz. Cream ____ oz. Sugar ____ tsp.

Bread: Kind _____ No. slices _____

Butter _____ tsp.

Other spread: Kind _____ Amount _____

Egg: Amount _____ How cooked _____

Bacon: No. slices _____ Thin or regular _____

Milk: Amount _____

Other beverage: Kind _____ Amount _____

Milk ___ oz. Cream ___ oz. Sugar ___ tsp. Cocoa ___ tsp.

Other foods _____ Amount _____

_____ Amount _____

_____ Amount _____

BETWEEN BREAKFAST AND NOON MEAL

Foods eaten _____ Amount _____

_____ Amount _____

_____ Amount _____

Time _____ a.m. Regular _____ Irregular _____

NOON MEAL: Time _____

Soup: Kind _____ Amount _____

Main dish: Kind _____ Amount _____

Potato: How cooked _____ No. and size _____

Vegetables: Kind _____ Amount _____

and/or sandwich filling: _____ Amount _____

_____ Amount _____

Bread: Kind _____ No. slices _____

Butter (on bread, potato, vegetables) _____ tsp.

Gravy _____ Tbsp.

Salad dressing: Kind _____ Amount _____

Milk: Amount _____

Other beverage: Kind _____ Amount _____

Milk ____ oz. Cream ____ oz. Sugar ____ tsp.

Dessert: Kind _____ Amount _____

Other foods _____ Amount _____

BETWEEN NOON AND EVENING MEALS

Food eaten _____ Amount _____

_____ Amount _____

_____ Amount _____

Time _____ p.m. Regular _____ Irregular _____

HANDOUT: ACTIVITY NO 6

Table Q1.1 Food balance sheet for rice and corn, country X, in year Y (in hundred thousand metric tons)

Item	Milled rice	Corn
Supplies for year		
Imports	400	20
Domestic production - total	3600	465
Commercially marketed	3150	415
Subsistence output	450	50
Total supplies	4000	485
Distribution or disappearance		
Exports	600	neglible
Domestic nonfood use	300	55
Domestic food (disappearance = residual)	3100	430
Per capita in kilograms (pop.= 30 million)	(86)	(12)

Table Q1.2 Household food survey data on per person consumption of rice, corn, wheat products, and cassava, country X, year Y (in kilograms as purchased)

Item	Milled rice	Corn	Wheat products	Cassava
National average per person	110	19	4	8
Averages in urban households	96	6	8	2
Lowest socioec. status group	90	8	3	3
Mod. low " " "	108	5	8	2
Mod. high " " "	100	3	15	1
Highest " " "	80	1	25	1
Averages in rural households	115	23	2	10
Lowest sicioec. status group	110	30	1	12
Mod.low " " "	120	10	2	6
Mod.high " " "	135	5	6	4
Highest " " "	110	3	10	2

PER CAPUT FOOD SUPPLIES

60

TANZANIA

(INFORMATION AVAILABLE AS AT 30/09/78)

COMMODITY	1961-65	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
POPULATION (THOUSANDS)												
	11052	12252	12583	12923	13273	13671	14081	14504	14939	15388	15872	16371
CALORIES (NUMBER PER DAY)												
GRAND TOTAL	1976	2094	2054	2043	2116	2024	2005	2040	2125	2126	2077	2064
VEGETABLE PRODUCTS	1797	1887	1846	1828	1898	1815	1815	1856	1936	1935	1878	1864
ANIMAL PRODUCTS	179	206	208	215	218	209	190	185	189	192	198	202
GRAND TOTAL EXCL ALCOHOL	1909	2028	1989	1975	2044	1960	1937	1982	2062	2055	2013	2004
CEREALS	703	749	724	718	724	744	728	717	782	797	732	724
WHEAT	40	48	50	30	41	50	54	32	64	80	45	45
RICE	67	73	66	78	83	83	68	73	95	81	78	85
MAIZE	485	517	497	499	486	509	500	530	529	520	497	491
MILLET AND SORGHUM	112	110	111	111	114	102	105	83	96	116	111	102
ROOTS AND TUBERS	608	616	614	593	578	528	507	544	566	566	563	560
SUGARS AND HONEY	64	74	76	79	92	104	105	105	92	75	68	74
PULSES	76	94	100	97	97	86	105	98	102	90	97	99
NUTS AND OILSEEDS	46	66	65	41	55	54	49	63	58	61	74	70
VEGETABLES	33	34	34	35	36	35	33	33	32	31	32	32
FRUIT	147	131	110	136	178	134	152	168	168	169	168	167
MEAT AND OFFALS	56	61	60	66	68	60	56	57	58	59	60	60
EGGS	2	2	2	2	2	2	2	3	3	3	3	3
FISH AND SEAFOOD	13	19	22	20	23	23	20	21	21	23	28	32
MILK	90	98	97	103	103	96	87	79	80	80	80	79
OILS AND FATS	66	80	82	83	86	87	89	92	96	97	105	102
VEGETABLE OILS AND FATS	52	59	59	63	68	68	70	71	72	74	81	77
ANIMAL OILS AND FATS	14	21	23	20	18	19	19	21	24	22	24	25
STIMULANTS			1	1	1	1	1		1			
SPICES	3	3	3	2	2	2	2	3	3	3	3	3
ALCOHOLIC BEVERAGES	67	66	65	67	72	64	67	59	63	71	69	62
PROTEIN (GRAMS PER DAY)												
GRAND TOTAL	48.8	48.1	48.1	47.4	48.9	47.1	46.4	46.3	48.6	49.5	49.0	48.0
VEGETABLE PRODUCTS	31.9	34.3	34.2	33.0	33.8	32.6	33.6	33.6	35.7	36.0	34.8	34.2
ANIMAL PRODUCTS	12.0	13.8	14.0	14.5	15.1	14.5	12.8	12.7	12.9	13.5	14.2	14.8
GRAND TOTAL EXCL ALCOHOL	42.9	47.2	47.2	46.5	48.0	46.3	45.5	45.6	47.8	48.6	48.2	48.2
CEREALS	17.2	18.3	17.7	17.4	17.6	18.1	17.9	17.3	19.1	19.7	17.9	17.6
WHEAT	1.2	1.5	1.5	.9	1.2	1.5	1.6	1.0	1.9	2.4	1.4	1.4
RICE	1.3	1.4	1.3	1.5	1.6	1.6	1.3	1.4	1.8	1.6	1.5	1.6
MAIZE	11.5	12.2	11.8	11.8	11.5	12.0	11.8	12.5	12.5	12.3	11.7	11.6
MILLET AND SORGHUM	3.2	3.2	3.2	3.2	3.3	3.0	3.1	2.4	2.8	3.4	3.2	3.0
ROOTS AND TUBERS	3.6	3.7	3.7	3.6	3.5	3.2	3.2	3.5	3.5	3.5	3.5	3.5
SUGARS AND HONEY												
PULSES	4.8	6.0	6.4	6.2	6.1	5.4	6.6	6.2	6.4	5.8	6.2	6.3
NUTS AND OILSEEDS	1.4	1.6	1.9	1.0	1.3	1.3	1.1	1.7	1.8	2.1	2.4	2.0
VEGETABLES	2.0	2.0	2.0	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9
FRUIT	1.7	1.5	1.3	1.6	2.1	1.6	1.8	2.0	2.0	2.0	2.0	2.0
MEAT AND OFFALS	5.1	5.5	5.4	5.9	6.0	5.7	5.0	5.0	5.1	5.3	5.3	5.3
EGGS	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
FISH AND SEAFOOD	2.2	3.1	3.5	3.2	3.6	3.8	3.2	3.4	3.4	3.8	4.5	5.1
MILK	4.5	5.0	4.8	5.2	5.2	4.8	4.4	4.0	4.1	4.2	4.1	4.1
OILS AND FATS												
VEGETABLE OILS AND FATS												
ANIMAL OILS AND FATS												
STIMULANTS	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
SPICES	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
ALCOHOLIC BEVERAGES	.9	.9	.9	.9	.9	.9	.9	.7	.8	.9	.8	.8
FAT (GRAMS PER DAY)												
GRAND TOTAL	26.6	31.2	31.1	29.7	31.8	31.1	29.9	30.9	31.2	31.6	33.8	33.3
VEGETABLE PRODUCTS	16.0	18.9	18.5	16.9	18.9	18.7	18.6	19.7	19.6	20.0	21.6	21.0
ANIMAL PRODUCTS	10.7	12.3	12.5	12.8	12.9	12.4	11.3	11.2	11.6	11.6	12.2	12.3
GRAND TOTAL EXCL ALCOHOL	26.6	31.2	31.1	29.7	31.8	31.1	29.9	30.9	31.2	31.6	33.8	33.3
CEREALS	4.0	4.2	4.1	4.0	4.0	4.1	4.1	4.0	4.2	4.4	4.1	4.0
WHEAT	.1	.2	.2	.1	.1	.2	.2	.1	.2	.3	.2	.2
RICE	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
MAIZE	2.8	2.9	2.8	2.8	2.8	2.9	2.9	3.0	3.0	3.0	2.8	2.8
MILLET AND SORGHUM	1.0	1.0	1.0	1.0	1.0	.9	.9	.7	.8	1.0	1.0	.9
ROOTS AND TUBERS	.9	.9	.9	.8	.8	.8	.7	.8	.8	.8	.8	.8
SUGARS AND HONEY												
PULSES	.4	.4	.5	.5	.5	.4	.6	.5	.5	.4	.4	.4
NUTS AND OILSEEDS	4.1	6.0	5.6	3.6	5.0	4.9	4.5	5.6	5.0	5.1	6.3	6.2
VEGETABLES	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
FRUIT	.4	.4	.4	.4	.5	.4	.5	.5	.5	.5	.5	.5
MEAT AND OFFALS	3.8	4.2	4.1	4.5	4.6	4.4	3.9	3.9	3.9	4.0	4.1	4.1
EGGS	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
FISH AND SEAFOOD	.5	.6	.7	.7	.8	.8	.7	.7	.7	.8	1.0	1.1
MILK	4.7	5.0	5.0	5.3	5.2	4.9	4.4	4.0	4.1	4.1	4.2	4.1
OILS AND FATS	7.4	9.0	9.2	9.3	9.7	9.8	10.0	10.4	10.8	10.9	11.9	11.5
VEGETABLE OILS AND FATS	5.8	6.6	6.7	7.1	7.7	7.7	7.9	8.0	8.1	8.4	9.2	8.7
ANIMAL OILS AND FATS	1.6	2.3	2.5	2.2	2.1	2.1	2.2	2.2	2.7	2.5	2.7	2.8
STIMULANTS												
SPICES	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
ALCOHOLIC BEVERAGES												
CALCIUM (MILLIGRAMS PER DAY)												
GRAND TOTAL	425	457	452	462	470	435	420	410	422	429	429	427
VEGETABLE PRODUCTS	242	250	249	247	252	233	237	240	249	250	248	245
ANIMAL PRODUCTS	183	207	203	215	218	203	183	170	173	179	181	182
CEREALS	47	49	48	49	49	48	47	45	48	51	49	48
ROOTS AND TUBERS	95	97	96	93	90	82	79	85	89	89	89	88
PULSES	23	28	30	29	29	26	33	30	31	27	29	29
NUTS AND OILSEEDS	5	6	6	4	5	5	5	6	7	9	9	7
VEGETABLES	44	45	45	46	46	45	44	43	42	41	41	41
FRUIT	22	20	17	21	27	21	23	25	25	25	25	25
MEAT AND OFFALS	3	3	3	4	4	4	3	3	3	3	3	3
EGGS	1	1	1	1	1	1	1	1	1	1	1	1
FISH AND SEAFOOD	8	11	13	12	15	15	12	13	13	14	17	20
MILK	171	191	185	198	198	183	166	152	156	160	159	158

PER CAPUT FOOD SUPPLIES

61

TANZANIA

(INFORMATION AVAILABLE AS AT 30/05/78)

COMMODITY	1961-65	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
IRON (MILLIGRAMS PER DAY)												
GRAND TOTAL	14.9	15.8	15.6	15.6	15.9	15.0	15.2	15.2	15.8	16.0	15.8	15.5
VEGETABLE PRODUCTS	13.4	14.1	13.9	13.8	14.1	13.2	13.6	13.6	14.2	14.4	14.0	13.7
ANIMAL PRODUCTS	1.5	1.7	1.7	1.8	1.8	1.8	1.5	1.6	1.6	1.7	1.8	1.8
CEREALS	4.8	5.0	4.9	4.8	4.9	4.9	4.8	4.7	5.0	5.2	4.9	4.8
ROOTS AND TUBERS	3.3	3.4	3.4	3.2	3.2	2.9	2.8	3.1	3.1	3.1	3.1	3.1
SUGARS AND HONEY		.1	.1	.1	.1	.1	.1	.1	.1			
PULSES	1.4	1.8	1.9	1.8	1.8	1.6	2.0	1.9	1.9	1.7	1.8	1.8
NUTS AND OILSEEDS	.3	.4	.4	.3	.4	.3	.3	.4	.5	.6	.5	.4
VEGETABLES	1.5	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.4
FRUIT	.9	.8	.7	.8	1.1	.8	.9	1.0	1.0	1.0	1.0	1.0
MEAT AND OFFALS	1.0	1.1	1.1	1.2	1.2	1.2	1.0	1.0	1.1	1.1	1.1	1.1
EGGS												
FISH AND SEAFOOD	.2	.3	.4	.3	.4	.4	.3	.4	.4	.4	.5	.6
MILK	.1	.2	.2	.2	.2	.1	.1	.1	.1	.1	.1	.1
RETINOL (MICROGRAMS PER DAY)												
GRAND TOTAL	151	160	163	169	167	157	142	146	146	149	151	151
VEGETABLE PRODUCTS												
ANIMAL PRODUCTS	151	160	163	169	167	157	142	146	146	149	151	151
MEAT AND OFFALS	96	98	101	104	102	94	85	92	91	93	94	93
EGGS	4	4	4	4	4	4	4	5	5	5	5	5
FISH AND SEAFOOD	2	3	4	4	5	6	4	4	4	5	5	6
MILK	46	49	49	52	51	48	43	40	40	40	40	40
OILS AND FATS	3	7	5	5	5	5	5	5	6	6	7	7
RETINOL EQUIVALENT — RETINOL + 1/6 BETA CAROTENE (MICROGRAMS PER DAY)												
GRAND TOTAL	664	664	660	703	717	662	670	689	692	706	721	720
VEGETABLE PRODUCTS	504	494	487	524	540	496	520	534	538	548	562	560
ANIMAL PRODUCTS	160	170	173	179	177	166	151	155	155	158	160	160
CEREALS	12	13	12	12	12	12	12	13	13	13	12	12
ROOTS AND TUBERS	61	67	65	60	61	54	54	66	66	67	67	66
PULSES	2	2	2	2	2	2	2	2	2	2	2	2
NUTS AND OILSEEDS												
VEGETABLES	251	251	250	251	250	243	240	236	232	231	229	227
FRUIT	128	118	107	124	150	127	136	145	145	145	144	143
MEAT AND OFFALS	100	102	105	108	106	98	88	95	94	97	98	97
EGGS	5	5	5	5	5	5	5	6	6	6	6	6
FISH AND SEAFOOD	2	3	4	4	5	6	4	4	4	5	5	6
MILK	50	54	54	57	56	53	47	44	44	44	44	44
OILS AND FATS	21	18	24	48	39	32	47	44	53	69	81	84
VEGETABLE OILS AND FATS	18	11	18	42	34	27	42	39	46	57	74	76
ANIMAL OILS AND FATS	3	8	6	6	5	5	5	5	6	7	8	9
THIAMINE (MILLIGRAMS PER DAY)												
GRAND TOTAL	1.29	1.37	1.36	1.32	1.34	1.30	1.31	1.34	1.38	1.39	1.37	1.35
VEGETABLE PRODUCTS	1.19	1.26	1.25	1.21	1.23	1.20	1.21	1.25	1.28	1.29	1.27	1.25
ANIMAL PRODUCTS	.09	.10	.10	.11	.11	.11	.09	.09	.09	.10	.10	.10
CEREALS	.61	.65	.62	.62	.61	.64	.63	.62	.66	.67	.63	.61
ROOTS AND TUBERS	.20	.21	.20	.20	.19	.18	.18	.20	.20	.20	.20	.19
PULSES	.12	.14	.15	.15	.15	.13	.16	.15	.15	.14	.15	.15
NUTS AND OILSEEDS	.05	.05	.07	.03	.04	.04	.03	.06	.05	.06	.09	.07
VEGETABLES	.10	.10	.10	.10	.10	.10	.10	.10	.09	.09	.09	.09
FRUIT	.06	.06	.05	.06	.07	.06	.07	.07	.07	.07	.07	.07
MEAT AND OFFALS	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
EGGS												
FISH AND SEAFOOD	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.02
MILK	.06	.06	.06	.06	.06	.06	.05	.05	.05	.05	.05	.05
RIBOFLAVIN (MILLIGRAMS PER DAY)												
GRAND TOTAL	.95	1.01	.99	1.01	1.03	.97	.95	.99	.96	.98	.96	.95
VEGETABLE PRODUCTS	.60	.62	.60	.61	.63	.59	.60	.60	.62	.63	.61	.60
ANIMAL PRODUCTS	.35	.39	.38	.41	.41	.38	.35	.33	.33	.34	.35	.35
CEREALS	.19	.20	.19	.19	.19	.20	.19	.19	.20	.21	.19	.19
ROOTS AND TUBERS	.09	.09	.09	.08	.08	.07	.07	.08	.08	.08	.08	.09
PULSES	.05	.05	.06	.06	.06	.05	.06	.06	.06	.05	.06	.06
NUTS AND OILSEEDS	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
VEGETABLES	.11	.11	.11	.11	.11	.11	.11	.11	.10	.10	.10	.10
FRUIT	.07	.06	.05	.07	.08	.07	.07	.08	.08	.09	.08	.08
MEAT AND OFFALS	.08	.09	.09	.09	.09	.09	.08	.08	.08	.08	.08	.09
EGGS		.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
FISH AND SEAFOOD	.01	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.03
MILK	.25	.28	.27	.29	.29	.27	.25	.23	.23	.24	.23	.23
NIACIN (MILLIGRAMS PER DAY)												
GRAND TOTAL	12.4	13.0	13.1	12.7	13.2	12.6	12.3	12.8	13.1	13.3	13.5	13.4
VEGETABLE PRODUCTS	10.5	10.8	10.8	10.3	10.7	10.2	10.2	10.7	10.9	11.0	11.0	10.9
ANIMAL PRODUCTS	1.9	2.2	2.3	2.4	2.5	2.4	2.1	2.2	2.2	2.3	2.5	2.6
CEREALS	4.1	4.4	4.2	4.2	4.2	4.3	4.2	4.2	4.5	4.6	4.3	4.2
ROOTS AND TUBERS	2.1	2.1	2.1	2.1	2.0	1.9	1.9	2.1	2.0	2.0	2.0	2.0
PULSES	.5	.6	.7	.6	.6	.6	.7	.6	.6	.6	.6	.6
NUTS AND OILSEEDS	.8	.8	1.1	.5	.6	.6	.5	1.0	.8	.8	1.2	1.2
VEGETABLES	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.9	.9	.9	.9	.9
FRUIT	.9	.8	.7	.8	1.1	.8	.9	1.0	1.0	1.0	1.0	1.0
MEAT AND OFFALS	1.4	1.5	1.5	1.6	1.7	1.6	1.4	1.4	1.5	1.5	1.5	1.5
EGGS												
FISH AND SEAFOOD	.4	.5	.6	.6	.6	.6	.6	.6	.6	.6	.8	.9
MILK	.2	.2	.2	.2	.2	.2	.1	.1	.1	.1	.1	.1
ASCORBIC ACID (MILLIGRAMS PER DAY)												
GRAND TOTAL	88	89	86	89	94	85	87	92	91	90	90	90
VEGETABLE PRODUCTS	86	87	84	87	92	83	86	91	89	89	88	88
ANIMAL PRODUCTS	2	2	2	2	2	2	2	2	2	2	2	2
ROOTS AND TUBERS	27	28	28	27	26	24	25	28	27	27	27	27
VEGETABLES	33	33	33	34	34	33	32	32	31	31	31	30
FRUIT	24	23	20	24	29	25	27	28	28	28	28	28

FOOD BALANCE SHEET

TANZANIA

(INFORMATION AVAILABLE AS AT 30/05/78)

POPULATION (THOUSANDS) 19877

WEIGHT (MST) THOUSAND METRIC TONS
NUMBERS(NOS) THOUSAND UNITS

YEAR AVERAGE 1975-77

COMMODITY	PRODUCTION INPUT	PRODUCTION OUTPUT	IMPORTS	STOCK CHANGES	EXPORTS	DOMESTIC SUPPLY	DOMESTIC UTILIZATION FEED	SEED	MANUFACTURE FOOD USE	MANUFACTURE NON FOOD USE	WASTE	FOOD	PER CAPUT SUPPLY KILOGRAMS /YEAR	GRAMS	PER DAY CALORIES NOS	PROTEIN GRAMS	FAT GRAMS
GRAND TOTAL															2089	48.2	32.9
VEGETABLE PRODUCTS															1892	35.9	20.9
ANIMAL PRODUCTS															198	14.2	12.0
GRAND TOTAL EXCL ALCOHOL															2024	46.3	32.9
CEREALS															791	18.4	4.1
WHEAT		58	46			104		5	97		2						
WHEAT/FLOUR	97	73	18			91					1	90	5.7	15.5	97	1.7	.2
WHEAT/BRAN	97	22			14	8	8										
PADDY RICE		172				172		13	158		2						
PADDY RICE/MILLED	158	103	34			137					7	130	8.2	22.4	81	1.6	.1
PADDY RICE/BRAN	158	13				13	13										
BARLEY		2				2			2								
BARLEY/MALT	2	2	8			9			9								
MAIZE		897	126	47	3	1013	31	26	894		62						
MAIZE/FLOUR	894	832	8			840			2		8	829	52.2	143.1	502	11.9	2.9
MAIZE/BRAN	894	45			5	39	39										
OATS/ROLLED OATS			1			1						1	.1	.1	1		
MILLET		147	2			148	3	3	127		15						
MILLET/FLOUR	44	40	20			60						60	3.0	13.8	46	1.2	.4
MILLET/BRAN	44	3				3	3										
SORGHUM		260				260	5	5	224		26						
SORGHUM/FLOUR	112	106				106						106	4.7	18.3	63	2.0	.6
SORGHUM/BRAN	112	6				6	6										
ROOTS AND TUBERS															368	3.5	.8
POTATOES		84				83		18			8	57	3.6	9.8	7	.1	
SWEET POTATOES		328				328					16	312	19.6	53.8	52	.7	.1
CASSAVA		3980				3980	20		2970		585	390	24.6	67.3	74	.6	.1
CASSAVA/FLOUR	3986	726				726				4		723	46.5	124.7	429	2.0	.6
YAMS		8				8						7	.5	1.3	1		
SUGARS AND HONEY															72		
SUGAR CANE		1262				1262		84	1178								
/RAW SUGAR	1107	111			18	93			93								
RAW SUGAR/REFINED SUGAR	93	86	10	-5		101						101	6.3	17.4	67		
CANE BEET/MOLASSES	1107	39			10	29	29										
CANE/NONCENTRIF SUGAR	66	5				5			4			1	.1	.2	1		
/SUGARS AND SYRUPS NES														.1			
HONEY		8				7						7	.5	1.3	4		
PULSES															95	6.1	.4
DRY BEANS		144		-3	17	121		13			7	110	6.9	19.0	64	4.2	.2
DRY PEAS		6				6		1				5	.3	.9	3	.2	
CHICKPEAS		7				7						6	.4	1.0	4	.2	
DRY COWPEAS		21				21		2			1	18	1.1	3.1	11	.7	
PIGEON PEAS		21				21		1			1	19	1.2	3.3	11	.6	
PULSES NES		5	2			7			1			5	.3	.9	2	.1	
PULSES NES/FLOUR	1																
NUTS AND OILSEEDS															68	2.2	5.9
CASHEW NUTS		104		-9	105	7					6	2	.1	.3			
NUTS NES		4				4						4	.3	.7	2	.1	.2
SOYBEANS		1				1						1	.1	.1	1		
GROUNDNUTS IN SHELL		65				65		6	5		3	51	3.2	8.8	34	1.4	2.8
GROUNDNUTS/SHELLED	5	3				3			3								
SHELLED GROUNDNUTS/CAKE	3	2				2	2										
COCONUTS		307				307			170		31	106	6.7	18.3	27	.3	2.6
COCONUTS/COPRA	170	27				27			27								
COPRA/CAKE	27	9			5	5	5										
PALM KERNELS		7				7			7								
PALM KERNELS/CAKE	7	4				4	4										
CASTOR BEANS		8			2	6			6								
SUNFLOWER SEED		7			1	6			2			3	.2	.6	1		.1
SUNFLOWER SEED/CAKE	2	1				1	1										
SESAME SEED		7			2	6			5								
SESAME SEED/CAKE	5	2				2	2										
COTTONSEED		111				111		9	101								
COTTONSEED/CAKE	101	47		-4	35	18	18										
OILSEEDS NES		12				12			11		1						
OILSEEDS NES/CAKE	11	6			2	4	4										
/FLOUR MEAL OF OILSEEDS			5			5						5	.3	.9	4	.3	.1
VEGETABLES															32	1.9	.3
TOES		15				14					1	13	.8	2.2			
ONIONS		36				36					5	30	1.9	5.2	2	.1	
GARLIC		1				1						1	.1	.2			
GREEN CORN(MAIZE)		20				20					1	19	1.2	3.3	2	.1	
FRESH VEGETABLES NES		840				840					126	714	45.0	123.2	27	1.7	.2
FRUIT															168	2.0	.5
BANANAS		770				770	15		77		154	524	33.0	90.3	54	.9	.1
PLANTAINS		770				770	15		77		154	524	33.0	90.3	54	.9	.1

FOOD BALANCE SHEET

TANZANIA

(INFORMATION AVAILABLE AS AT 30/05/78)

POPULATION (THOUSANDS) 15677

WEIGHT (WGT) THOUSAND METRIC TONS
NUMBERS(NOS) THOUSAND UNITS

YEAR AVERAGE 1975-77

COMMODITY	PRODUCTION INPUT	PRODUCTION OUTPUT	IMPORTS	STOCK CHANGES	EXPORTS	DOMESTIC SUPPLY	DOMESTIC UTILIZATION FEED	SEED	MANUFACTURE FOOD USE	MANUFACTURE NON FOOD USE	WASTE	FOOD	PER CAPUT SUPPLY KILOGRAMS /YEAR	PER DAY GRAMS	CALORIES NOS	PROTEIN GRAMS	FAT GRAMS
MANGOES		171				170					17	153	9.7	26.5	10	.1	
PINEAPPLES		46				46					5	41	2.6	7.0	2		
DATES			1			1						1		.1			
FRESH TROPICAL FRUIT NES		36				36					4	32	2.0	5.6	2		
FRESH FRUIT NES		166				166					17	149	9.4	25.6	12	.1	.1
MEAT AND OFFALS															99	5.3	4.1
CATTLE(NOS)		1323	1		5	1319			1319								
CATTLE(NOS)/BEEF(WGT)	1319	121				120			3			117	7.4	20.2	38	2.9	2.9
BEEF/CANNED	3	2			1	1						1	.1	.2			
CATTLE(NOS)/OFFALS(WGT)	1319	20				20						20	1.3	3.5	4	.6	.1
SHEEP(NOS)		761			1	760			760								
SHEEP(NOS)/MUTTON(WGT)	760	11				11						11	.7	2.0	4	.3	.3
SHEEP(NOS)/OFFALS(WGT)	760	2				2						2	.1	.4		.1	
GOATS(NOS)		1233				1233			1233								
GOATS(NOS)/MEAT(WGT)	1233	19				19						19	1.2	3.2	5	.5	.3
GOATS(NOS)/OFFALS(WGT)	1233	4				4						4	.2	.6	1	.1	
PIGS(NOS)		5				5			5								
PIGS(NOS)/MEAT(WGT)	5																
CHICKENS(NOS)		22763	1404			24167			24167								
CHICKENS(NOS)/MEAT(WGT)	24167	22				22						22	1.4	3.8	5	.5	.3
DUCKS(NOS)		1645				1645			1645								
/POULTRY MEAT NES(WGT)		2				2						2	.1	.3	1		.1
HORSES(NOS) /SAME MEAT(WGT)		8				8						8	.5	1.3	1	.2	
EGGS															3	.2	.2
HENS(NOS)/EGGS(WGT)	6667	21				21		4			4	12	.8	2.2	3	.2	.2
/POULTRY EGGS NES(WGT)		2				2		1			1			.1			
FISH AND SEAFOOD															28	4.5	1.0
FRESHWATER DIADROM WHOLE		192				192			140			51	3.2	8.9	6	1.0	.2
FRESHWATER/CURED	140	46				46						46	2.9	8.0	16	2.5	.6
DEMERSAL FRESH WHOLE		20				20			4			16	1.0	2.8	1	.2	
DEMERSAL/CURED	4	1	1			3						3	.2	.5	1	.2	
PELAGIC FRESH WHOLE		14				14			4			10	.6	1.8	2	.2	.1
PELAGIC/CURED	4	1				1						1	.1	.3		.1	
PELAGIC/CANNED			1			1						1	.1	.2			
PELAGIC/MEALS			2			2	2										
MARINE NES FRESH WHOLE		15				15						15	.9	2.5	2	.3	.1
MILK															68	4.2	4.1
COWS(NOS)/MILK(WGT)	2863	678				678			69		14	595	37.5	102.7	65	3.2	3.6
COW MILK/CONDENSED			1			1						1	.1	.2	1		
COW MILK/DRIED														.1			
SHE GOATS(NOS)/MILK(WGT)	1300	48				48					1	47	3.0	8.1	7	.3	.4
COW MILK/COW SKIM MILK	64	61				61					3	58	3.6	10.0	4	.3	.1
COW SKIM MILK/CONDENSED			1			1						1		.1			
COW SKIM MILK/DRIED			4			4						4	.3	.8	3	.3	
COWMILK/CHEESE	5	1				1						1		.1			
OILS AND FATS															101		11.4
VEGETABLE OILS AND FATS															73		8.8
SOYBEANS/OIL			1			1						1		.1	1		.1
SHELLED GROUNDNUTS/OIL	3	1	1			3						3	.2	.5	4		.5
COPRA/COCONUT OIL	27	16			1	16						16	1.0	2.7	24		2.7
PALM KERNELS/OIL	7	4				4						4	.2	.6	6		.6
/PALM OIL		3	4			7						7	.4	1.2	10		1.2
CASTOR BEANS/OIL	6	2				2				2							
SUNFLOWER SEED/OIL	2	1				1						1		.1	1		.1
SESAME SEED/OIL	5	3				3						3	.2	.5	5		.5
COTTONSEED/OIL	101	14		-1		15			3			13	.8	2.2	19		2.2
/VEGETABLE OILS NES	11	4			1	3						3	.2	.5	4		.5
/MARGARINE SHORTENING	3	3				3						3	.2	.6	4		.5
ANIMAL OILS AND FATS															24		2.7
CATTLE(NOS)/FAT(WGT)	1319	3				3						3	.2	.6	5		.6
SHEEP(NOS)/FAT(WGT)	760	1				1						1		.1	1		.1
GOATS(NOS)/FAT(WGT)	1233													.1	1		.1
/TALLOW			8			8						8	.5	1.4	12		1.4
COW MILK/BUTTER	35	2	1			3						3	.2	.5	4		.4
COW MILK/GHEE	29	1				1						1	.1	.2	2		.2
DEMERSAL FISH/BODY OIL			1			1	1										
SPICES															3	.1	.1
PIMENTOES		5				4						4	.3	.7	2	.1	.1
CLOVES WHOLE STEMS		8			7	1						1		.1			
NUTMEG MACE CARDAMONS		1			1												
STIMULANTS																.1	
GREEN COFFEE		95		-1	94	2			1			2	.1	.3			
/COFFEE EXTRACTS	1																

FOOD BALANCE SHEET

64

TANZANIA

(INFORMATION AVAILABLE AS AT 30/09/78)

POPULATION 15877 (THOUSANDS)

WEIGHT (MT) THOUSAND METRIC TONS
NUMBER (NOS) THOUSAND UNITS

YEAR AVERAGE 1975-77

COMMODITY	PRODUCTION INPUT	PRODUCTION OUTPUT	IMPORTS	STOCK CHANGES	EXPORTS	DOMESTIC SUPPLY	DOMESTIC UTILIZATION FEED	SEED	MANUFACTURE FOOD USE	MANUFACTURE NON FOOD USE	WASTE	FOOD	PER CAPUT SUPPLY KILOGRAMS /YEAR	GRAMS PER DAY	CALORIES NOS PER DAY	PROTEIN GRAMS PER DAY	FAT GRAMS PER DAY
TEA		14			12	3						2	.1	.4			
ALCOHOLIC BEVERAGES																	
BARLEY MALT/BEER	9	67				67						67	4.2	11.6	5	.1	
MAIZE/BEER	2	10				10						10	.7	1.8	1		
MILLET/BEER	64	318				318						318	20.0	54.9	17	.3	
SORGHUM/BEER	112	560				560						560	35.2	96.6	30	.5	
/FERMENTED BEVERAGES	194	194				194					15	179	8.7	23.9	11		
/DISTILLED ALCOHOL	4	4				4						4	.3	.7	2		

ASSUMPTIONS UNDERLYING PRODUCTION AND UTILISATION STATISTICS (ASUPUS)

TANZANIA

65

YEAR AVERAGE 1975-77

COMMODITY	EXTRACTION CONVERSION RATE	FEED	SAUCE	SEED RATE
	%	... % OF SUPPLY ...		KG/HA
WHEAT				
WHEAT/FLOUR	76		2	100
WHEATFLOUR/BREAD	120		1	
WHEAT/BRAN	23	27		
PADDY RICE				
PADDY RICE/MILLED	65		1	90
PADDY RICE/BRAN	8	100	5	
BARLEY				
BARLEY/MALT	80			60
MAIZE			2	
MAIZE/FLOUR	93	3	6	20
MAIZE/BRAN	5		1	
OATS		88		
MILLET		100		
MILLET/FLOUR	95	2	10	15
MILLET/BRAN	5	100		
SORGHUM				
SORGHUM/FLOUR	95	2	10	15
SORGHUM/BRAN	5	100		
/CEREALS BRAN NES		100		
POTATOES				
SWEET POTATOES			10	800
CASSAVA			5	
CASSAVA/FLOUR	25	1	15	
YAMS				
SUGAR CANE			5	
/RAW SUGAR	10			2000
RAW SUGAR/REFINED SUGAR	92			
CANE BEET/MOLASSES	3	74		
CANE/NONCENTRIF SUGAR	8			
DRY BEANS				
DRY PEAS			5	45
CHICKPEAS			5	20
DRY COWPEAS			5	20
PIGEON PEAS			5	20
PULSES NES			5	20
PULSES NES/FLOUR	70		5	35
CASHEW NUTS				
SOYBEANS			5	
GROUNDNUTS IN SHELL			5	45
GROUNDNUTS/SHELLED	66		5	45
SHELLED GROUNDNUTS/CAKE	63	100		
COCONUTS			20	

COMMODITY	EXTRACTION CONVERSION RATE	FEED	SAUCE	SEED RATE
	%	... % OF SUPPLY ...		KG/HA
COCONUTS/COPRA	16			
COPRA/CAKE	35	50		
PALM KERNELS/CAKE	50	100		
CASTOR BEANS				
SUNFLOWER SEED			3	10
SUNFLOWER SEED/CAKE	40	100	3	10
SESAME SEED				
SESAME SEED/CAKE	40	100	5	5
COTTONSEED				
COTTONSEED/CAKE	46	33		25
OILSEEDS NES				
OILSEEDS NES/CAKE	50	68	5	
TOMATOES				
DRY ONIONS			10	
GARLIC			15	
GREEN CORN (MAIZE)			5	
FRESH VEGETABLES NES			5	
BANANAS			15	
PLANTAINS		2	20	
CITRUS FRUIT NES		2	15	
MANGOES			10	
PINEAPPLES			10	
FRESH TROPICAL FRUIT NES			10	
FRESH FRUIT NES			10	
/POULTRY EGGS NES (NOT)			10	
SHELLED GROUNDNUTS/OIL	36		50	30
COPRA/COCONUT OIL	60			
PALM KERNELS/OIL	50			
CASTOR BEANS/OIL	40			
SUNFLOWER SEED/OIL	30			
SESAME SEED/OIL	35			
COTTONSEED/OIL	14			
/VEGETABLE OILS NES	38			
/MARGARINE PROCESSING	125			
BIRDSEEDS				
/COFFEE EXTRACTS	33		5	
TEA				
BARLEY MALT/BEER	723		2	
MAIZE/BEER	504			
MILLET/BEER	500			
SORGHUM/BEER	500			
/FERMENTED BEVERAGES	100			
/DISTILLED ALCOHOL	100		10	

COMMODITY	EXTRACTION CONVERSION RATE	FEED	SAUCE	MARCHING RATE
	%	..... % OF SUPPLY		
BEEF/MEAT EXTRACTS	43			
BEEF/PREPARATIONS	66			
BEEF/CANNED	66			
HERS (NOS)/EGGS (NOT)			20	20
FRESHWATER/CANNED	33			
DEMERSAL/CANNED	40			
PELAGIC/CANNED	40			
PELAGIC/MEALS		100		

COMMODITY	EXTRACTION CONVERSION RATE	FEED	SAUCE	MARCHING RATE
	%	..... % OF SUPPLY		
COWS (NOS)/MILK (NOT)			2	
SHE GOATS (NOS)/MILK (NOT)			2	
COW MILK/COW SKIM MILK	95		5	
COWMILK/CHEESE	10			
COW MILK/BUTTER	5			
COW MILK/CREAM	3			
DEMERSAL FISH/BODY OIL		100		

COMMODITY	OFF-TAKE RATE	CARCASS WEIGHT	OFFALS	SLAUGHTER FAT
	%	..... KG/ANIMAL		.....
CATTLE (NOS)	9	91	15	3
SHEEP (NOS)	26	15	3	1
GOATS (NOS)	26	15	3	
PIGS (NOS)	19	41		
CHICKENS (NOS)	116	.9		
DUCKS (NOS)	70			

COMMODITY	POPULATION PRODUCING	YIELD PER ANIMAL		
			EGGS	
	%	KG	NOS/MAN	GRAMS/ EGG
COWS (NOS)/MILK (NOT)	15	325		
SHE GOATS (NOS)/MILK (NOT)	26	40		
HENS (NOS)/EGGS (NOT)	44	2.4	.56	43

Activity 6: Suggestions for Instructors

+ The concepts and issues involved in measurement of consumption and nutrition status are complex, and our time is limited. The main points to stress:

  - Food balance sheets are inadequate sources of information about the consumption/nutrition status of populations.

  - Sample surveys are better ways of obtaining data about the distribution of food consumption patterns and some of the elements influencing consumption patterns (e.g., income, prices, cultural tradition).

  - But surveys combining information about agricultural production and food consumption in detail are costly.

  - Therefore, if data on nutritional status is to be obtained with a frequency useful for planners in resource-poor countries, acceptable compromises need to be made in such things as sample selection and stratification and in questionnaire design.

Measurement of Nutrition and Consumption--Important Points

- FOOD BALANCE SHEETS relate total food available (domestic production plus imports minus exports) to a country during a given year to the totoal estimated population for that year. From these data "average per capita food availabilities" and "average per capita nutrient availabilities" can be calculated.

- Food balance sheets DO NOT provide information about:

  - Actual consumption of food
  - Actual intake of nutrients and nutrient absorption
  - Distribution of food supplies
  - The health/nutrition status of the population
  - The social and economic costs of malnutrition and related infectious disease resulting from reduced physical and mental capacity, labor hours lost, infant and adult mortatility
  - How the levels and patterns of demand for food are likely to change as incomes rise, relative prices change, and cultural patterns evolve under the impact of development policies and projects

- Development planners need to estimate the total food DEMAND for food resulting from population growth and socio-economic change in order to plan for both increases in total VOLUME of food supply and in PATTERNS of crop livestock diversification.

Income, Price, and Consumption Relationships--Important Points

- INCOMES of consumers and PRICES of all goods and services consumers might want to buy are among the most important VARIABLES determining what consumers are likely to buy at any given time.

- Planners and decision makers would like to be able to FORECAST how much consumers will buy in the future, given estimated levels and rates of change in prices and incomes.

- DEVELOPMENT ASSISTANCE PROGRAMS and PUBLIC POLICY in less developed countries are designed to influence the LEVELS and DISTRIBUTION of incomes and the RELATIVE LEVELS of prices.

- SYSTEMATIC RELATIONSHIPS between (1) incomes and the amounts of consumption goods purchases, and (2) prices and the amounts of consumption goods purchased, can be estimated from data collected through SAMPLE SURVEYS.

- INCOME-CONSUMPTION relationships (called "consumption-functions" by economists) are usually POSITIVE: people with high incomes consume more than people with low incomes; and, as their incomes rise, people in a given group tend to consume more.

- A consumer's income, then, places an upper limit on the amount of TOTAL EXPENDITURE the consumer can make for food; this limit is called the consumer's BUDGET CONSTRAINT.

- In practice, TOTAL CASH EXPENDITURE is often used instead of income when attempts are made to measure consumer behavior through sample surveys.

- PRICE-CONSUMPTION relationships (called "demand schedules" by economists) are usually NEGATIVE: people buy less of a given commodity or service as its price rises relative to other prices.

- As levels of income rise, total food consumption (by individuals or groups) will not necessarily rise at the same rate; the "flattening-out" of food purchases with rising income is called the ENGEL EFFECT.

- Some less preferred (but cheap) foods are actually consumed in smaller amounts as rising incomes permit consumers to buy more expensive (but preferred) foods. The former are called INFERIOR GOODS and the latter are called SUPERIOR GOODS.

- Changes in the price of one food can affect the consumer's purchases of others. If two foods are SUBSTITUTES, then an increase in the price of one food (apples) may lead to an increase in the purchases of another food (pears). If the two foods are COMPLEMENTS then an increase in the price of one food (beer) may lead to a decrease in the purchases of the other (pretzels). These phenomena are called CROSS-PRICE effects in consumption (demand).

- INCOME ELASTICITIES OF DEMAND and PRICE ELASTICITIES OF DEMAND for both food and other kinds of consumption goods can be estimated from data collected in sample surveys of household expenditures. Both kinds of elasticities permit planners to forecast changes in PATTERNS OF CONSUMPTION EXPENDITURES as development programs influence incomes and prices in predictable ways.

- Elasticity estimates are valid only for given levels of incomes and prices for given groups at a given point of time. Elasticities themselves can be expected to change as development proceeds and social change takes place. Therefore sampling and monitoring of target populations on a continuous basis are important if program and projects are to acheive pre-established goals and targets.

- HIGH income elasticity foods are preferred (but relatively costly) foods which are consumed at rapidly growing rates as incomes rise (example: steak versus hamburger).

- LOW income elasticity foods are less preferred (but relatively cheap) foods which are consumed at declining rates as incomes rise and which are consumed at relatively unchanging rates as incomes fall (example: cassava relative to polished rice).

- HIGH price elasticity foods are generally those regarded by consumers as luxuries (examples: steak, truffles); an increase in the price of such foods leads to a relatively rapid fall in the demand for them.

- LOW price elasticity foods are generally those regarded by consumers as necessities (examples: pasta, beans). Such foods, although they may not be "preferred" relatvie to other foods, are relatively cheap; therefore low income families will try to maintain their purchases of these foods even at relatively high price levels if no cheaper substitutes are available.

The following KINDS OF INFORMATION are needed by planners in order to incorporate consumption/nutrition concerns into rural and agricultural development projects:

KIND OF INFORMATION	ITEM	USED TO ESTIMATE
Economic	Cash and other forms of INCOME earned by rural households	NET INCOME earned by rural households during a given time
	COSTS of agricultural production and household maintenance	NET INCOME earned by rural households during a given time
	Total household FOOD CONSUMPTION (or EXPENDITURE on food) by food type during a given time	INCOME ELASTICITIES of DEMAND for foods Coefficients for CONSUMPTION FUNCTIONS for food EXPENDITURE elasticities of demand for food

KIND OF INFORMATION	ITEM	USED TO ESTIMATE
Economics (Continued)	Individual FOOD PRICES	PRICE ELASTICITIES of DEMAND for food Expenditure and Price elasticities of demand for food FOOD ELASTICITIES OF SUPPLY
	Allocation of household LABOR	Labor productivity Nutrition requirements
	Household PRODUCTION of crops/livestock per period of time	Labor/land productivity
	Division of household food production between sales and home consumption	Food availability to family Food ELASTICITIES OF SUPPLY
	Household food purchases per period of time	Food availability to family
Family Characteristics	NUMBER of family members by AGE, SEX	Nutrition requirements
	EDUCATION of family members	Source of BELIEFS and KNOWLEDGE about food
	INTRAFAMILY DISTRIBUTION of of food	Consumption and nutritional status of individual family members Age/sex biases in meal distribution
	Family FOOD STORAGE, PREPARATION, COOKING practices	Loss/waste of nutrients between acquisition and consumption of food
	SANITARY PRACTICES and availability of POTABLE WATER	Factors which may reduce ABSORPTION of food
Anthropometric	HEIGHT-for-AGE	Long-term malnutrition (STUNTING)
	WEIGHT-for-HEIGHT	Short-term (recent) malnutrition (WASTING)
	WEIGHT-for-AGE	Combination index of nutritional status
Anthropological	Child weaning and feeding practices	Adverse effects upon family nutrition
	Beliefs about food and food taboos	Kinds of educational projects needed to alter food beliefs, practices

* Many other kinds of information about the nutritional status of a population (e.g., biochemical data, clinical tests). However, there is a TRADEOFF between costs of acquiring information and the amount of usefullness obtained from greater detail, given the strict resource limitations in developing countries and the need for flexibility and timeliness in decision making.

- SAMPLE SURVEYS are used to obtain information about a wide variety of characteristics of developing countries, including agricultural income, employment, and production, rural health and nutrition, household expenditure and consumption.

- Because of the trade-offs between the costs and benefits of obtaining information, large scale surveys which include data of interest to nutrition planners are rarely undertaken because

  - Supply-oriented planners rarely comprehend the linkages among food demand, food consumption, nutrition, and food production
  - It is commonly believed that surveys yielding information about nutritional status are necessarily expensive and time-consuming

TWENTY-FOUR HOUR RECALL EXERCISE

FOOD RECORD FOR _____ (Date and time) to _____(Date and tim

NAME_____

Breakfast:

Between Meals:

Lunch:

Between Meals:

Dinner:

Bedtime snack

Computation of Nutrient Intake

Name _____ Age _____ Sex _____ Weight _____ Height _____

Activity Level: Sedentary _____ Moderately Active _____ Active _____

Recommended Caloric Intake _____

Food	Amounts Household Measure	Grams	Calories

Handout: Activity 9 Key Questions

II. Kinds of data needed to meet project planning requirements if the food and nutrition problems are to be dealt with.

A. If low food consumption and food energy supplies are indicated for low income or other specific disadvantaged groups and there is evidence of low heights and weights among their children, need to identify and quantify major staples in their food patterns and the principal complementary foods. Questions such as those listed next can be used in family surveys and processed quickly.

1. What is the principal starchy dish eaten by your household?_____

   How often eaten by the family in day?____ How many are fed?_____

2. About how much of this principal starchy dish do you prepare for the day's meals?_____

3. Does your household sometimes substitute another kind of food for this principal starchy dish?_____yes _____no

   If so, how much is cooked for a day's meals?_____

4. What foods or combination of foods do you usually serve with your starchy dish?_____

   About how much of it do you cook a day?_____

   Do you vary this side dish or complementary dish from day to day? _____yes _____no

   How?_____

   Do you vary this complement from season to season?

   _____yes _____no

   How?_____

B. If there are reports based on research of deficiencies in certain nutrients in the diets of particular groups, it will be helpful to use questions to ascertain the frequency with which the family consumed foods known to contain substantial amounts of the particular nutrient(s).

C. If there are serious problems in infant feeding, local experts can suggest a few questions for use in identifying contributing factors.

D. If you want to know whether changes in purchasing power expected from project activities and inputs would help resolve the known food and nutrition problems, consider use of direct questioning instead of more elaborate survey of income and consumption. Examples are:

If your family had (specify) more money for food, which foods would you buy more of?_____
How would you divide the extra money among these foods?_____
_____

E. If you doubt the adequacy of responses regarding incomes, try alternative indicators of socioeconomic status such as key household possessions, type of house, land and livestock holdings, boat ownership, etc.

F. To get information on home production, which is very difficult to measure, consider use of questions such as the following:

1. Do you produce some of the foods eaten by hour household?
____yes _____no

2. In a homeyard garden?____yes ____no. Size?_____

3. Outside the homeyard, as in a field?____yes _____no

Size of the plot?_____

4. Do you get fruit or leaves from trees on your land or communal land? _____yes _____no. What kinds?_____

About how much in a season for each?

Kind _____ amount _____;; Kind _____ amount_____

5. Do you produce livestock, poultry or fish for household use?

Kind_____ amount;; Kind _____ amount

6. What difficulties do you have in trying to produce more food for family use?_____

QUICK AND DIRTY SAMPLE SELECTION: SUMMARY OF STEPS

STEP 1: Determine how many interview sites are to be selected.

STEP 2: Lay out in tabular form the characteristics of the possible sites.

STEP 3: Decide which characteristic is likely to be the most important determinant of nutritional status.

a. Calculate the proportion of the population (e.g., total number of villages) falls within each category of this characteristic.

b. Divide the number of sites to be sampled according to these proportions.

STEP 4 and beyond: Do the same for each of the other site characteristics in decending order as possible determinants of nutritional status.

FINAL STEP: The preceeding steps have divided the total number of possible sites into a number of subgroups or categories corresponding to the characteristics thought to be important in determining nutritional status. The final step is to choose, within each subgroup, the specific sites to be visited in the field. This should be done randomly, that is, in such a way that each site within the subgroup has an equal chance of selection. Numbering the sites from 1 to N and selecting from a table of random numbers is an easy way to do this.

NOTE: Samples selected in this way may not provide as accurate or statistically valid information on nutritional status and related factors as sample surveys utilizing RANDOM SAMPLING from up-to-date SAMPLE FRAMES. We may, for example, make a mistake in our ranking of characteristics of sites according to likely importance for nutritional status.

HOWEVER, skilled analysts and interview personnel who gain experience through a number of "rapid reconnaissance" surveys will be able to make adjustments in site selection so that future surveys will include more representative samples. The flexibility and relatively low cost of these methods (as compared with full-scale random sampling of large populations) should insure a steady flow of increasingly accurate information about nutritional status and food consumption to both nutrition and rural development planners.

Activity 8: Lecturette: Important Points

° RAPID NUTRITION RECONNAISSANCE methods offer ways of doing this

+ Participants will have read the Rhoades article, and there should be no need to enter into detail about the justifications for, and techniques used in "informal surveying"

+ Nevertheless, later in the week as the specific case studies are discussed, one of the key issues will center about the adequacy of sample selection. Therefore, the Activity 5 lecturette should focus on this aspect of "rapid nutrition reconnaissance." (See Uzzell, p. 9 and Rhoades, p. 9).

+ An example of the "Uzzell-type" is summarized on the next page for use as an in-class participant exercise.

° "Micro-survey" techniques of the kind used for RAPID NUTRITION RECONNAISSANCE provide planners with rough but useable information about the nutritional status and nutrition-related behavior in areas where nutritional problems are believed to exist.

° BASIC QUESTIONS to ask when information is needed for planning:

= Is a survey NECESSARY, or can EXISTING INFORMATION be used?
= What GROUPS of people should be surveyed, and how are they DIFFERENTIATED from other groups?
= What is the size of the GEOGRAPHIC AREA to be surveyed?
= How much TIME is available for the survey?
= How large a SAMPLE is needed?
= How should the group and/or sample be DIVIDED ("stratified")?
= How should the sample be SELECTED in order that it be REPRESENTATIVE?
= How many of what kinds of questions should be included in the survey QUESTIONNAIRE in order to obtain the needed information at least cost?
= How can BIAS be avoided in sample selection, questionnaire preparation, and survey administration?

° Answering these questions in detail can be time-consuming and costly. RAPID NUTRITION RECONNAISSANCE techniques minimize time and cost by

= Focusing on relatively small groups and/or regions
= Rapid sample selection based upon broad characteristics of groups and sub-groups to be sampled (e.g., ethnic characteristics, agro-climatic zone, large versus small villages, etc.) instead of random sampling (which generally requires relatively large groups)
= Attention to methods of field interviewing and survey logistics to minimize resistance by informants and to maximize the amount of useful information obtained in limited time

Activity 9

MATERIAL FOR
PARTICIPANTS

The Situation:

March 198_

The AID Mission to _____ wants to add food consumption nutrition concerns to an integrated rural development project for a period of five years at an approximately level of funding of $25,000,000 for Region X. You have been allowed an amount of $75,000 to do pre-feasibility studies. The project committee has met and has decided that you will be responsible for spending $50,000 on finding out the necessary background information on the nutrition/food consumption problems of the region. In order to fit into the project cycle and spend the money this fiscal year, the information is needed by May 21, 198_. A new IDI has just spent a month conducting a review of the USAID files, and has written the following summary of information about Region X

Region X: Major characteristics

The target populations are small to medium agriculturists with land holdings ranging from 10 to 2 hectares, classified as irrigated, humid, or marginal. They raise some dairy cattle, as well as minor livestock and kitchen gardens.

Ninety percent of the population live in villages ranging from 1,000 to...5,000 population. The mean village population is 1,500. There are 73 villages in the target area, four of which are market centers.

Not all of the villages are equally well integrated into the regional market system. Those which are more distant from market centers and roads consume fewer consumer goods and go less far afield to seek temporary work.

Two linguistic/cultural groups are represented, Group A and Group B. There are 23 Group B villages and 50 Group A villages.

The ecology of the area can be roughly divided into two zones, one relatively flat with some annual flooding and a high water table, the other hilly to mountainous. Both areas produce grains and legumes, but in different proportions, and average annual yield differs between the two areas.

Fifty of the villages are in the lowlands and 23 are in the highlands. Of the highlands villages, 17 are Group B and 6 are Group A. Of the lowland villages, 42 are Group A and 6 are Group B. All four of the market centers are in the lowlands and dominated by Group A.

Task: To design an interview guide which will yield the following information in micro survey:

Food consumption including nutrients and nutrient absorbtion
Distribution of food supplies
What cultural patterns effect food consumption and nutritional status
How patterns of demand for food will change as incomes and prices change under the impact of the proposed project

SAMPLE CASE STUDY - SAMPLE SELECTION PROBLEMS

In this activity, we will select a sample number of sites for field study. We will do this on the basis of what we know about differences among sites that are likely to affect nutrition... If we knew nothing in advance and wished to draw a statistically useful sample, we would draw a random sample in which each household, village, or other unit had an equal chance of being selected. This would require a much larger sample, which would render the rapid reconnaissance unfeasible. Or is we simply drew a small number of villages at random, we could have far less confidence that the villages were representative of villages in the region as a whole...

In this exercise, information is supplied for population size, agro-ecological zones, access to markets, ethnicity, and cultural-economic pratices. In actual practice, other factors would probably intervene.

For the sake of this exercise, it is assumed that time and funding constraints limit the project to eight field workers for a period of 5 weeks...

THE REGION:

The target populations are small to medium agriculturists with land holdings ranging from 10 to 2 hectares, classified as irrigated, humid, or marginal. They raise some dairy cattle, as well as minor livestock and kitchen gardens.

Ninety percent of the population live in villages ranging from 1,000 to...5,000 population. The mean village population is 1,500. There are 73 villages in the target area, four of which are market centers.

Not all of the villages are equally well integrated into the regional market system. Those which are more distant from market centers and roads consume fewer consumer goods and go less far afield to seek temporary work.

Two linguistic/cultural groups are represented, Group A and Group B. There are 23 Group B villages and 50 Group A villages.

The ecology of the area can be roughly divided into two zones, one relatively flat with some annual flooding and a high water table, the other hilly to mountainous. Both areas produce grains and legumes, but in different proportions, and average annual yield differs between the two areas.

Fifty of the villages are in the lowlands and 23 are in the highlands. Of the highlands villages, 17 are Group B and 6 are Group A. Of the lowland villages, 42 are Group A and 6 are Group B. All four of the market centers are in the lowlands and dominated by Group A.

CHOOSING A SAMPLE:

Step 1: Determine how many sites are to be selected based on time and the number of field workers available.

Step 2: Lay out in tabular form the characteristics of the possible sites. (In this exercise, we will ignore...the population who do not live in villages, and villages will be the units of study (i.e. the "sites").

There are a total of 72 villages. There are two agro-ecological zones. There are two ethnic types. We have divided the population into two types in terms of level of integration into the market economy. We have divided the villages into market centers and non-market centers. The information is summarized:

SITE TYPE	NUMBER OF SITES	POPULATION
Lowland, integrated, Group A, market center	4	20,000
Lowland, integrated, Group A, non-market	28	42,000
Lowland, non-integrated, Group A	12	18,000
Lowland, non-integrated, Group B	6	9,000
Highland, Group A	6	9,000
Highland, Group B	17	25,000
	73	123,000

Step 3: Decide which characteristic we think will be the most important determinant of nutritional status. For this exercise, let's say that this characteristic is agro-ecological zone. Fifty out of 73 villages are in the lowlands, or roughly 68%.

Step 4: Decide what the next most important characteristic is. Let's say that this characteristic is degree of integration into the market system.

Step 5: Decide the next most important characteristic. Let's say that it is ethnicity.

Step 6: Finally we come to a real judgement call. The number of market centers in the lowlands is 4, or 8% of the total lowlands sites (although they contain 22% of the population). Since 8% of 5 sample sites would be less than half, perhaps we should not include this characteristic. If we take the percentage of integrated sites, 4

divided by 32, or 12.5%; 12.5% of 3 (the number of lowland integrated sites) is still less than half (of a site). What are we to do? This depends ultimately on how important you feel that residence in a market center is as a determinant of nutritional status.

One "Solution" to the Problem

Now we know how many sites of each category we may want to select for research.

FINAL SITE SELECTION:

SITE TYPE	TOTAL	SAMPLE	%
Lowland, integrated, Group A, market center	4	1	25
Lowland, integrated, Group B, non-market	28	2	7
Lowland, non-integrated, Group A	12	1	8
Lowland, non-integrated, Group B	6	1	17
Highland, Group A	6	1	17
Highland, Group B	17	2	12
TOTALS	73	8	11

Next, we number the sites in each category from 1 to N (the total number in the category); then, using a table of random numbers, we select the sites for each category. While we are at it, we should select one or two alternative sites for each category in case it should become impossible to work in one of the first choices. This is an important step. Should we choose the sites casually, even after this degree of stratification, it would likely be on the basis of accessibility, having a contact in the village, or some other factor that sould bring hidden biases to the sample.

This sample, although a great improvement over a simple random sample, should still not be considered as the basis for complex statistical inferences about the population as a whole. That would require a great deal more prior information and considerably more confirmation of our assumptions aobut causes of nutritional status.

HOW CAN POTENTIAL CHANGES IN FOOD CONSUMPTION & NUTRITION BE ESTIMATED

I. Conventional procedure is calculation and use of income-consumption elasticities

A. Procedure -- calculate $\frac{\text{percent change in consumption}}{\text{percent change in income}}$. This yields a weighted average ratio. Historical data not available in developing countries so turn to cross-section data from household surveys, thus static data. To make projections, some economists insert estimates for percent change (or usually percent variations) in income ~~expected~~ in equation computed from survey data and derive ~~estimated~~ change(??) in consumption. Examples of data on consumption used include quantities for rice per capita and kilocalories per capita.

B. Limitations

1. Inadequacy of data on consumption , e.g., day for year, income mst.
2. Assumption implicitly that same pattern of income-consumption relationships among households at future time will prevail as observed in base period or survey period.
3. Assumption that all other factors have same relationships to income and consumption as in base period, BUT the process of development is usually designed to change such relationships.

II. Suggest use of reweighting procedure with judgmental estimates for subgroups among project participants

A. Procedure -

1. Begin with (a) consumption averages for subgroups derived from survey data or estimated from data for similar areas and (b) estimates of percentage distributions of the population among subgroups, e.g., by area and soc.econ.status.
2. Calculate weighted average for base period (BP), which should match the reported average, if available. E.g.,

$$\sum\left[\sum\left[\begin{array}{l}\text{rice cons.p.c.}\\ \text{in each soc.ec.}\\ \text{level in each}\\ \text{area BP}\end{array} \times \begin{array}{l}\text{pct.of pop.}\\ \text{at each soc.ec.}\\ \text{level in each}\\ \text{area BP}\end{array}\right] \times \left[\begin{array}{l}\text{pct.of pop.}\\ \text{in each}\\ \text{area BP}\end{array}\right]\right] = \text{average rice cons. BP}$$

3. Estimate (a) likely consumption averages for same subgroups in later period (LP) on basis of expected changes resulting from project and other concurrent agricultural and marketing changes,
   (b) likely distributions of populations among socioeconomic levels and among areas
4. Calculate weighted averages for the later period, e.g.,

$$\sum\sum\left[\text{Rice cons.p.c. in SE level in area LP} \times \text{Pct. of pop. in LP level in area LP}\right] \times \left[\text{Pct. of pop. in each area LP}\right] = \text{estimated av. rice cons. LP}$$

5. Compare weighted averages in base period and in later period.
6. Alternative estimates can be computed easily by changing rice averages for subgroups but only one or the population distributions or vice versa. Comparison of such alternative estimates reveals range of possible effects of changes in major factors.

B. Advantages

1. Can incorporate best judgments re each type of change in major factor or consumption rates.
2. Can calculate effects of alternatives in judgments.

C. Limitations

1. Calculations greatly influenced by quality of estimates of consumption rates and distributions in base period.
2. Requires judgmental estimates of consumption rates for subgroups and for population distributions in later period. NOT MECHANICAL.

D. Recommendations

1. Use several different approaches and sets of estimates
2. Compare independent estimates by informed professionals.

III. Table Q6.1 Sample data for calculations of projections

Population subgroup	Av. consumption of rice, kg. per yr.		Percent distrns. of pop. By SE level in area		By area (urbanization)	
	Base period	Later period	BP	LP	BP	LP
Urban households						
In lowest SE level	90	95	50	40		
Mod.low " "	108	120	25	30		
Mod.high " "	100	100	20	25		
Highest " "	80	75	5	5		
Urban average	96	??			25	30
Rural households						
In lowest SE level	110	125	67	55		
Mod.low " "	120	130	20	25		
Mod.high " "	135	125	10	16		
Highest " "	110	100	3	4		
Rural average	115	125			75	70
Country average	110	??				

SEE FORMULAS ABOVE A.4.

IV. Questions for discussion

1. Compare the advantages and limitations of the conventional and reweighting procedures for making projections under project planning conditions.

2. What are the possible implications of such changes in food consumption & nutrition in terms of health benefits, general welfare, productivity?

3. How would you handle such projections along with benefit/cost analytical data for the appraisal of projects?

INTERIM WORKSHOP EVALUATION I

1. OPENING OF WORKSHOP: Were the Sunday afternoon and evening activities helpful to you in getting started in the workshop?

Yes _____

Somewhat _____

Not really _____

How could they have been improved?

2. POLICY PAPER DISCUSSION: Were the AID policy papers on Agriculture and Nutrition and discussion:

Useful ___ Interesting ___ New to You ___ Not Any Of Those ___

How could they have been improved?

3. POLICY CASE STUDY ANALYSIS: Evaluate the Tanzanian Case Study and activities associated with it:

Case Study Material:

Small Group Task Instructions:

Small Group Discussions:

Large Group Discussions:

4. MONDAY EVENING READINGS: Evaluate the readings assigned Monday night and activities associated with them:

Quality/Difficulty of Readings:

Discussions of Readings Tuesday Morning:

5. Tuesday Exercises on Nutrition/Consumption Data:

Comment on:

Twenty-four Hour Recall Exercise:

Food Balance Sheet/Food Survey Lecture and Discussion:

Small Group Problem Exercise:

National Trends Micro-Survey Discussion:

Small Group Problem Exercise:

Sample Selection Problem Exercise:

6. Please give any additional comments which would have made these first two days of the workshop more useful and enjoyable for you. Use other side of the sheet, if needed.

89

Materials for Participants 9B

NUTRITION IMPACTS OF LIVESTOCK DEVELOPMENT SCHEMES AMONG PASTORAL PEOPLES

November, 1980

prepared by:

Joel M. Teitelbaum

EXECUTIVE SUMMARY

Livestock development and range management projects in developing countries are shown in this paper to have inherent problems leading to implementation failure due to the marked changes they impose on local herding populations' patterns of food acquisition, distribution and consumption. The aim of this report is to examine AID and other donor livestock projects in arid regions of the world to determine the human nutrition impacts of various schemes and to identify project approaches that offer more realistic likelihood of success. Then guidelines are proposed for consideration by AID to design nutritionally sound livestock/range projects which sumultaneously achieve development goals of increased sustained ruminant animal production by pastoralists themselves.

The report focuses on a nutritional double bind caused by attempts to sharply raise the meat offtake of range livestock while upgrading soil and vegetation through environmental conservation measures, and assuming no adverse effect on the well being of herder peoples. National government and international donor agricultural policies concerning food production, especially for red meat, have been superimposed on the existing dietary ecology of graziers without careful attention to the nutritional basic needs of these producers. The report draws upon secondary data sources such as AID and World Bank documents, regional nutrition surveys and socio-demographic and anthropological field studies as well as on the up-to-date literature on nomadic societies and human nutritional needs. The report is organized in seven chapters, beginning with a description

of the food sources and way of life of pastoralists in developing areas, their nutritional conditions and dietaries and then focussing on the known impacts of livestock projects and potential effects of such activities, using case studies from AID. The final chapter of the report deals with guidelines and recommended policy orientations as well as project design and management procedures to achieve nutritional benefits for pastoralists as part-and-parcel of the development process.

The approach is to point out the predominance of subsistence production of cereal foods, especially coarse grains, among pastoralists as well as their reliance on ruminant milks from the herds, and occasional use of livestock for meat consumption as a means of hunger alleviation. Semi-nomads are found to cluster in agro-herding systems, with fewer groups in more arid areas specializing in extensive migratory nomadism. The diets of these groups vary in the quantity of milk used in the food supply, but grain consumption remain. critical especially for intake of caloric energy, total protein and a variety of vitamins and minerals considered essential to health. In fact, the mixed preparation and consumption of plant and animal origin foods creates complementarity in the essential amino acid array; this has a synergistic effect in raising the biological value of protein needed for human growth and tissue maintenance. In addition, milk contributes minerals such as calcium to the diet and if drunk regularly may provide immunological properties against various types of diseases. Pastoral peoples have adapted both culturally and genetically to living with livestock and consuming ruminant milk in quantity over many generations. This combination of nutritional impacts, along with other multi-purposes uses of livestock byproducts, show an imperative need to consider the nutristructure of pastoralism in making changes for development and meat production purposes.

The potential effects of range and livestock development inputs on herding peoples are viewed in terms of a series of questions to be asked of the design for development as to specific impacts and interactions, food supply and availability, price, distribution and timing. An historical overview of post-independence livestock development projects shows those involved with pastoralism have occurred in Africa and the Middle East. The project types initiated in the early 1960's are described as primarily animal health and breeding oriented; those of the late 1960's and early 1970's are aimed at the stratified production of meat for urban consumption from the range areas through the use of range management techniques borrowed from Western countries, especially the United States. These output strategies were not sensitive to the seasonal hunger periods and human ecology of pastoralism.

During the 1970's the lengthy period of cyclical drought in Africa has altered livestock policies by giving additional priority to rangeland conservation practices through limitation on stocking rates and fenced off grass growing perimeters or anti-bush fire control measures. However, the expected increase in the offtake of meat, especially beef in sub-Saharan Africa and mutton in the Near East, did not materialize during the entire 1970's period. Livestock/range management projects were delayed in the implementation stages and met with pastoralist resistance or avoidance in many cases. This led to serious reductions of donor agency investment in the livestock sub-sector by the end of the decade. With the effects of revised development policies by international agencies in favor of basic human needs, the stage was set for the introduction of social and nutritional soundness criteria into livestock development design. Meanwhile, livestock were made part of regional integrated development of rural systems linked to river basin control and irrigation strategies on a larger scale than before as the 1980's began.

Two major case studies of livestock development schemes were traced from the late 1960's through the 1970's, one in the Sahel and the other in North Africa. Both projects and their sequelae represent attempts to increase meat production by semi-nomadic pastoralists on inland ranges for shipment to coastal city consumers, while conserving the range soils and vegetation against erosion and over-grazing. In neither case were the food and nutritional conditions of the impacted livestock raisers effectively considered by the project designers to the point of implementation. The potential loss of milk, manure, wool or hides, meat and other economic and social values that pastoralists draw from their herds, as well as loss of control over herd movements and the land led to piecemeal revision of each project by AID. The changes made during the 1970's were not appropriate to achieving nutritional improvements. By the beginning of the 1980's both projects were slated for regional development schemes as part of entire river basin development efforts; these too took little account of local herdsmens' needs nutritionally or otherwise. At present no serious adverse impacts of project development could be measured due to lack of adequate implementation, but few if any benefits had been realised by pastoralists or others. Redesign efforts including nutrition guidelines and socio-economic impacts are in order. The report cites examples of newer nutrition-oriented AID livestock projects also.

Nutrition guidelines recommended include consideration of the basic subsistence availability of essential food supplies including grains, milk, wild and cultivated vegetables and fruits as well as hunting and some trade foods, mainly grains. The emphasis should be placed on determining the advantages of a semi-nomadic ecological setting rather than trying to force settlement of nomads or assume they live in fixed locations. Herds need to

retaining control over the movements of their beasts and their marketing rather than government agency or parastatal managerial takeover of the herding functions. Conservation efforts are important, but need not cause a radical destocking of the range or limitation of grazing to small blocks of land. The more successful inputs such as veterinary health measures, and improvement of underground water resources for livestock should be complemented with human health interventions and improvements in water availability and sanitation for human use.

An internal rate of return analysis does not show the progressive effects of a nutritionally sound approach, but errors in the calculations and over-estimates of return on investments are part of the implied problem in current livestock development strategies. Careful attention to a set of nutrition impact development questions shows that subsistence use of livestock can be encouraged rather than discouraged, thereby avoiding intense constraints on pastoralist food supply and preventing malnutrition and hunger as well as socio-economic disintegration of herder family and society. Only by assuring grazier families of a mix of food resources and livestock accessibility for milk, manure, meat and sale or gift-exchange can the nutristructure of their society by maintained or ameliorated across various seasons of the year and through cycles of drought and precipitation. The development of livestock on a managed transhumant basis as an adjunct to the growth of irrigated cropping is an appropriate use of the rainfed lands. Designs that are more realistic and longer range may be required to integrate pastoralism into the wider production and exchange relationships of economic development in low income, low technology parts of the world.

7.0 SUMMARY RECOMMENDATIONS AND SUGGESTED GUIDELINES FOR POLICY AND PROJECT PLANNING

As indicated in the analysis of pastoralist nutristructure, the AID range/livestock development project history and the Case Study illustrations, one finds little concrete information on actual nutrition impacts of past and current development efforts in this field. There is a built-in lag in the intended outcomes due to the deferred nature of benefits (income) expected from project inputs. However, a variety of unexpected impacts and concerns about adverse nutritional effects have been signaled in this paper. In fact, pastoralist resistance or non-cooperation and land takeovers provide clear indications that livestock/range development projects as currently designed do not meet their needs for food, health and income.

7.1 Recommendations for Project Design Criteria.

Project design should include a concern from the start with the real and immediate food and dietary needs of pastoralist populations. Short-term economic effects should be taken as seriously as longer-term production results. The following factors should be considered before launching a livestock project in a pastoral area:

a) determination and allocation (if feasible) of land use and water access rights in the pastoral zone among the stock-keeping and owning populations.

From the nutritional point of view, this will provide a secure resource base for equitable exploitation of the range environment by pastoralists who depend on livestock for their basic food supply.

b) Assessment of the availability of water for livestock and human groups for both home use and agricultural production, and adjustment of development plans to the vagaries of rainfall and ground water resources. Water resources management is a major element in the provision of a self-sufficient food supply for pastoralists; and adequate quantities of safe drinking water are essential to human health and nutrition.

c) Maintenance of mixed species of livestock on the rangelands is necesasary to the milk supply system of pastoralists. Milk herds should be considered first in livestock project design, as without them the nutristructure of the diet, across seasons, can be impaired. Also multipurpose economic herd products such as wool, hair and hides of various livestock species need to be considered in calculating project benefits and trade-offs.

d) Pastoralists' cultivations on rangelands should be assessed and encouraged rather than discouraged. Cereal cultivation is a primary food/nutrient

energy resource. Use of natural livestock droppings as fertilizer should be retained and encouraged. Use of crop residues in the field should be considered for animal fodder as well as cut forages.

e) Provision of human health care should be included along with the veterinary health care component of livestock project planning, especially preventive measures such as vaccinations and primary health care facilities and first aid. Nutritional rehabilitation and nutrition and child feeding education should also be elements of the design where epidemiologically and culturally indicated.

f) An adaptive education program for adults concerning livestock and land improvements should be developed using project staff skilled in communications, knowledgeable of the pastoralist group language and culture, and willing to learn from the pastoralist as well as to provide extension education.

g) Existing pastoral groupings suited to the range use conditions should be consulted and given increasing decision powers over project plans, and herding households should retain their capacity for mobility and close managment of the livestock.

7.2 Suggested Nutrition Impact Guidelines for Pastoralist Project Planning

A variety of technical models are used in livestock/range development efforts among pastoral peoples. Each project must adapt its approach to the specific characteristics of the types of ruminants, geomorphology and soil, vegetation and climatic conditions of the range areas as well as the food production and consumption practices of the herding populations. It must, at times, also build in an off-take surplus of product in congruence with government policies and development purpose. However, it is fundamental to development policy aims that an improved nutritional outcome be designed into livestock projects in light of the sensitive dietary balances needed to maintain pastoralist nutristructure and nutritional well-being.

The nutritional soundness of a project design is a necessary element of the social analysis and economic cost-benefit calculations. As this paper demonstrates, it involves cross-cutting inter-sectoral issues of pastoralist human ecology: subsistence production and consumption of food and water; dietary staples and supplements; the role of women in the pastoralist enterprise; and the health and population dynamics of the target group.

<u>Procedures</u>

The following procedures for project identification, assessment and design are suggested as nutritional guidelines for AID consideration.

1) First, ask a set of necessary (see below) questions which bring out the obvious nutrition impacts of intended outcomes of the project for pastoralists.

2) Answers may suggest options to compensate for direct negative impacts with targeted interventions that improve the availability of scarce nutritents.

3) Next, raise questions that deal with unobvious or unintended potential spillover effects of projects, also to be addressed in the planning and monitoring processes. These include interactions that may indirectly deprive pastoralists of adequate nutrition by adversely impacting their food supply, income and price of food substitutes, or lessened availability of essential foods at critical points in project implementation. Moreover, some unintended interactions may also be shown to provide positive nutrition results.

Major nutrition-related questions to be answered in identifying and designing projects are as follows*:

1) What are the nutritional problems prevalent in the pastoral population? Which members of the community are more malnourished according to strata and household age-sex category? How do deficient or vulnerable nutrition states of pastoralists relate to the basic dietary pattern of the population in relation to herding of livestock and use of livestock for food?

---

* These questions are drawn largely from Pinstrup - Anderson's list, and are reduced or expanded as appropriate to the special limitations of pastoral livestock project conditions.[1]

2) How will project activities affect the production levels and subsistence availability of pastoralist foods, especially those consumed by the most at-risk members of the population? Will home consumption of subsistence foods increase, decrease or be unaffected by the project?

3) Will the project alter seasonal availability of specific foods used by pastoralists, especially in seasons which are considered to be nutritionally precarious? How will project affect the food supply during extremes of adverse weather for food production such as drought, flood, etc.?

4) What will be the impact of the project on the market supply of pastoralist food products, in terms of availability and price? How will off-take of project foods affect the market price of these foods and the prosperity of pastoralists who consume them?

5) What will be the economic costs of the project to pastoralists, and how will these cost burdens be distributed across the population strata? What income improvements can be expected for pastoralists and other beneficiaries, and how distributed? What delays can be expected in receiving income from the project due to deferred use of resources?

6) How might the project interventions affect the expenditure of labor and time by pastoral society members, especially for the more deprived strata; within the household among men, women and children? How could the project impact upon the

existing intra-household distribution of income, food and budget expenditures? What effect could this have on the food consumption pattern of individuals, especially those in the nutritionally vulnerable groups such as mothers and their young children?

7) Does the project's overall degree and type of change lead to forseeable major second round nutrition impacts which can be anticipated in the design?

Project Design Stages

Once the questions have been asked at a preliminary stage, they should be reiterated at each stage in the development of a project design. These stages are the Project Identification Document, the Project Paper, baseline data collection, survey analysis, progress monitoring, and Project Evaluation.

1) At the Project Identification Stage, the AID Mission should seek to develop cooperative efforts between the Agriculture Division and the Health/Population/Nutrition Division staff in preliminary review of potential project sites. Host government agencies should be made fully aware that AID considers pastoral peoples' diet and nutrition to be of critical importance in setting the goals for a project area, and that a joint effort by host government central ministries and regional officials will be necessary in generating the technical assistance design. In addition, a variety of inputs from pastoral

group leaders or representatives in the design phase will be of the essence in taking steps toward identification of project area inputs.

2) The Project Identification Document should include a presentation on the relationship of the proposed livestock development activity to the land tenure, land and water uses of pastoralists and other groups in the area. It should also define the boundaries of the project location suited to the human geography and ecology of the zone. The PID should state in general how the project is expected to impinge on pastoralists in terms of nomadic movements and possible sedentarization, on herd management techniques and the uses of herd products by pastoralists and others. It should identify the major food items in pastoralist diet and the nutritional importance of each food commodity in terms of human quantitative and qualitative dietary needs. It should state which herd products are intended as offtake and the expected output levels.

3) Based on the major questions posed above and the critical nutrition impact issues for pastoralists, a scope of work for a field design of the Project Paper should include the items listed, and respond quantitatively to the potential effects of the project changes on pastoralist diets. A key member of the design team should be a pastoral anthropologist familiar with the languages and cultures of the project area; one able to translate dietary practices and foods into nutritional value and determine nutristructural linkages.

This project design effort requires coordination such that the following elements are built into the inputs and schematic of the design document: Anticipated effects of the project activities on milk production by livestock of each species according to their proportion in the herds; subsistence consumption levels of milk by pastoralists; division of labor in milking and herding, and seasonal marketing of milk products; anticipated effects of the project activities on pastoralist access to gathered and hunted foods on the range land; potential losses to livestock and food supplies from wild animal predators and crop pests.

The design team approach should also focus on the level of crop cultivation by pastoralists, type of tillage and food crops planted on project lands. The multiple uses of livestock products e.g., droppings as fertilizer and wool, hair and hides should be determined. The field team should also assess shifting cultivation, vegetation burning versus other forms of soil preparation, and the role played by draught animals from the herds in plowing and cultivation, transport of food crops and use of crop residues or byproducts for livestock feed. The actual degree of livestock intrusion and damages to cultivated plots should also be assessed, especially in areas of agro-pastoral interaction. A design team should attempt to judge the attitudinal context and experiences of the pastoral people with previous livestock development or conservation efforts and consider their openness or degree of resistance to new projects.

7.3.1 Pre-Implementation Stage Design

One component of all livestock projects should be a baseline socio-economic and dietary survey to provide information on the living conditions of pastoral peoples, and their livestock practices and other food acquisition methods. The baseline survey will serve as a pre-implementation benchmark to measure progress during the project by monitoring changes, and as a means of evaluating the effectiveness of livestock projects in both production and human nutrition impacts on the pastoralists. The data to be collected should include:[2]

a) The socio-demographic profile of the pastoralist groups including population size and composition by age, gender and type of residence; population dynamics including human fertility, mortality and morbidity trends, with special attention to the nutritionally at-risk segments the mothers and their infants and young children. Migration should also be measured since pastoralists form a 'moving' target population. Other factors such as seasonal movements with herds, in-migration and out-migration (in association with project changes), may be critical indicators of availability of nutritional resources in the area.

b) Nutrition-related health and morbidity should be measured including:

i) incidence of vector-borne diseases and changes in prevalence of zoonooses and parasitic infestations of

humans in close association with livestock herds; food and water-borne outbreaks. This can be obtained through veterinary and sanitary observations and health records.

ii) epidemic and endemic childhood diseases including: seasonal child diarrhea and intestinal infections, rates of young child dehydration. This will require health care data and epidemiological data.

iii) measures of anthropometric and clinical degrees of protein, energy or other forms of malnutrition, especially among weaned and growing children. This can be carried out through a monitoring survey such as the nutrition assessment surveillance system devised by the Center for Disease Control for use by AID.

iv) dietary intake and food consumption of households and vulnerable individuals should be determined by repeated sample studies of the target pastoral population as the project proceeds.

7.2.2 Design Review Stage

The review process for a Project Paper should include distribution to the following AID organizational units:

1) Social analysts and nutrition advisers in the Regional Bureaus should be given the opportunity to comment on the social and nutritional aspects of the project. Rural development economists should have an input on the basis for rate of return calculations and cost-benefit trade-offs anticipated.3

2) For analysis of the nutrient interactions and nutritional health components of the project and for advice on a consistent method for monitoring nutritional status of pastoral groups, the Nutrition Office should provide a comment and advisory function.

3) The role of the Program and Policy Coordination Office is three fold:

a) An evaluation component should be built-in to the project in close coordination with the Office of Evaluation. The baseline data collection instrument should be designed for consistency across projects as well as for measurement of specific aspects of each project. Evaluation should be considered part of the project design, rather than an afterthought. In addition to progress reports from the field a set of checkpoints for process evaluation of the project's nutritional impacts should be considered, with summative evaluation slated for a point in time when deferred effects of the project are expected to occur.

b) At the Central AID/Washington level the Project Paper should receive comments from the Women in Development Office, since the impact of livestock projects on women's roles is closely linked to the nutritional conditions of mothers and young children.

c) The Human Resources Office of PPC should provide the review function for pastoral/livestock projects to

produce development of food production, it is important that PPC consider each new project with care, note its use of range and livestock technology, and the track record for such project models of the past. PPC should also take a hand in determining the degree to which the national policy of the developing country government is conducive to protecting their pastoral peoples from the excesses of wider society development demands. This includes a review of other development projects in the vicinity and their potential effects on herd movements and linkage to national markets, as well as policies on rural land tenure especially in collective lands where individual ownership is problematic. One function of PPC should be to assess the degree to which the project plan involves pastoralists in the design and implementation, the adaptive aspects of the plan to suit pastoralist needs, and the compensatory and basic needs benefits the project expects to offer to pastoralists especially during the implementation phase.

d) PPC should also maintain liaison with other international donor organizations such as the international banks and bilateral agencies working in the livestock development field. It is important that projects financed by other agencies receive overall policy and location review at AID in order to prevent overlaps,

avoid conflicts in the field, and in order to devise strategies for coordination and cooperation in the area of enhancing nutritional impact through consistent guidelines.

7.3 Ending

During the past two decades the developing countries with pastoral populations have experienced a dramatic rise in national policy expectations for meat production from rangeland livestock as part of the development process, followed by a precipitous decline in donor-assistance in the livestock development sub-sector. The reasons for this turn-about, as described in this paper, are in part due to the lack of success in the range management/livestock meat production efforts of the 1970's. Some underlying reasons involve the lack of pastoralist willingness to participate in the projects as designed, and administrative or technical problems with which technical field staff and host governments cannot cope. Despite a policy mandate to increase food production in developing countries while serving the basic needs of the rural peoples, the number of livestock projects has declined and the budgets of donor agencies have not increased even as the total budget for food and agricultural development rose several fold.

With the beginning of the 1980's a broader set of pastoral development options has come into play. There is new opportunity to draw upon the lessons learned from past livestock projects and apply them to improving the chances for

achieving realistic development between now and the end of the Twentieth Century. One intent of this detailed analysis and review of AID livestock activities in terms of their nutritional impact is to focus the attention of development planners on the fundamental issues which place some project designs at odds with the nutritional needs and dietary patterns of pastoralists.

It is hoped that the critical nutrition impact issues highlighted here will contribute to improve project design, expectations and evaluation in the future. The goal is to make success possible through attention to pastoralist nutristructure, to encourage a new commitment to appropriate development of pastoral economy, and to focus on pastoralists as part of the wider society to which they can make a particular contribution.

DEVELOPMENT AND FOOD CONSUMPTION PATTERNS IN RURAL SIERRA LEONE

prepared by:

Victor E. Smith
Kathryn Kolasa
John Strauss
William Whelan
Linda Bingen

2

Development and Food Consumption Patterns in Rural Sierra Leone

Victor E. Smith, Kathryn Kolasa, John Strauss, William Whelan and Linda Bingen

Nutritionists have long argued that development can inadvertently threaten the delicate nutritional balance of the local diet in developing countries. In an effort to understand the far-reaching effects of development, the U.S. Agency for International Development sponsored a research project. Carried out by Michigan State University (Contract No. AID/DSAN-C-0008), the project looked at the effects of economic policy on food consumption in rural Sierra Leone. The following report was prepared as part of that project.

Development policies and the development process often have unforeseen consequences for the nutritional well-being of people in a developing country — particularly for those who live in subsistence or semi-subsistence rural households. Literally millions of the malnourished in developing countries live in households that produce much of their own food. For people in subsistence households, survival often depends upon maintaining a delicate balance in the use of extremely limited resources. Their well-being may be drastically affected by shifts in agricultural and marketing practices brought about by well-intentioned government officials or planners.

All the authors are with Michigan State University. Dr Smith is a Professor of Economics, Dr Kolasa is an Associate Professor of Food Science and Human Nutrition and of Community Health, Mrs Bingen is a graduate student in the College of Human Ecology, Mr Strauss and Mr Whelan are graduate students in the Department of Agricultural Economics.

Economists vs nutritionists

Nutritionists and economists characteristically approach problems of development from quite different perspectives. Nutritionists assert that often one of the unintended consequences of development is an increase in malnutrition, most notably of women and children. Fieldworkers in nutrition often relate the problem to an increase in market orientation or declare that when a mixed cropping system aimed at producing food for consumption is replaced with cultivation of cash crops the food available decreases in quantity and variety.

Economists, on the other hand, who usually believe that the major cause of undernutrition is lack of income, are likely to say that people shift to cash crop production because it increases their incomes; with higher incomes households consume more food and their nutritional level rises. To this the nutritionist replies that the increased income may not be spent on food, and the quality of the diet may be worse than prior to cash cropping. They cite numerous instances in support of their thesis.

The difference of opinion stems in part from the fact that economists and nutritionists look to different types of factors in their attempts to explain the causes of undernutrition. Most often neither succeeds in seeing the whole picture.

Nutritionists tend to think in terms of food preferences, food availability, and physiological factors. Economists, trained in a discipline primarily devoted to analyzing the workings of markets, tend to concentrate their attention on the influences of market forces — incomes and the prices at which foods can be obtained in the market. Few economists have studied how food consumption will change when subsistence or semi-subsistence households make the transition to market production. The material presented here provides a beginning for such a study.

Hypothesis: market production has adverse effects on the diet

Our purpose is to describe food consumption patterns among rural households in Sierra Leone — households that produce much of their own food — and to identify factors that affect these patterns, with special attention to the hypothesis that production for the market has adverse effects upon the diet.

The economist's contribution to this discussion has been limited by the fact that the traditional model of consumption behaviour with which he works assumes that a household obtains its income by selling services or goods in the market, and exchanges that income for goods purchased from the market. The amount of income matters, but not the form in which it is received. The nutritionist's belief that producing for one's own consumption leads to better diets is equivalent to an assertion that the form in which income is received (including as income the value of goods produced for home consumption) also affects food consumption.

The basic hypothesis is that decisions concerning food consumption in the household form part of a unified decision-making process which governs production decisions, decisions as to the extent to which a household shall depend upon the market (either as a source of income or as a source of food) and decisions as to the use of household labour in farm, nonfarm or off-farm production activities.

Data that describe both the production and the consumption activities of the same household are rare, but the 1974-75 African Rural Employment Survey in rural Sierra Leone provided just such data /Smith *et al.*, 1979, Chapter 3/.

The survey sample

The 1974-75 survey was designed to represent the wide range of productive activities carried out in rural households in Sierra Leone. The country was divided into eight different zones on the basis of ecological characteristics. Within each zone three census enumeration areas were chosen at random, and within each enumeration area 24 households were selected, also at random, thus providing a total of over 500 households. For the production survey, interviewers visited each household twice a week for 12 or 13 months. The expenditure survey was based on a subsample of the production group (half the households, also chosen at random). For the purposes of the expenditure survey, two interviews, four days apart, were scheduled to take place in one week of each month.

From these data we have estimated the quantity of each food consumed (or available for consumption) in each household by adding the quantity purchased from the market (determined from the expenditure survey) to the quantity available for consumption from home production. We estimated the latter by subtracting from the quantity harvested the quantities sold, used for seed (in the case of rice only), paid out as wages in kind for hired labour, or used in processing; after adding wages received in kind we adjusted the result for losses in storage. Our sample consisted of 140 households for which we had usable data for both the production and the expenditure sides of household activity. Tests revealed these 140 households to be quite representative of the larger production sample from which they were drawn /Smith *et al.*, 1980, Chapter 2/.

The survey findings: food consumption

Because factual information about the quantities of food consumed in rural Sierra Leone is extremely scarce, we begin by describing the major features of food consumption patterns. Table 1 gives a few examples of the consumption estimates. (Smith *et al.* /1980/ provide figures for 100 food commodities.) These results describe the sample, not the rural popu-

Table 1. Mean annual household consumption in sample, by commodity
Rural Sierra Leone

Commodity	Quantity Consumed, Mean over All Households (kilograms)	Percentage Produced by Consuming Household	Quantity Consumed, Mean over Consuming Households (kilograms)	Percentage of Households Consumin
Rice, clean	612	74	612	100
Sorghum	54	88	81	66
Cassava root	343	80	418	82
Palm oil	83	52	86	96
Groundnut, shelled	68	81	91	74
Fish, saltwater, fresh				
Bonga	3	0	13	25
Other	99	72	141	70
Fish, saltwater, dried				
Bonga	61	0	67	90
Other	79	4	88	90
Palm wine	114	94	306	37

lation as a whole, but we have made population estimates as well. The most important foods consumed were rice, palm oil, dried fish and cassava. Every household consumed rice. Indeed, rice constituted 24 percent of the total value of the consumption of the average rural household. Most of the households consumed the other foods mentioned. Table 1 includes all foods, except onions, peppers and chillies, salt and Maggi cubes (a bouillon cube), that were consumed by at least 66 percent of the households. The standard meal pattern consists of rice cooked in palm oil, of green leaves, onions, peppers. other vegetables, and pieces of fish or meat. Various kinds of green leaves play an important nutritional role, but do not appear to be adequately represented by the quantitative information available. Annual rice consumption per household was 612 kg per year or about 924 calories per person per day. Annual cassava consumption was 343 kg per year, and annual dried fish 140 kg.

For all the major food items except dried fish and palm oil the percentage produced at home exceeds 70 percent. The average household produces 52 percent of the palm oil, 74 percent of the rice and 80 percent of the cassava it consumes, but households vary widely in this respect. The list of major and minor food items of which more than 70 percent is produced for home consumption is a long one; it includes rice, other cereals (sorghum, fundi, etc.), cassava root, groundnut, almost all the beans, fresh saltwater fish other than bonga, okra, peppers and chillies, greens, jakato, tomato, mango, coconut, and palm wine. Producing for home consumption is a major feature of life in rural Sierra Leone.

Knowing how much a household consumes is of little use unless we know how large the household is. Table 2 converts quantities per household into quantities per capita and per adult male consumer equivalent. Note that in Table 2 sorghum has been replaced by "other cereals" and palm wine by "alcoholic beverages".[1]

[1] At this point the list of 100 foods from which Table 1 was drawn had been consolidated into 26 food groups /Smith, *et al.*, 1980, Tables 3.2 and 3.3/.

Table 2. Mean annual consumption, all households in sample, by commodity group
Rural Sierra Leone
(kilograms)

Commodity group	Quantity per household	Quantity per capita	Quantity per consumer equivalent
Clean rice	612	93	126
Other cereals	116	18	24
Cassava	343	52	71
Palm oil	83	13	17
Groundnuts	68	10	14
Fish: saltwater, fresh or frozen	114	17	23
Fish: saltwater, dried	140	21	29
Beverages, alcoholic	118	18	24

Because the number of consumer equivalents[2] is normally less than the number of persons in the household, quantities per consumer equivalent are usually greater than quantities per capita. For instance, the rice estimate of 93 kg per capita becomes 126 kg per consuming equivalent, while the dried saltwater fish figure goes from 21 kg per capita to 29 kg per consumer equivalent

The survey findings: variables which affect food consumption

In addition to knowing what foods rural households consume, we must know how their quantities are affected by economic and other variables. Perhaps the simplest approach is cross-classification (tabular) analysis, on which we report here.[3]

We studied six commodities: rice, other cereals, cassava, palm oil, groundnuts and alcoholic beverages — all the major items of food consumption except fish and vegetables.

The factors we looked at were income, several demographic variables (region, ethnic group, number of wives, household size, number of dependents) and four variables designed to reflect the attitude of the household toward reliance on the market.

All the hypotheses that deal with the extent to which production for the market affects the quality and quantity of the diet relate in principle to the diet as a whole, and to the quantities of the nutrients it provides, but our work here examines only individual components of the diet. We regard this as a first stage, but an essential one, in the study of the broader question.

Rice — the most important food

Table 3 gives the cross-tabulation results for rice, the most important food

[2] Each member of the household was assumed to be equivalent as a consumer to a specified fraction of an adult male, according to the following scale:

Sex	Age (in years)			
	0-5	6-10	11-15	16 and over
Male	.2	.5	.75	1.0
Female	.2	.5	.70	.9

[3] Results from single-equation regression analysis and systems estimation of a household-firm model are reported in Smith *et al.* /1981/ and Strauss *et al.* /1981/.

Table 3. Rice consumption per consumer equivalent, consuming households in sample (kilograms)

A. Classified by income per adult male consumer equivalent and region

Household income per consumer equivalent (Leones per year)	Region			Row
	North	South	East	
Less than 70	73	138	40	89
70 or more, but less than 106	134	134	61	125
106 or more, but less than 169	195	168	85	159
169 or more	159	183	78	158
Column	130	158	68	133

of Sierra Leone[4]. Rice consumption per consumer equivalent generally rises with income, but not necessarily so in the two highest income classes. Except in the South, income has its strongest effect on rice consumption in the lower reaches of the income distribution.

Clear regional and ethnic differences exist. Southerners generally eat more rice than Northerners (but not at every income level); Easterners eat much less rice than either. On the average the Mende people eat about the same quantities of rice as the Temne; the Limba eat distinctly less. But those Mende people who obtain less than 20 percent of their value product from the activities usually carried out to obtain money income eat more rice than the Temne, while those more oriented toward earning money income eat less. Regional and ethnic groupings overlap; all the Mende households are in the South and East; the Limba and almost all the Temne households are in the North.

The number of wives of each household head appears to have no clear influence on rice consumption (Table 3.C), but the dependency ratio[5] does. According to Table 3.D, except for households with no dependents the higher the dependency ratio the less rice is consumed, both for the sample as a whole and for the 84 households (60 percent of the sample) that sell less than 8.5 percent of the value of their output. As for the 40 percent of the sample households with a higher degree of market orientation, the dependency ratio had no clear relationship to the level of rice consumption.

The last of the demographic variables considered, the number of consumer equivalents (Table 3.E), generally appears to be inversely related to consumption. The 49 largest households consumed distinctly less rice than the 91 smallest. The economist would say there are "economies of scale" in rice consumption; the nutritionist would say that members of the larger households were less well-fed, assuming that the lower consumption of rice was not offset by greater consumption of other foods.

The hypothesis that production for the market has an adverse effect on food consumption finds only weak support in the data for rice, the principal food of Sierra Leone. Selling a large proportion of one's output (by value) shows no clear relation to rice consumption (Table 3.D). On the other hand, devoting a large percentage

[4] The comparable table in Smith *et al.* /1980, pp 44-46/ also includes the number of households in each cell and the standard deviation around the cell mean.

[5] $\frac{\text{Household members less than 16 or more than 65 years old}}{\text{Members 16-65 years old}}$

B. Classified by percentage of value output from specified sources[a] and ethnic group

Percentage of output (by value) from specified sources[b]	Ethnic group			Row
	Limba[c]	Temne	Mende	
Less than 10	124	119	190	157
10 or more, but less than 20	120	127	158	144
20 or more, but less than 45	117	143	111	119
45 or more	96	159	73	95
Column	116	132	138	133

[a]Percentage of value of output plus labour sold out that is derived from the following: onions, peppers and tomatoes; cocoa and/or coffee; oil palm products; non farm activities other than fishing; labour sold out.

[b]Largely produced for sale.

[c]One Loko household is included with this group.

of one's output to specified activities[6] is consistently associated with smaller consumption of rice, except among the Temne, where it is associated with consuming more rice (Table 3.B). Relying mainly on one's own production for the rice consumed also has mixed effects (Table 3.E). Some of the lowest consumption levels are among the 25 households that produce at least 99 percent of their consumption, but some of the highest consumption levels are among the 45 households that produce between 87 and 99 percent of their consumption. In short, to assume that the diet in rural Sierra Leone would improve by encouraging household self-sufficiency is a risky business, at least for rice.

Producing upland rice is the most important farm enterprise in Sierra Leone. In '74-75 it required more than 10 percent of household labour and provided more than 10 percent of household income for over 75 percent of the rural households surveyed /Spencer *et al.*, 1979, p. 7/. But yields per acre and per man-hour are much less than those obtained from other types of rice production /*ibid.*, Tables 4.I to 4.3, pp. 12-20/, so the government is encouraging the expansion of the latter, which involves single cropping in swamps or flooded areas.

However that may be, our data show that for households devoting more than 10 percent of their total labour to the production of upland rice, rice consumption rises with the percentage of labour devoted to that crop (Table 3.C). The greater the production, the greater is the consumption. But rice production can also be increased by reducing the labour spent on upland rice if the household has the alternative of using that labour to grow rice in the swamps or flooded areas. Perhaps that explains why households that devote less than 10 percent of their labour to the production of rain-fed rice generally consume more rice than those that devote between 10 and 49 percent of their labour for that purpose.

Cereal, cassava, palm oil, groundnuts and alcoholic beverages

Cross-classification analyses of food consumption levels similar to that shown here for rice, were done for other cereals, cassava, palm oil, groundnuts and alcoholic beverages. Each of the hypotheses we are concerned with finds some support in the data on these five commodities but none is consistently valid. The economist's

[6]Producing onions, peppers, and tomatoes, cocoa and/or coffee; oil palm products; non farm activities other than fishing; and working for others (labour sold out).

C. Classified by percentage of total labour devoted to upland rice and number of wives of household head

Percentage of total labour devoted to upland rice	Number of wives				Row
	0	1	2	3 or more	
Less than 10	132	72	138	140	125
10 or more, but less than 49	54	107	103	53	95
49 or more, but less than 61	94	187	135	135	158
61 or more	163	168	152	...	162
Column	114	143	133	117	133

D. Classified by market orientation[c] and dependency ratio[d]

Market orientation (Percentage)	Dependency ratio				Row
	0.00	0.13 or more but less than 0.70	0.70 or more but less than 1.45	1.45 or more	
Less than 3.5	136	127	104	94	114
3.5 or more, but less than 8.5	170	196	153	101	160
8.5 or more, but less than 22.5	125	193	126	174	142
22.5 or more	41	138	144	137	126
Column	122	158	130	111	133

[c]Total sales ÷ value of total output (farm and nonfarm).

[d]$\frac{\text{Household members less than 16 or more than 65 years old}}{\text{Members 16-65 years old}}$

assertion that consumption rises with income holds the most generally: except for alcoholic beverages (and for cassava in the North) consumption tends to rise with income, but the relationship is not consistent among subgroups of households.

If we measure production for the market by the percentage of the value of total output that comes from activities usually engaged in to obtain money income, two instances support the general hypothesis that an increase in market activities is associated with lower consumption. Rice is one such case and cassava is the other; but we must question whether reducing the consumption of cassava reduces the quality of the diet. A decline, in the quantity of cassava consumed may represent an improvement in the diet if it is replaced by energy sources that provide larger quantities of protein. Yet the change in protein may be of no importance, for obvious signs of protein deficiency are uncommon in Sierra Leone. With palm oil consumption the relationship is reversed: low partici-

E. Classified by percentage of consumption derived from home production and number of adult male consumer equivalents

Percentage of consumption derived from Home production	Number of consumer equivalents				Row
	Fewer than 3.5	3.5 or more but fewer than 5.5	5.5 or more but fewer than 7.5	7.5 or more	
Less than 50	141	127	124	129	131
50 or more, but less than 87	124	145	73	75	123
87 or more, but less than 99	200	144	148	131	159
99 or more	140	139	67	68	108
Column	151	140	107	113	133

pation in market production activities is associated with low consumption of palm oil. For the other foods studied, no clear relationship could be seen between involvement in these kinds of activities and consumption levels.

The hypothesis that households producing large shares of their own consumption consume more than other households is supported by the data in three out of the four instances studied: for cassava, palm oil and groundnuts. The exception is rice, for which no clear pattern was established.

One hypothesis remains: that the quality of the diet improves as households devote larger percentages of their labour to the production of upland rice, because upland rice, unlike other types, is grown with a mixture of other crops. The percentage of labour devoted to its production does appear to be positively associated with cassava consumption, and a low percentage of labour devoted to upland rice is associated with low palm oil consumption. Yet between the two groups of households that most emphasize upland rice these relationships are less clear or even reversed.

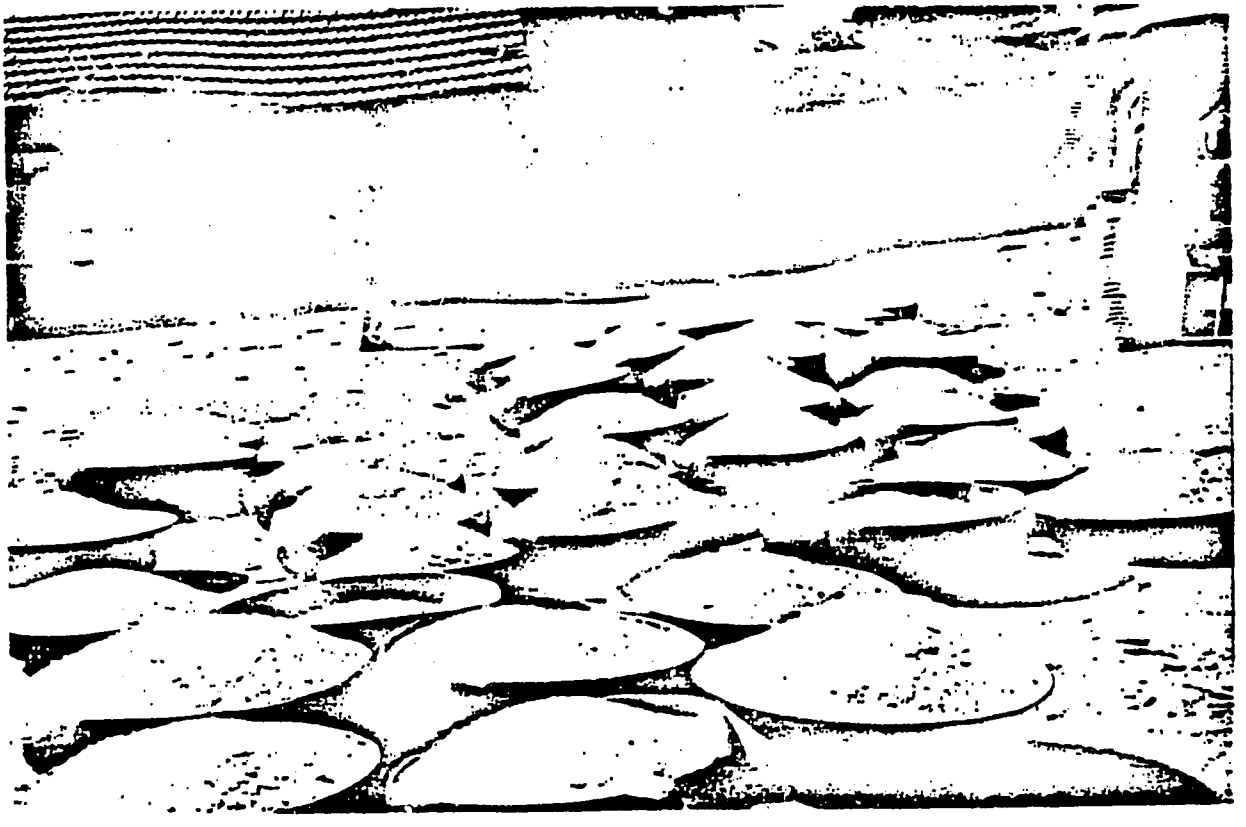
The production of upland rice has no clear relationship to the consumption of cereals other than rice, groundnuts or alcoholic beverages.

The survey conclusion:

Rice is the basic food of Sierra Leone, but palm oil, dried fish, cassava and groundnuts are also important, followed by sorghum and other cereals and a wide variety of vegetables and fruits. Green leaves are important nutritionally but may be underrepresented in most quantitative data. Seventy-four percent of the rice, 80 percent of the cassava and 52 percent of the palm oil consumed are produced within the consuming household, but wide variation exists in the extent to which households concentrate their energies on production for home consumption or for the market.

The hypothesis that production for the market has an adverse effect on the diet finds some support in the data, but more often it is not confirmed. However, in three instances out of four (for cassava, palm oil and groundnuts) consumption increased as households produced larger shares of the quantity they consumed. But this was not so for rice, the most important food of all. In any case there are enough instances in which the consumption of a specific food falls as one or the other measure of production for the market rises to remind us that the economist cannot safely ignore the possibility that greater dependence on the market may have adverse effects.

FAO Photo



Cassava market

In short, none of the hypotheses considered here, except the hypothesis that food consumption generally rises with income, will do as a basis for policy. Even the income hypothesis provides no assurance that the nutritional benefits possible from higher incomes necessarily outweigh the possibility of nutritional losses from changes in production patterns that take place in order to earn those incomes. No rule of thumb is an adequate basis for policy; we must examine the facts of each specific case in order to assess the probable outcomes.

REFERENCES

Smith, Victor E., Lynch, Sarah, Whelan, William, Strauss, John and Baker, Doyle. Household Food Consumption in Rural Sierra Leone. MSU Rural Development Working Paper No. 7. East Lansing: Department of Agricultural Economics, Michigan State University. 1979

Smith, Victor E., Strauss, John, Schmidt, Peter and Whelan, William. Non-Price Factors Affecting Household Food Consumption in Sierra Leone. MSU Rural Development Working Paper No. 12. East Lansing: Department of Agricultural Economics, Michigan State University. 1980

Smith, Victor E., Strauss, John and Schmidt, Peter. Single-Equation Estimation of Food Consumption Choices in Rural Sierra Leone. MSU Rural Development Working Paper No. 13. East Lansing: Department of Agricultural Economics, Michigan State University. 1981

Spencer, D.S.C., Byerlee, Derek and Franzel, Steven. Annual Costs, Returns, and Seasonal Labour Requirements for Selected Farm and Nonfarm Enterprises in Rural Sierra Leone. African Rural Economy Program Working Paper No. 27. East Lansing: Department of Agricultural Economics, Michigan State University. 1979

Strauss, John, Smith, Victor and Schmidt, Peter. Determinants of Food Consumption in Rural Sierra Leone: Application of the Quadratic Expenditure System to the Consumption Leisure Component of a Household-Firm Model. MSU Rural Development Working Paper No. 14. East Lansin: Department of Agricultural Economics, Michigan State University. 1981

THE ART OF THE INFORMAL AGRICULTURAL SURVEY

prepared by:

Robert E. Rhoades

THE ART OF THE

INFORMAL AGRICULTURAL SURVEY

Robert E. Rhoades

The ideas that we have in research are only in part a logical product growing out of a careful weighing of evidence. We do not generally think problems through in a straight line. Often we have the experience of being immersed in a mass of confusing data. We study the data carefully, bringing all our powers of logical analysis to bear upon them. We come up with an idea or two. But still the data do not fall in any coherent pattern. Then we go on living with the data — and with the people— until perhaps some chance occurrence casts a totally different light upon the data, and we begin to see a pattern that we have not seen before. This pattern is not purely an artistic creation. Once we think we see it, we must reexamine our notes and perhaps set out to gather new data in order to determine whether the pattern adequately represents the life we are observing or is simply a product or our imagination.

William Foote Whyte (1955)

Table of Contents

I. INTRODUCTION 5

II. WHY CONDUCT INFORMAL SURVEYS? 6

The feasibility survey 6
Reconnaissance surveys to prepare formal surveys 6
Informal surveys for the direct planning on-farm Agronomic trials 6

III. THE FRAME OF MIND 7

IV. GETTING READY: PRE-FIELDWORK PREPARATION 7

Literature review 7
Defining the region 8
Using aerial photos and maps 8
Basic questions and techniques 9

V. IN THE FIELD 14

Interviewing farmers 14
Executing the interview 15

VI. INFORMALLY ORGANIZING DATA: TYPES OF FARMERS AND CROPPING SYSTEMS 20

Types of farmers 20
Agroecological zones 21
Moving toward quantification: Satisfying an impulse 24

VII. USE OF MATERIALS: WRITING IT UP 26

REFERENCES 27

SUPPLEMENT I: RECOMMENDATIONS FOR ON-FARM AGROECONOMIC TRIALS: CAÑETE, PERU 29

I. AGROECOLOGICAL PRODUCTION ZONES 29

Valley margin zone 29
Valley center zone 30
Coastal saline zone 30

II. TYPES OF FARMERS AND FARMERS PERCEPTIONS OF PROBLEMS 30

III. FARMERS' PERCEPTIONS OF PRODUCTION PROBLEMS 31

IV. INTERVIEWS WITH EXTENSION WORKERS AND MINISTRY OFFICIALS 32

V. CONCLUSIONS 32

SUPPLEMENT II: GUIDE FOR INFORMAL SURVEY OF A POTATO PRODUCING REGION 35

I. HISTORY OF POTATOES IN THE REGION 35

II. AGROECOLOGICAL SETTING OF POTATO PRODUCTION 35

III. SOCIOECONOMIC PROFILE OF LOCAL POPULATION AND POTATO PRODUCERS 36

IV. AGRICULTURAL CALENDAR (FOR EACH VARIETY AND AGROECOLOGICAL ZONE) 38

V. FARMING PRACTICES 39

THE ART OF THE INFORMAL AGRICULTURAL SURVEY*

Robert E. Rhoades**

I. Introduction

The informal survey has often been called "quick and dirty," the approach of rural development "tourists." This put-down derives from the belief that short-term surveys yield impressionistic and "soft" data. Formal surveys based on the written questionnaire, however, are thought to be "objective," capable of producing "hard" data amendable to quantification and computer analysis. Nevertheless, budgetary, time and personnel limitations in Third World countries and international agencies frequently require use of informal surveys for agricultural development planning (Chambers 1980).

The informal survey is in fact a form of appropriate technology: cheap, practical, and fast (Bradfield 1981). If properly executed such surveys can produce at minimum cost a rich description of life in a farming community, an understanding of how farmers, merchants, extension workers, and others perceive their conditions and make decisions. On top of this, a properly conducted informal survey can give an accurate comprehension of local farming ecology and practices.

And anyone can do it --agronomists, extension workers, biologists, and social scientists. All you need is a little time (a few days to two weeks), pencil, paper, common sense, and a down-to-earth approach to farm people and their circumstances.

Surveys are only tools -means to an end-- to provide information for intelligent decision-making in solving rural development problems. As the springboard of planning, the informal survey places project implementors in contact with their clients for the first time and on the client's home turf. In this early phase the researcher is like an explorer, making a rapid survey of the horizon before plunging into the thickets from which the wider view is no longer possible. If we observe keenly at the start, the remainder of our journey stands a better chance of success. However, if we gather faulty information we may wander aimlessly throughout the project or lose precious time and funds backtracking. The purpose of this paper, therefore, is to suggest a few basic ideas on how to guarantee the efficient and successful execution of the informal survey.

---

* Funds for the development of this survey method came from the Rockefeller Foundation, IDRC-Canada, and CIP core budget.

** Agricultural anthropologist, CIP.

II. Why Conduct Informal Surveys?

The Feasibility Survey

Informal surveys can function to provide basic information on the feasibility of beginning a project in a region. This is especially the case when dealing with areas or farming systems about which little is known. In this situation, the informal survey may be of more immediate use to policy makers than to field agronomists, and it will probably be less concerned with specific production problems than with a balanced overview of the region, unless the introduction of a specific technology is under consideration.

Reconnaissance Surveys to Prepare Formal Surveys

The objective is to quickly obtain basic information specifically for the design and execution of formal surveys or more in-depth investigations which may, in turn, lead to on-farm experimentation. Thus, the immediate purpose is to help focus a subsequent formal survey that will utilize random sampling and quantify critical aspects of the production system. The need is not simply to get a "feel" of the area, but to discover important, albeit tentative, organizing concepts upon which to base future research. For example, we may want to map agroecological zones, develop a working typology of producers, and find out how farmers describe their problems. The exploratory, informal survey can also help insure that the questionnaire is written in a manner understandable and relevant to farmers' circumstances and sensitive to local issues.

Informal Surveys for the Direct Planning On-Farm Agronomic Trials

In this case, the formal survey stage is skipped and on-farm experiments are designed on the basis of an informal survey which aims to pinpoint farm-level problems. Most developing country projects will, out of financial necessity, opt for this approach.

For this reason, we need to rationalize the informal survey and make it a powerful tool capable of yielding accurate data upon which to base our research decisions. In this case, we may wish to ask more specific production questions or attempt to rank constraints in order to make sure the trials answer important local problems. In cases where the informal survey is the only planning investigation the team should be interdisciplinary, made up of at least one technical person and one social scientist. If this is not possible, team members should try to incorporate the missing perspective, be it social or biological, into the research.

III. The Frame of Mind

Long used by anthropologists in their study of everyday people, the informal survey is more in the vein of art than a set of fixed procedures. And like art, it involves creativity and technique which, if properly applied, make the difference between success and failure. And there is no substitute for experience as the teacher.

The informal survey is methodologically simple but usually physically tough. And dirty. It normally can't be accomplished by driving along a main road looking at fields, although a "windshield survey" may be a way to begin. The successful survey may require sloshing through muddy fields, scrambling along rocky paths and dangerous slopes, or whiling away hours in fly-ridden tea shops casually talking with farmers. The surveyors must be country-oriented, grubbing out information in fields, market places, bars, or wherever farmers' daily routines carry them. Those unwilling to face a few village hardships have no business doing informal surveys.

The successful informal survey also requires mental and methodological flexibility. It does not proceed like the formal questionnaire survey where pre-determined hypotheses are tested. Instead, important questions and the direction of study emerge as information is collected. This is not to say the informal survey lacks logic, but that one must be able to accomodate new information and adjust research plans accordingly. As the survey advances, you will pass from initial vagueness to a mid-way focussing and finally arrive at a stage where you can begin pulling the threads together and test specific ideas.

IV. Getting Ready: Pre-Fieldwork Preparation

Literature Review

Before going to the field, assemble and review any relevant secondary socioeconomic and production information about the general area to be studied. A surprising amount of data can be found if an effort is made to dig it out of libraries, research stations, and government offices. Secondary materials, especially government statistics, should be taken as suggestive of possible lines of inquiry and not as gospel truth. Attempt to acquire secondary data on rainfall, soils, population, markets and prices. Do not forget to consult studies conducted by other disciplines; it is a mistake for an anthropologist to read only anthropology, an economist only economic studies, or an agronomist to consult only agronomic reports.

Defining the Region

The most difficult early decision in the informal survey centers on delineating the geographical region to be studied. This depends, of course, on time, available manpower, and the project's aim. One must be careful, however, not to define the study region too broadly or narrowly. If the target area is vast, covering more than 300 square kilometers, it will be better to plan mini-surveys in representative areas.

In agricultural research, a target region will most likely share common physical and economic characteristics or linkages. In Peru, for example, the highland area selected for on-farm research was the Mantaro Valley, a high intermontane river valley marked clearly by right and left marginal slopes. On the arid coast, research was conducted in Cañete, a lowland valley, the territory of which is defined precisely by its irrigation system. In the Peruvian jungle, however, the informal survey was carried out in selected farming communities located at various points along the major river which served to link communities with the nearest commercial center. In this case there was no concept of a valley or plain but a broad study area linked by transportation arteries.

Using Aerial Photos and Maps

The best way to get a rapid overview of a region is to acquire aerial photos, land-use, relief, or ecological maps. In fact, do not even think of going to an area without at least one map, preferably a topographic map. A few hours studying such visual materials can reveal more than years on the ground trying to figure out agroecological zonation or land use patterns. Contrary to popular belief, excellent maps and aerial photos now exist in the geological or military survey offices of most underdeveloped countries. Satellite imagery already provides excellent coverage for some of the most remote areas of the world.

The ability to read maps and aerial photos is of greatest importance for conducting informal surveys. The images on an aerial photo may at first seem strange because one is not accustomed to a view from the air. With a little practice, however, the kaleidoscopic patterning of an aerial photo can tell us a great deal about both the historical and present structure of man-land relationships. By tracing field distribution and size, shadows and tones which reflect variations in crops or soil texture, irrigation channels, location of towns and roads, one can rapidly understand in a very general way the regional organization of agriculture.

Later, on the ground, the reality of the photo (called "ground truth" in satellite imagery interpretation) can be checked. For example, in planning on-farm research in Cañete, an International Potato Center survey team examined aerial photos of the valley. Three outstanding images were observed: (1) marginal belt circling most of the valley's edge made up of tiny fields, (2) center region made up of medium to large fields, (3) area of seemingly mixed field sizes and perhaps wasteland

reflecting a light tone. The team hypothesized that these images may represent distinct agroecological belts. The aerial photographs and the agroecological map developed from them are shown in photos I, II and Map I.

With additional data on communities in each zone and soil maps from the national resources office, the team conducted a windshield survey of the valley for two days and talked to farmers. By using aerial photos, field clusters were located. It was discovered that the zonation reflected in the photos did correspond to ground level reality, although some modification was required. The marginal zone, characterized by poor, rocky soil, was inhabited by small-scale producers. The center zone, historically the location of large estates, turned out to be a zone of large fields and the best soil in the valley. The third zone was mixed in terms of landholding size but was characterized by a common problem of extreme soil salinity and poor drainage and thus better suited for livestock and saline adapted crops such as sweet potato, peppers, and cotton. Field observations and interviews with farmers revealed that each zone was characterized by distinct combinations of crops, farming practices, and production problems. The differences between zones and similarities within zones were taken into consideration in implementing on-farm trials (see supplement I for the summary recommendations of this survey).

Basic Questions and Techniques

Before we ever set foot in any farmer's field, we need to go to the drawing board and decide: what kinds of information are we after and for what end? Our general objectives should be clear, even though we may not yet know relevant questions. Draw up a list of tentative topics for investigation:

- What are the agro-climatic zones?
- What are the principle crops?
- What is the cropping (or post-harvest) system?
- What are the types of farmers?
- What are the farmers' practices?
- Why do farmers follow these practices?
- What do they feel are their main problems?

MISSING PAGE

NO. 10

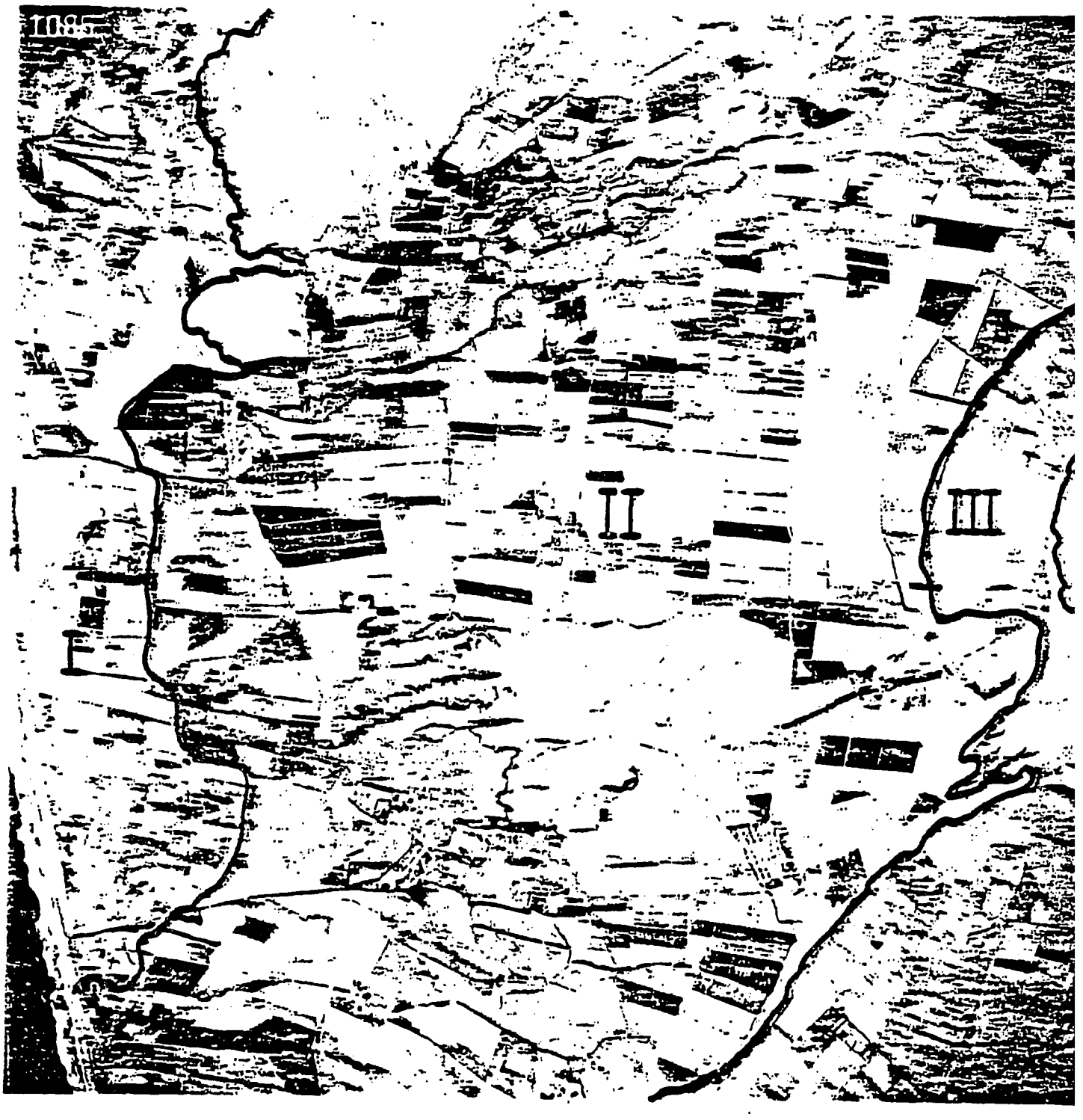
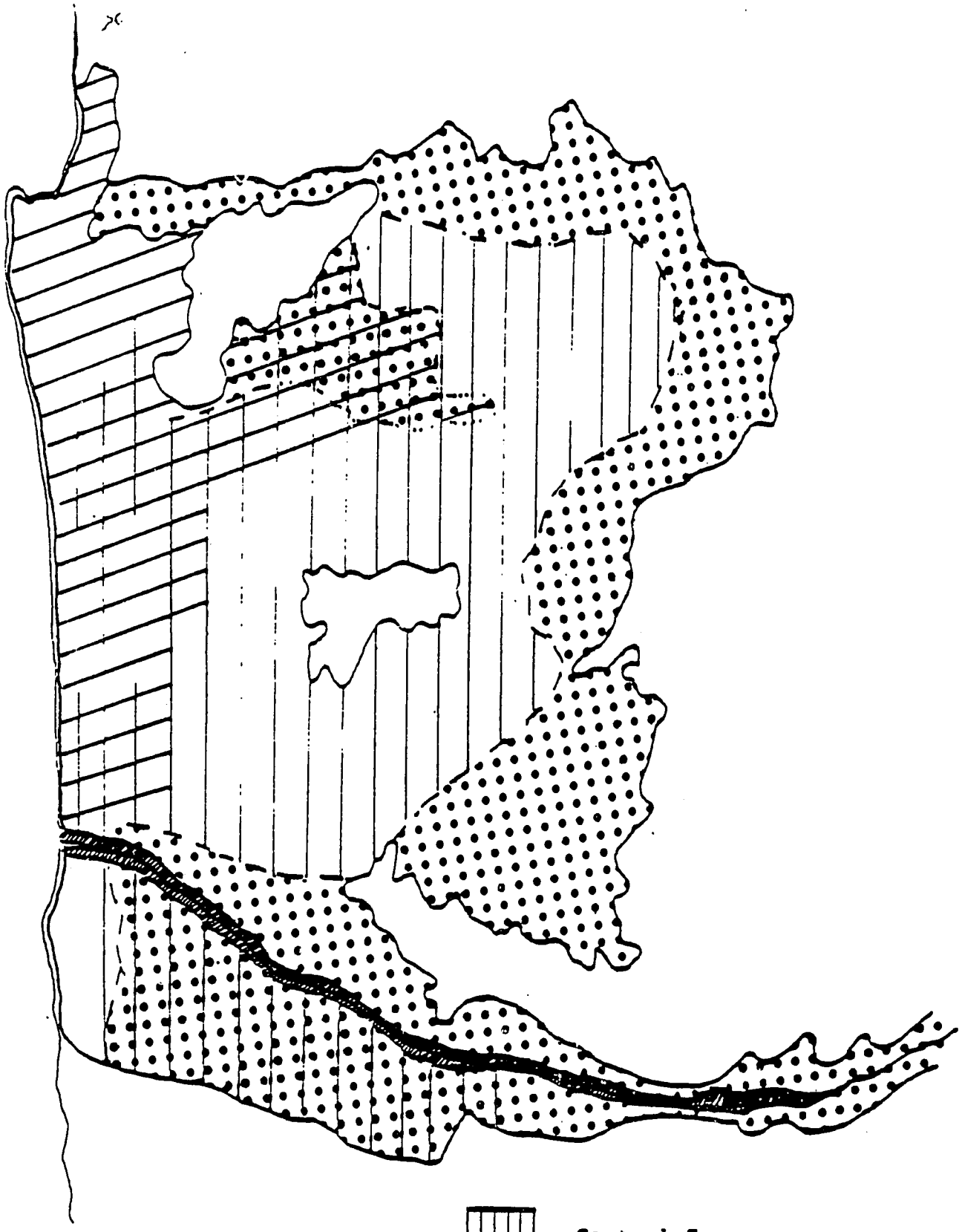


Photo II. By examining field size and distribution, shadows, tones, and other features, organization of agriculture in a region can rapidly be understood, albeit in a general way. Later, "ground truth" can be checked by visiting selected areas and surveying farmers and fields. In this case, three hypothetical zones were determined.

Following further study on the ground, an agroecological map (see Map I next page) was drawn.

(Photo: Courtesy of the Instituto Geográfico Militar).

Map I: Agroecological Zones. Cañete Valley, Peru.



Central Zone

Marginal Saline Zone

Marginal Higher Zone

Non-agricultural hills

p. 12

Note: Some areas showed mixed characteristics of more than one zone. These are shown on the map by overlayed markings.

During the informal survey, seek out "key informants," those talkative individuals with great depth of experience and knowledge about farming. Don't fall into the bias of interviewing only men. Normally all family members are involved in agricultural decision-making and especially in regions of high male labor outmigration, women, old people, and children are the backbone of farming.

V. In the Field

Armed with the questions you decide are relevant and available secondary material, you are ready to begin. At first, everything will seem a booming confusion in the field. This initial disorientation is inevitable, so don't let it concern you. Just remember three simple bread-and-butter techniques and before long your region will become comprehensible.

OBSERVE. Keep your eyes open for patterns in crop production, land use, and farmer behavior.

CONVERSE. Talk with people and listen to their concerns and views.

RECORD. Discreetly, write everything down. Try to keep as complete fieldnotes as possible. This is essential in the early stage to help organize your thinking.

Interviewing Farmers

The key to a successful informal survey, especially in relation to understanding how farmers see their problems, is the successful interview. It is important to decide early whom you want to interview. A frequent bias in agricultural development is to think in terms of "the farmer." Farmers, however, usually do not live in isolation. They belong to groups --families, communities, nations-- and decisions about farming are often made by these groups. Although you may talk to individuals, place their comments in the context of social pressures and beliefs. Interviews with groups of farmers are frequently more lively than with only one person. Be sure that local leaders know what you are doing. Informal does not mean incognito. In fact, in many parts of Asia and Africa you must go through the local headman or village leader to gain cooperation. Don't try to shortcut the local chain of command. Although be aware that local leaders will selectively introduce you to the people that support their biases.

One way to understand the total farming system (not just on-farm production) is to construct a chain of "key informants." The key informant is an individual who is accessible, willing to talk, and has great depth of knowledge about an area, certain crops, credit, marketing and other agricultural problems. Do not believe everything key informants say but do not pass up the old-timer who enjoys talking. In any community it won't take long to construct a chain of key informants: banker or money-lender, landlord, ministry official, extension agent, farmer, merchant, and middlemen. Each person in the chain may see the problem differently.

Executing the Interview

The mechanics of the informal interview itself can be arbitrarily divided into five stages (Rhoades 1980).

1. *APPROACH*
2. *WARM-UP*
3. *DIALOGUE*
4. *DEPARTURE*
5. *RECORDING*

1. The Approach - With our general objectives in mind, information from secondary materials, and possibly names of local "key informants," we are ready to enter the field. It is best to keep as low a profile in the rural setting as possible. Oversized vehicles bearing official looking numbers driven by chauffeurs should, if possible, be avoided. Walk as much as possible. Do not go in large numbers. Two in a team is often best. If you have a sizeable team it is advisable to divide the study area into a number of zones in order to avoid duplicating efforts or interviewing the same farmers. Once you spot a man in a field or a woman in her garden who appear as persons to interview, don't drive around indecisively creating suspicion. Approach him or her directly. However, avoid the "opinion poll syndrome," where you startle the farmer by driving up to him in his field and jumping out with notebook in hand ready to interview. Try to blend into the local context as much as possible without "going native." Be sensitive to the fact that people may be suspicious of you.

Timing is extremely important. One has to be aware of the daily work schedule, seasonal activity, work habits, climate, and how these affect farmers' willingness to talk. In Peru's highlands, we have found that interviewing is acceptable early in the morning before the day's activities get underway. In Indonesia, however, the best time for interviewing is between 4 pm, after prayer, and the evening meal when people are in their homes.

If one is willing to take the time and physical effort to walk to the field, interviewing is often more successful since discussions can center around ongoing agricultural activities. If appropriate lend a helping hand without getting in the way. The slack season is also an excellent opportunity for informal interviewing.

2. The Warm-Up - Informal interviewing is a dynamic process in which important information develops out of casual conversation. The first interviews may be very simple but soon, as our knowledge of an area increases, questions will become more penetrating and valuable.

One purpose of the informal survey is to communicate with farmers. If large numbers of researchers descend upon a farmer, the result is likely to be like this. The farmer is the man on the left, isolated and alienated. When he works with only one or two researchers he is known to be an excellent and talkative informant.

Don't go directly to the subject at hand. The farmer should first be greeted according to local custom. Farmers should be treated with respect (if the local language requires it, use the "polite" form of address). Here, avoid what I call the "sahib syndrome" which is condescending and aggressive. Treat farmers with courtesy. Don't talk to the farmer from a vehicle; try to avoid positioning yourself above him. Open the conversation with locally accepted polite talk about the weather, how his crops are doing, or the price of potatoes. Tell him exactly who you are, why you wish to talk, and the nature of your work.

Observe the situation to make sure the context is conducive to an interview. For example, if the farmer is irrigating and receives water only once a week for an hour, he may not be interested in small talk. Ask for an appointment. Sometimes farmers can suggest the best time and place to continue.

3. The Dialogue - The key to the successful informal interview is to be natural and relaxed while guiding the conversation to a fruitful end. Let the discussion flow and mix up your questions. At first avoid sensitive questions. Don't fall into the "Joe Friday syndrome" (The famous TV policeman whose interrogation always began with a blunt "just give me the facts, ma'm"). Allow people to stray onto another topic or tell stories. You are seeking general information and what is said may be revealing of local customs or pshychology. You can return to the main line of thought later. By all means, don't ask too many questions back to back. Intersperse the conversation with personal comments of your own.

One method that gains farmer cooperation anywhere in the world is the straight forward, honest admission on your part that the farmer is the "expert" about farming in his area and you are the learner. Just say "I am not from around here and I don't know much about how you farm. Would you kindly explain ...?" Then, go to your specific questions. If you have personal farm experience from your region or country, farmers always like to compare notes.

If you ask a question that causes silence or it is obvious he can't answer it, don't try the socratic method of suggesting answers to lead the conversation where your bias thinks it should go. Rephrase the question. Always use plain understandable language with farmers. After all, they have a rich vocabulary tied to their profession and area, but they do not understand scientific jargon. There are advantages to working in pairs with at least one person from the same culture although not necessarily from the target area. Don't ask questions that are too abstract or sensitive. Don't extend the interview beyond 30 to 45 minutes unless the farmer is in a talkative mood. Observe facial expressions as they may reveal a great deal about farmers' concerns or reservations. Make sure your questions are culturally sensitive. Frequently, you may get information on sensitive matters through indirect questioning. But always remember that what people say and do may be two different things.

This field notebook is indispensable to the informal survey. Although you have to discreetly use pen and paper in front of farmers, write down in detail your observations and thoughts during or immediately after interviews. Without a complete data-packed notebook the informal survey will likely fail.

4. The Departure - After you have covered all relevant topics or exhausted the time the farmer can afford to give you, bring the conversation to an end. Not too abruptly, however. If the weather is unfavorable (too hot, raining) or the farmer seems pressed for time you may wish to prematurely stop the informal interview. Remember to do it gracefully and naturally. Avoid the "gringo syndrome," the abrupt, business-like "gotta go" departure. Thank him for his time and depart with the proper local farewell.

If locally accepted the camera can be an important research tool. Photos can be used later to help design formal surveys or experiments. Sometimes you can do the farmer a favor (and win his confidence for future on-farm work) by sending or returning with photos of the farm or family. Do not let the family down by failing to send promised photos. Also, in most world areas farmers appreciate receiving small packages of vegetable seed for their gardens or technical brochures written in plain language.

5. Recording of Information - Immediately after (or if permissible during) the interview jot down memory-jarring notes. Agricultural scientists, in particular, tend not to write down what farmers say or their own personal observations. However, it is amazing how facts, ideas, and important observations that one "will never forget" quickly slip away. It is estimated that 50 per cent of the details of an interview are lost within 24 hours and by the end of the second day, over 75 per cent. After that, only skeletal notes can be salvaged. Thus, remember during the interview to take mental notes reminding yourself: "don't forget to write that down." Jotted notes will serve to aid your memory later when you write out full field notes on interviews and a day's observations.

Whether one should take notes in front of farmers depends on the situation. Be sensitive to your actions. The best rule is to abstain from using pencil until you feel the situation is truly relaxed. Informal interviews lasting more than 30 minutes will usually be casual enough to allow the writing of some notes. Don't pull out an official-looking questionnaire in any case. This will surely destroy confidence. Test the ground first by "interacting" with the farmer on paper by drawing a field layout or cropping pattern. If he does not react suspiciously to the pen and paper, you can probably continue to take some notes. However, if issues turn sensitive, stop writing. Try to get the farmer's name and address unless he prefers not to give it so that you can contact him or if you visit the area again you can make specific personal reference to your previous visit.

How long one waits before jotting down notes or writing full field notes depends by and large on the setting, people interviewed, and personal style. In cases of team research, it may be best to appoint a scribe, a person whose job is to write everything down. After interviewing farmers in the morning, for example, stop around midday and write out field notes while they are still fresh in mind. It is also valuable

for the research team to meet daily in the evening to go over notes and plan for the next day (Hildebrand 1979).

Think by writing in your field notebooks. One method of recall is to think in terms of a "sequence of events," that is writing while remembering the activities surrounding an interview. If you discover your questions are not yielding new information it may be time to ask them in a new way or change the questions themselves. Through this rethinking process and "brainstorming" with your team workers, you will have analytical flashes where sudden realizations will consolidate into a pattern. For example, when at once you saw isolated fields and crops, now you can see how they associate to form an agroecological zone.

VI. Informally Organizing Data: Types of Farmers and Cropping Systems

One purpose of the informal survey is to define relatively homogeneous types of farmers and agroecological or production zones. Technology is frequently locational and group specific. What works for one group of farmers in one ecological zone may not work elsewhere. This fact is complicated through a widespread tendency by technical agriculture scientists to select larger, "better" (more successful) farmers for experimental research since this group is more accesible and has resources to carry out experiments. Also, agronomists have been known to prefer level fields with quality soil near roads rather than perhaps more representative sloping, rocky, fields located far from the main road. Thus, one should be aware of the representatives of the experimental plot for extrapolation of research results.

Types of Farmers

Early in the informal survey one can begin to develop a typology of producers. Typically, such groupings are based on a predetermined and quantifiable landholding size (e.g. 1-5 hectares is small farmer, 5-10 hectares is medium, over 10 hectares are large farmers). However, care must be taken not to assume size is necessarily correlated with specific cropping patterns or even economic status. Often both large and small farmers in the same area pursue similar cropping strategies. And it may be that the "small" farmer with his limited farm size is more efficient or a better farmer because he must be able to subsist on a much smaller landholding. Thus, multiple factors have to be considered in developing a typology of producers; e.g. size of holding, purpose of production, and cropping system. In terms of potatoes, for example, one might develop a technology involving large to small commercial seed growers, small-scale subsistence farmers, and large, medium and small-scale commercial growers of ware potatoes. However, remember that typologies are merely ways of organizing thinking and that farmers cannot be so easily stereotypes. Do not automatically assume that all farmers in a type will behave the same.

Agroecological Zones

An agroecological zone represents an association between a set of natural conditions (climatic, topographic, soils) and agricultural activity (farming, herding) utilized to exploit that environment. The usefulness of zones resides in the possibility for extrapolation since conditions within zones are more similar than between zones. Presumably, farmers living in the same zone would have similar problems and technological needs.

Studying agroecological zones can be facilitated by two simple techniques: agroecological transects and field plotting.

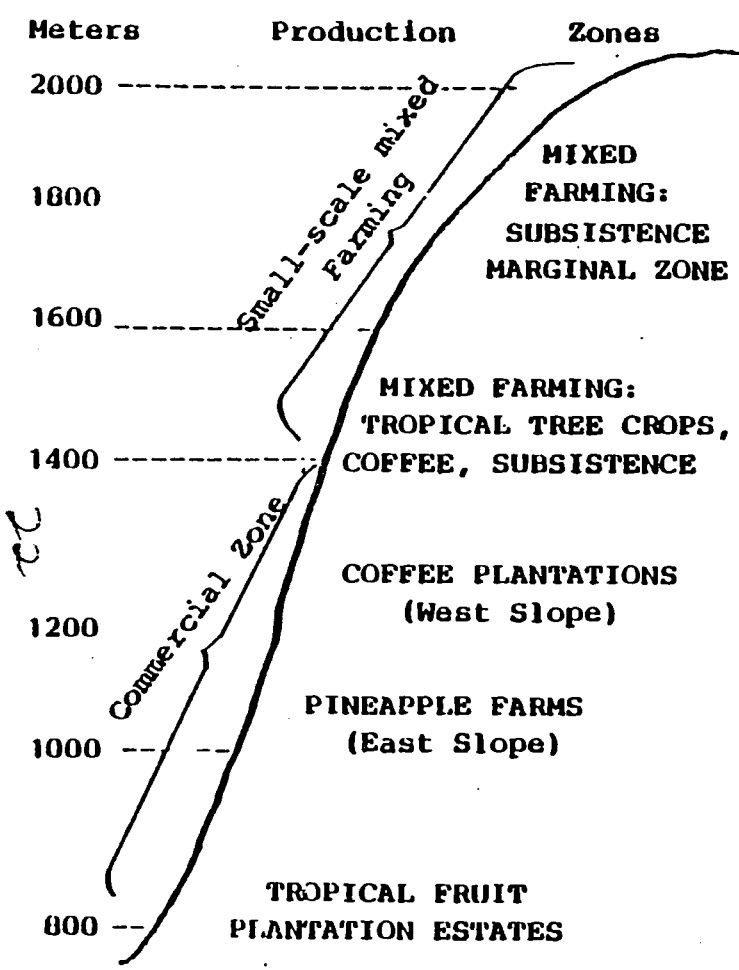
The transect is simply a cut or cross-section of a territorial expanse wherein fields are mapped, cropping patterns and practices observed through space, and the boundaries of agroecological zones defined. Transects are relatively easy to do, depending on the ruggedness of terrain and visibility as affected by topography and vegetation. The transect is especially appropriate where you have relatively rapid changes in topography and natural conditions, such as in mountainous regions.

For example, a transect was made in Peru's Chanchamayo Valley to determine agroecological zonation and crop distribution (Diagram 1). The Chanchamayo stretches between Peru's high jungle on the eastern Andean slopes down to the lower Amazon Basin. The region ranges in altitude from 500 to 800 meters on the valley floor up to surrounding 2,000-meter ridges.

Using an altimeter, aerial photos, and topographical maps, the survey team started walking from the valley floor along an access road toward higher elevations. Detailed notes were periodically taken of natural vegetation and sketches of field shapes and crop associations made. Technological observations were likewise taken and, whenever possible, farmers interviewed. It is important to observe settlement patterns, distance of dwellings from fields and distance between fields. These aspects might be important, for example, in determining labor or time requirements in getting to fields or transporting a harvest to market. Transects similar to this were made in several parts of the valley and later the information assembled to give us a general idea about land use in the region.

Field plotting is a second simple technique for rapidly understanding cropping patterns and practices in a region. It can be conducted in relation to the transect exercise or while systematically driving through a region. Periodically, especially if it is sensed that the ecology has altered, the team should stop and plot a field in terms of its crop associations and observed farming practices (Diagram 2). We do not even have to talk to a farmer to learn a tremendous amount. In a single day, data on several hundred fields can be recorded in an area of open terrain with good roads. For example, agronomists at the International Potato Center were considering trials related to intercropping in the Peruvian Highlands.

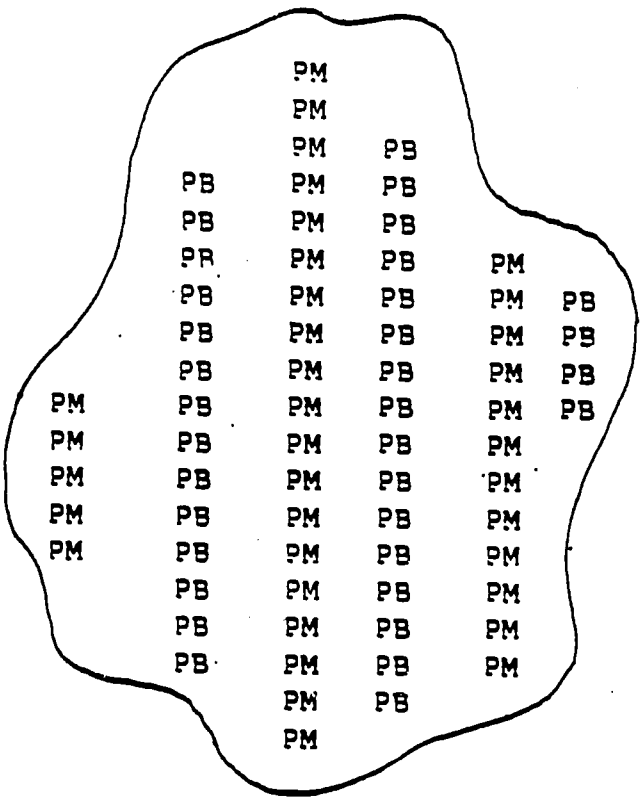
Diagram I: Agro-Ecological Transect. Chanchamayo, Peru.

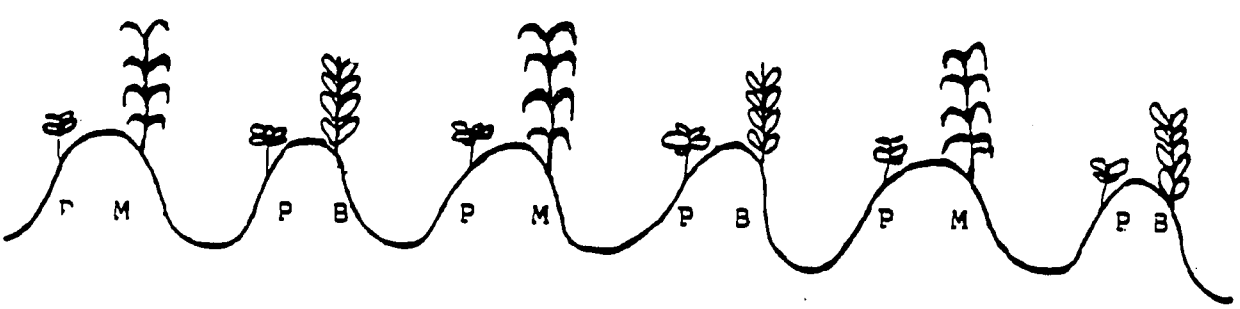


OBSERVATIONS

Landholding	Cultivation Type	Associated Crops	Origin of Farmers
Family units 8 - 10 hectares	Semi-shifting cultivation Vegetable garden No pesticides No fertilizers Mixed cropping	Vegetables (potatoes) Livestock Maize Bananas	Recent settlers from highlands
Families tied to Cooperatives	Semi-shifting (until permanent crops put in)	Papaya Palta Banana	Recent migrants from highlands
Cooperatives Large units	Hired labor pest - fertilizer	Banana Palta Papaya	Long-term residents
Household; private	Hand cultivation	Yuca	Second generation settlers
Large units; coops (haciendas)	Permanent, mechanized, pesticides, fertilizers	Banana Palta Papaya	Old-timers

Diagram II: Field Plotting





PM = Potatoes-maize (same row)

PB = Potatoes-beans (same row)

Description: at 3,175 meters we encountered a field with intercropping of maize, potato, and broad beans. Appears potatoes planted first and with first hilling up, then maize and broad beans planted. This was confirmed by farmer met later on the trail. Apparent reason is to save labor by planting maize and beans while hilling up potatoes. Also, farmers spreading risks; in case one crop fails, will have others to fall back on.

Source: Chanchamayo field notes, 1979.

A subsequent informal survey conducted in one day yielded data on 175 fields. Field plotting was done for representative types. The results showed that 86% of the conveyed fields were monocropped and that potatoes are rarely intercropped even in the remaining 14 per cent. Agronomists dropped the idea of conducting on-farm intercropping trials for this region (Werge, N.D.).

The sampling may not be random but after two to three hundred fields are covered, the cropping pattern should be generally understood. This, for example, can indicate whether experiments should be done with intercropping, monocropping, or what field trials might be considered.

The problem is that such field observations are time frozen. To gain a long term view of a field or zone, interviews with farmers are necessary. This can be done, however, by having the farmer tell the history of a few parcels as far back as memory and time allow. It is important to gain an understanding of rotations and the overall cropping system so as to determine how a farmer views the role of different fields in his farming strategy.

Moving Toward Quantification: Satisfying an Impulse

If the informal survey lasts more than one week, you may feel the need for some degree of quantification, a first step toward a formal survey. It is at this point, that the development of a simple one-page interview schedule is suggested. The purpose of this is to gather some very basic numbers, perhaps on size of operation, rotations, crops, and farmer opinions on primary production problems. By this simple quantification, it can be seen if patterns emerge in different zones and among different types of farmers. You can also use it as ammunition with colleagues who won't believe you unless they see numbers.

One valuable technique is the farmers' ranking scale developed from responses to the open-ended questions: "What is the most important problem you have in producing potatoes? The second most important, the third, and so on (see Supplement 1). Although these are abstract questions, we have found that farmers always have three or four major technical problems on their mind. After the interview, write down farmers' perceived production problems, ranking them numerically. Later a ranking table can be constructed and the data used to select technology for on-farm experimentation which relates to farmers' felt needs. It should be remembered, however, that concerns are very seasonal. In Cañete, Peru, potato farmers in March always see cost or quality of seed as their main problem (because they are getting ready to plant); in August (just before harvest) it is an insect pest.

A table drawn from one of CIP's informal surveys is given below (see Table I). Farmers were asked to rank their first four problems in order of importance. Such tables are easy to construct and useful as a sort of intermediate step toward quantification.

Table I: Farmers' Perceptions of Production Problems Ranked in Order of Importance: Mantaro Valley

Problems	N° of Farmers' Responses				Total Responses
	Most Important	Next Most Important	Third	Fourth	
1. Climate	10	11	12	2	35
(frost)	(3)	(4)	(5)	(0)	(12)
(hail)	(3)	(6)	(3)	(0)	(12)
(drought)	(4)	(1)	(4)	(2)	(11)
2. Insects	9	6	5	0	20
3. Lack of Capital	8	2	6	3	19
4. Plant Disease	5	7	3	2	17
5. Cost of Inputs	1	3	3	1	8
6. Lack of Land or Poor Land	2	1	3	0	6
7. Cost of or Lack of Labor	0	2	1	0	3
8. Lack of Irrigation	0	2	0	0	2
9. Lack of Technical Knowledge	1	0	0	0	1
10. None	1				

VII. Use of Materials: Writing It Up

Immediately after fieldwork, the team should sit down and quickly write a summary report even if it lacks professional polish. Don't worry too much about grammar and style. Re-writing can come later. It is important to get the information down while still fresh on everyone's minds. The exact format or outline will depend on the purpose of the survey but be sure to write in a language understandable to everyone. If the report is to be used to implement on farm experiments, summarize only directly relevant material. Keep recommendations brief. Copies of summary and final reports should be sent to all offices, institutes, or interested individuals, especially those who assisted in the research. This final reciprocity is only fair. The people of the region have given you their time. The least you can do is give them a copy of the study which they have so kindly help you prepare.

It is important not to let the report be shelved away only to gather dust. Take it seriously: it should be your guide throughout future activities but constantly upgraded as you progress. The informal survey is for immediate utilization, not as an historical document. It should serve to keep us honest (or at least caution against slipping into our prior biases without reason). If, for example, our survey shows that the majority of potatoes in a target region are produced by resource-poor, small growers located in a high, marginal zone 1 hour walk from the main road, we should fight off the understandable desire to carry out trials with a few large-scale producers located on fertile valley floor lands (unless the technology being tested is relevant to all growers, large or small in either zone).

Unless we take seriously our findings and what farmers have told us, we are likely to discover that farmers will not take us seriously either. We have to be sensitive to their needs, opinions, customs, and capabilities. Otherwise, we may fall victim to what I call the "which way to Little Rock syndrome?" In a rural area of the United States, in the state of Arkansas, a farmer was hoeing cotton in his field near a forked road. A city "slicker" (country term for pretentious people from big cities) in a big, shiny car, was headed toward this fork trailing a cloud of dust behind. When he got to the fork and was obviously confused he yelled to the farmer: "Hey, buster (an insulting form of address not used in Arkansas), does it matter which road I take to get to Little Rock?" "No" yelled the farmer back. Satisfied the man turned left and sped away. The farmer with a sly grin paused, leaned on his hoe and yelled again: "No, don't matter to me no how" as he watched the city slicker drive away on the wrong road.

References

1. Bradfield, Stillman
   1981 — Appropriate Methodology for Appropriate Technology. In American Society for Agronomy, Transferring Technology for Small-Scale Farming. Chapter 2, pp. 23-33

2. Chambers, Robert
   1980 — The Small Farmer is a Professional. Ceres. 13(2): 19-23

3. Hildebrand, Peter
   1979 — Summary of the Sondeo Methodology Used by ICTA. ICTA: Guatemala (Mimeo).

4. Rhoades, Robert
   1980 — Some Notes on the Art of Informal Interviewing. Discussion paper prepared for workshop on "Methodological Issues Facing Social Scientists in Applied Crop and Farming Systems Research" CIMMYT: Mexico (April 1-3).

5. Werge, Robert
   N.D. — Interplanting Practices in the Northern Andean Sierra. Mimeograph. International Potato Center.

6. Whyte, William Foote
   1955 — Street Corner Society: The Social Structure of an Italian Slum. Chicago: University of Chicago Press.

MISSING PAGE

NO. 28

SUPPLEMENT I

RECOMMENDATIONS FOR ON-FARM AGROECONOMIC TRIALS: CAÑETE, PERU

An informal survey was conducted over 10 days in late February and early March, 1980, to help CIP's agroeconomic team focus better on farm-level problems in conducting trials. In this case, the agronomic team had already been through one season of trials and had considerable knowledge of the area. However, they had conducted trials mainly with larger farmers located in the center of the valley and on problems generally defined from the outside rather than by farmers. The attempt then was to (1) define agroecological zones; (2) identify representative types of farmers and their perceptions of production problems; (3) interview local extension and ministry workers to better pinpoint relevant problems for which improved technology might be available. This report, highly simplified, presents the findings of this informal survey.

I. Agroecological Production Zones

We would strongly urge that the upcoming trials take into account the internal agroecological ~~diversity of the~~ valley. Mainly based on soil, irrigation, and socioeconomic conditions, we have determined the existence of three main zones: (1) Upper Valley Margin, (2) Valley Center and (3) Lower Valley Saline Margin (see Map I earlier in this report). In each of these zones farmers distinct sets of production problems or possibilities. Although we cannot present the mass of data we have available, we can briefly summarize the differences in the valley.

Valley Margin Zone

This is a zone of small agriculturists with most holdings varying from 1-3 hetares. It contains the poorest soil in the valley being quite shallow, sandy, and rocky. Since the agriculturists here receive water only every 8-10 days (by mita) and face water management problems, water supply is considered a major problem. They tend to opt for plants which require less water, mainly cotton (which also has price stability). The water problem has been severe for two years because of a lack of rains in the highlands and predictions are that this year will see an even greater scarcity of water. Here one finds the greatest variation in crops and intercropping. Potatoes are grown mainly in the sectors of Quilmana Alto and Nuevo Imperial (47% of all Cañete potato growers for 1980 are programmed in these areas according to ministry data).

Valley Center

The valley center was historically the location of the large farms which are today cooperatives. This region contains the "alluvial plains" soils, considered to be deep and the best in the valley for agriculture. Scattered throughout the valley are sections of small and medium-size agriculturists. The cooperatives and medium-scale producers concentrate on 3 or 4 main commercial crops (cotton, potatoes, maize, sweet potato). They farm with tractors and have a strong market orientation. The small agriculturists in the zone also plant commercial crops but also pursue cultivation for home use (pan llevar). The cooperatives receive water at all times so there are no major water problem. A typical rotation is cotton-potatoes-maize.

Coastal Saline Zone

The main characteristics of soil are: salinity, clay texture, and poor drainage. Farmers complain especially of salinity which they note prevents the growing of potatoes. Cotton, maize and pasture for cattle are the main crops here. The zone has a mixture of CAPS (cooperatives) and small to medium producers. Under a land rehabilitation project, more than 3,000 hectares will be improved for cultivation purposes. Since most irrigated, arid zone have problems with salinity, Cañete would be an area for fruitful investigation with application to other world areas. Many farmers in this area wish to plant potato but are not willing to take the risk because of salinity.

II. Types of Farmers and Farmers' Perceptions of Problems

In addition to identification of major zones, we also studied 6 areas within the valley. It was learned that significant variation occurs in agricultural practices even within our larger zones. Each area has its own special characteristics (demographic patterns, crops, irrigation system, etc.) and anyone doing experiments would benefit enormously from the detailed studies on 17 areas of the valley carried out by the agronomists of Valle Grande. This information includes complete and detailed questionnaire, often covering every farmer of the selected area.

Contrary to popular belief, Cañete is not a valley of only large farming operations. It is also a farming community made up of small landholdings. According to 1976 data, 84.2% of all farm units contain less than 3 hectares, 11.2% with 3-9.9 hectares and the other units are medium or CAPS. It is also not an established fact that mainly medium size farmers and CAPS grow potatoes. In fact, according to the ministry's registration (all farmers must submit a cultivation plan) the average size planting is around 4 hectares. The vast majority plant only 2-3 hectares. Furthermore, since 1976 the CAPS have drastically cut the number of

hectares they plant in potatoes. According to 1980 ministry data (not quite complete for 1980) only 25% of total hectareage will be planted by CAPS this year.

Table 1 gives a general breakdown of the 1980 programmed planting. The sectors Quilmana Alto, Quilamana Bajo and Nuevo Imperial Alto contain most of the potato farmers (69.75%), and nearly all of those farm less than 3 hectares of potatoes. These three areas account for 48.25% of the programmed land area. Only in Quilmana Bajo do we find CAPS and a significant number of medium farmers. In Nuevo Imperial the average size of planting will be 1.73 (N = 99). It should be further noted that 86.74% of all planting will take place in April and May. Thus, if one can speak of an "average" farmer (representative of the majority of the region) it would be a farmer with 2 to 3 hectares who lives in one of the marginal communities and plants in April and May. In any case, these available data suggest that if representativeness is a concern then at least 70% of the experiments should deal with these small farmers.

III. Farmers' Perceptions of Production Problems

To acquire a better understanding of farmers' perception of problems we conducted a non-random survey with farmers from various zones. Among other things, we asked them to rank their production problems.

The ranking of all farmers was the following:

		N° of Farmers	% of Total
1.	Cost of seed	32	65
2.	Cost of inputs (besides seed)	31	63
3.	Irrigation problems	19	39
4.	Insects	18	37
5.	Soils (poor or saline)	13	26
6.	Disease	11	22
7.	Marketing	11	22
8.	Climate	6	12
9.	Others	8	16

The farmers of Cañete are presently weighing the decision whether to plant. This may have biased our survey, but there is little doubt that the prevailing cost of seed (105 soles/kilo) is a major concern in the valley. Nearly all farmers mentioned risk in conjuction with cost of seed and other inputs. Potatoes are extremely expensive and a crop failure would be a strong financial setback for small farmers.

Each agroecological zone has its own type of production problems. In addition to their concern with costs, the farmers of the marginal zone rank irrigation as a major problem (N = 14, 50% of total farmers

in the zone). In the central zone (where they mainly receive water continuously) problems with insects (mosca minadora) was a major concern (N = 7, 50% of central zone farmers). Along the coastal-saline zone, farmers perceive soil problems as the next problem after cost of seed. This is due to high salinity, poor drainage, and what they call a lack of "agua dulce" (sweet water) since they are at the end of the irrigation channel and receive the water after it has gone through the entire system. The implications of this data on perception of problems are that seed storage experiments may benefit farmers in all zones (including CAPS in the center of the valley), irrigation experiments may be most beneficial on the margins where water problems exist. Of course, experiments with salinity along the coast may be worthwhile if the transferability to other world zones is an objective of the experiments (as stated in the justification of the Cañete project).

IV. Interviews With Extension Workers and Ministry Officials

In addition to our work with farmers we also interviewed extension workers and ministry officials. Eng. Trelles, who is in charge of the potato section at the ministry, recommended three broad categories of experiments:

1. *Nematode Control* (cultural practices, chemical control or resistant varieties).

2. *Water/Irrigation* (any experiment to help solve water problems of small farmers).

3. *Salinity* with the opening of 3,000 new hectares, potatoes could play a role if we had the varieties or agronomic techniques to deal with salinity.

Other extension workers added the following: (1) storage experiments; need to store "criolla" seed from September/October to March; (2) insect control, especially "mosca minadora;" (3) fertilizer trials, incorporating more organic material in soil or trials with "guano del corral ; (4) biological control of insects.

V. Conclusions

Based on all the evidence we have available we would recommend the following:

1. Most of the experiments (70%) should be carried out with small farmers living in the marginal zone, the remaining 30% among medium size and CAPS.

2. The experiments should aim to increase efficiency in seed use, decrease cost of seed and inputs while increasing output (high cost complex packages will only increase the risk factor).

3. The key problems identified by farmers should be addressed: "mosca minadora," water problems, cost of seed, and salinity (in one zone).

4. Most farmers did not identify nematodes or storage as problems but these were stressed by knowledgeable extension workers in the area.

5. The experiments should be relevant to the agroecological zone where the experiment is conducted and to the majority of farmers in the zone.

6. Traditional fertilizer trials should be pursued only after an extensive review of the data on current farmer fertilizer practices available in Valle Grande, a local private research institute.

Table I: Programmed Potato Planting by Sector: Cañete (1980)

Sector	Agriculturists N°	Agriculturists % of Total	Has. Month of Planting March	April	May	June	Total Has.	Average Size of Planting	Sector % of Total Programmed
Nuevo Imperial Alto	99	18.9	8.46	70.62	61.76	30.79	171.63	1.73	7.42
San Luis	18	3.44	1.71	134.76	93.20	14.70	244.37	13.57	10.57
Herbay	3	.57	13.05	4.0	22.23	-	39.28	13.09	1.69
Quilmana Bajo	115	21.98	76.48	287.57	56.87	12.40	433.32	3.76	18.74
Quilmana Alto	151	28.87	-	284.51	206.52	19.65	510.68	3.38	22.09
Imperial	42	8.03	18.42	79.67	51.06	5.98	155.13	3.69	6.71
San Vicente Alto	23	4.39	1.00	142.87	143.32	28.00	315.19	13.70	13.63
San Vicente Bajo	30	5.73	10.70	57.86	33.62	14.00	116.18	3.87	5.02
Imperial	42	8.03	26.46	156.39	118.34	24.30	325.49	7.74	14.08
TOTAL	523	100.00	156.28	1218.25	786.92	149.82	2311.27	4.42	100.00
		% of planting by month	6.76	52.70	34.04	7.78	100.00	CAPS = 20.1% of Total area to be planted	

SUPPLEMENT II

GUIDE FOR INFORMAL SURVEY OF A POTATO PRODUCING REGION

The following set of questions and topics might be covered in an informal survey. It emphasizes socio-economic and farming systems aspects. They are by no means exhaustive and it may be convenient to discard many which may not bear on the specific needs of the researcher. It is suggested that the field surveyors study the topics and use them as a memory guide for exploring possible problem area, but not that the team necessarily collect data on each topic.

I. History of Potatoes in the Region

A. Gain an understanding of the agricultural history of the area, emphasizing

1. When were potatoes first introduced?
2. Why were potatoes introduced?
3. Who first introduced potatoes?
4. Any additional historically - relevant facts?

II. Agroecological Setting of Potato Production

A. Obtain and study relief maps, aerial photos, and land-use maps of the target area.

B. Obtain or develop more detailed maps of study area showing major agroecological zones.

C. Describe potato-relevant agroclimatic conditions using simple language and readable charts and tables.

1. Rainfall data (monthly rainfall averages).
2. Discuss predictability of rainfall, water availability.
3. Hail, frost, wind patterns.
4. Incidence of sunshine/temperature patterns.
5. Altitude, slope.

D. Describe the relevant topographical and soil conditions.

1. Identify different soil types in study area, extent in region, local names, and selective use by local farmers. Do farmers prefer a specific type of soil for growing potatoes?
2. Collect soil sample for analysis if possible.
3. Discuss strategies farmers use to exploit different ecological zones and soil conditions.

III. Socioeconomic Profile of Local Population and Potato Producers

A. Obtain data on population, population density, and population distribution (i.e., how are the people distributed according to agro-ecological zones).

B. Regional settlement patterns.

1. What proportion of population is rural and urban?
2. Are farms dispersed or nucleated?

C. Brief economic profile (what are the main sources of livehood?).

D. Ethnic groups and their relationship to the economy and agricultural production.

E. Others involved in potato production (middlermen, creditors, fertilizer seller, laborers, etc.).

F. What kind of people produce potatoes? (Develop a typology).

G. Develop a typology of potato producers by size of production, for example:

1. Small-medium-large (based on landholding size).
2. Commercial-subsistence (purpose of production).
3. Seed-ware (type of crops).
4. Combinations of above.

H. Units of production and decision-making: describe.

1. Households.
2. Coperatives.
3. Farms or plantation estates (large-scale)
4. Communities or kinship groups.

I. Land tenure: describe the major types.

1. Private
2. Communal
3. Cooperative
4. Share cropping, renting

J. Strategies and purposes of land use and production: A general overview.

1. Distribution of fields (nucleated or dispersed and why?).
2. Objectives of production in different fields (sale, home consumption, seed, exchange).
3. Intensity of land use and types of fields (gerdens, permanent, temporary pastures)

4. Rotation patterns (crops, fields, fallow periods, and possible reasons)
5. Importance of potatoes in the area in regard to area, labor, absorption, income, relative to other crops.
6. Purposes of potato production and relative importance: Is potato expansion possible?

   a. on-farm consumption
   b. exchange
   c. sale of consumer potatoes
   d. sale of seed potatoes
   e. processing
   f. combination of (a-e)

K. Labor

1. What is the busiest month of the year for local farmers?
2. What demands are placed on farm households over these year? How do these demands relate to the potato production period?
3. Do they hire temporary or permanent laborers or is family labor sufficient?
4. Do they hire machinery?
5. What is the sexual and age division of labor in decision-making and farming activities.
6. Seasonal out-migration of family members forcing changes in family labor use strategies.
7. Production strategies to better use family labor.

L. Cash sources and uses

1. What are the main crops sold by farmers?
2. What is the estimated proportion of total farm income from each main crop? (based on different types of farmers?
3. What are other non-farm sources of income?
4. What are the main expenditures by farmers? For agricultural inputs?
5. Are potatoes increasing in importance as a cash crop, remaining stable, or declining?
6. Main sources of credit and related problems.

   a. Government
   b. Private (money lenders or middlemen)
   c. Kin groups
   c. Cooperatives, voluntary association

M. Organization of marketing

1. Link between marketing, production and storage.
2. Methods of marketing potatoes

   a. Middlemen
   b. Exchange or sell within communities
   c. Direct sale to markets by farmers
   d. Other

3. Relationships between size of holding, farm type, etc. and type of marketing employed.
4. Other marketing problems.
5. Data on price mechanisms and trends and any information on seasonal or locational variability.

N. Socioeconomic infrastructure

1. Are inputs available (fertilizers, pesticides, fungicides, materials, etc.)? Sources of inputs (government, private companies, etc.).
2. Extension services.
3. Transportation facilities.
4. Condition of transport arteries and difficultires of transport.
5. Are markets available for their produce.

Other social aspects and farmer opinions

1. Problems with agricultural robbery.
2. Social demands for food exchange.
3. Religions beliefs concerning production.
4. Farmer's opinions on:

   a. Ranking of potato production problems (in order of importance
   b. Yield variability (what does he expect to get and what does he think prevents that goal?)
   c. Risks related to weather
   d. Risks related to marketing and prices
   e. Risks related to pests and diseases
   f. Taste or color preferences of varieties

IV. Agricultural Calendar (For Each Variety and Agroecological Zone)

A. General planting times for each crop or variety (over several years).

B. Range in planting times, including earliest and latest possible dates of each variety (including points of highest frequency).

C. Growing time for each variety.

D. General harvest dates (over several years if possible).

E. Asses why farmers plant the varieties they do and when.

V. Farming Practices

A. How does a farmer decide where he will plant his next potato crop? Why does he plant in one field versus another available field? What factors does he consider in the decision?

B. Land Preparation

1. When and how is the land prepared?
2. What is the sequence of work?
3. How does the farmer prepare the field? With what tools? Does he prepare a whole field, before planting, or prepare and plant a bit the same day, or what?

C. Planting

1. Where are seeds obtained and how are they prepared?
2. Are potatoes planted in association with other crops or alone in a field?
3. In cases where associated with other crops, what is sequence and why?
4. How do farmers decide when to plant?
5. Describe present planting methods (density, methods of putting in ground, coordination with water, etc.)
6. How and when is irrigation used, if at all? What is the organization of irrigation?

D. Weeding, thinning, fertilizing and cultivation

1. Implements used in weeding and thinning (if any)
2. When and how many times is weeding/thinning done?
3. What determines weeding/thinning pattern?
4. Are there any cultivation activities during growing season?
5. Fertilizer practices - What, how much, when?
6. Use of leaves, stalks, etc. for animals?
7. Action taken if crop fails completely during growing season

E. Pest and disease control

1. What do farmers consider as their main potato diseases and pests?
2. When and how is control carried out? Methods and frequency of application.
3. Asses damage to crop by pests.

F. Harvest

1. Method of harvesting.
2. Timing and frequency.
3. Tools used.

G. Storage

1. Description of storage techniques (with drawings)
2. Types of stores (government, in-field, in-house, separate buildings).
3. Why and for how long is storage required and how does this vary according to price fluctuations, climate, etc.?

References

1. Collinson, Michael
   1979 Understanding Small Farmers. Paper presented at Conference held at the Institute of Development Studies, University of Sussex, Brighton, U.K. Dec. 4-7, 1979. Mimeo.

TRAINER MATERIAL

DO NOT DISTRIBUTE
TO PARTICIPANTS

LOWER VOLTA

Sahelian Vegetable Production Project

INTRODUCTION

Rationale

The inclusion of nutrition or food consumption concerns in the stated goal of a Project does not ensure that the inputs and outputs are consistent with those goals. This unit focuses on project design issues — of defining goals through analysis of situations and evaluating simulated project paper for consistency with goals.

Objectives

At the completion of the unit, participants will be able to:

- identify weaknesses in goals, means, and end analyses;
- identify alternative means of integrating nutrition/consumption concerns into agricultural production projects; and
- identify nutrition consumption concerns as integral, multi-sector concerns which can contribute to the success or failure of a project — rather than as concerns of special interest groups.

Possible additional skills acquired:

- identify means of ensuring competent technical input into Project authorizations and review process.

Evaluation

During this unit, participants will be evaluated on their achievement of the objectives by:

- evaluation by instructor of participants' comprehension of the material as reflected in performance of group tasks;

- assessment of their own progress using the Progress Report at the end of this unit.

INSTRUCTIONS

Three types of activities have been designed to present and reinforce the concepts by this unit. More specific instructions for each will be given by the instructor. A brief description of each of the activities follows:

ACTIVITY 1 - Independent Reading

Participants should read the Project Paper prior to the beginning of the session.

Time: As needed (approx. 15-30 minutes)

ACTIVITY 2 - Group Tasks

Trainer should divide total participant population into 3 groups:

(1) Government of Lower Volta (GOLV) Review Committee
(2) Washington, D.C. AID Project Paper Review Committee
(3) Lower Volta AID Mission Office

Each group should receive a copy of the Draft Project Paper which has been prepared by a consultant for the Lower Volta AID Mission. The 1st two groups (D.C. AID, GOLV) should review the PP and prepare a guidance message to the Lower Volta AID Mission Office based upon the perspective of their respective roles. The message should include a summary of their definition of the situation, goals, objectives, and critique of Project. The third group representing the Lower Volta AID Mission Office should prepare recommendations to the consultant for improvement of the PP.

ACTIVITY 3 - Supplemental Reading

After group tasks are completed, distribute:

- Project Paper Evaluation Summary
- Summary of Project Events

Lower Volta, Sahelian Vegetable Production Project (632-7886)

Background

Description of Situation

The Sahelian drought decimated crops and livestock in Lower Volta. Large segments of the population were left without means of support and became dependent upon the Government of Lower Volta and Western donors. These groups were seen to have caloric and nutritional deficits as a result of the destruction of food from the drought.

GOAL

The GOLV and AID, as well as other donors, began investigating ways to offer assistance to affected inhabitants in order to supplement

- income
- caloric and nutritional deficiencies

MEANS

The means of reaching the stated goal was through the Lower Volta Vegetable Production Project. This proposed the introduction of Western vegetables and production techniques in various producing regions of the country.

ENDS

Proposed: (1) adequate caloric and nutritional intakes in rural areas
(2) increased incomes in rural areas

Actual: (1) unknown impact on both caloric consumption and nutrition;
(2) unknown impact on incomes;
(3) inconclusive evidence of feasibility of vegetable production in Lower Volta.

Basic Question: Is/was vegetable production project the appropriate means to realizing goal? If no, what are alternatives? If yes, suggest improved design which would allow ends to be met.

PARTICIPANT
MATERIAL

ACTIVITY 1:

INDEPENDENT READING

DRAFT

PROJECT PAPER

Lower Volta, Sahelian Vegetable Production Project
(632-7886)

Prepared by:

John Hudson
Consultant to Lower Volta AID Mission

Background

Since the drought of 1968-1973, Lower Volta has found it increasingly difficult to feed itself. Relying heavily upon the mining sector for revenue, Lower Volta has placed a relatively low priority on the traditional agriculture sector in which 90% of of the people are employed. The mines, while providing, directly and indirectly, a major portion of the government's revenue, employ less than 1/2 of 1% of the working population. In the meantime, agricultural production remains at the subsistence level, highly dependent upon the vagaries of weather and the availability of water. Agricultural production — excluding livestock — represents less than 3 percent of the GDP.

As a result of this drought that persisted in the countries of the Sahel, AID formed a committee which visited the countries of the Sahel to identify short-term emergency projects which USAID could finance. In November of 197_, the committee visited Lower Volta and selected four short-term projects, one of which was this Vegetable Production Project. GOLV initiatives and interest in this project are to be encouraged and supported as success in this realm may lead to new emphasis by the Lower Voltans in the areas of cereals production, fruit and nut production, the rational introduction of new technologies, the increased control of plant diseases, insects, and fire hazards.

The drought disrupted the traditional way of life for the populace of the country, at least temporarily. It resulted in the movement of large numbers of nomads into farming villages, palm grove oases and urban centers. With the loss or near loss of their traditional means of livelihood

(e.g. goats, sheep, cows), the nomadic populace was faced with unemployment and a lack of means with which to maintain their livelihood.

In 197_, the Government of Lower Volta developed an Emergency Assistance Plan to assist the population suffering from the drought. The GOLV requested USAID's assistance in carrying out the Plan, specifically, to increase vegetable and forage production on a family-plot basis by insuring that appropriate attention was given to small farmer participation and by assisting in the creation of family vegetable gardens in several locations throughout the country. Assistance was requested to be in the form of material and financial support for vegetable production around resettlement centers for displaced nomads.

Description of the Project

Goal:

The overall goal of the project is to promote the development and welfare of the rural population in Lower Volta by increasing small farmer food productivity and nutrition levels and by contributing to family food security.

Objective:

The major objective of this project is to assist the people most affected by the drought to establish a means of livelihood, and, as far as possible, their self-sufficiency by assisting them to develop and improve their family garden plots.

Purpose:

The purpose is to establish a Vegetable Production Service within the Agricultural Directorate of the Ministry of Rural Development and to promote vegetable production among small farmers and cooperatives in rural Lower Volta through the operations of the newly created service.

Outputs

In order to achieve the project purpose as stated above, AID proposes to help establish an effective vegetable production service both at the national level and at the regional level by providing timely inputs over a period of three annual growing seasons. At the end of this period, the Vegetable Production Service of the Directorate of Agriculture should be firmly established on a permanent basis with trained personnel at every level. In addition, vegetable production should be an ongoing viable and

profitable activity among approximately 3,000 farm families and cooperatives on at least 200 hectares of land in six agriculture regions.

Inputs

USAID's assistance is to be in the form of a grant to be provided for the purchase of water pumps, seeds, fertilizers, garden tools and vehicles. In addition, in order to achieve the project purpose and outputs, AID has been requested to provide the following staff, for 36 months:

A Project Manager/Agricultural Extensionist to be responsible for advising and in-service training of extension agents as well as instructing and supervising extension agents and PCVs in agricultural techniques to be used;

Short-term consultancies of a Soil Scientist and a Water Resource Specialist to be provided early during the project. These consultants will conduct an assessment to determine soil management practices that promote efficient water use, productive potential of the major soil types and potential exploitation of various water sources.

AID will also provide commodity support in terms of seeds, fertilizer, pesticides, and tools to carry out pilot demonstrations. These inputs will be provided to the participating farmers free of charge.

Non-AID Inputs

Peace Corps Volunteers are to be provided, with assistance from the American Embassy, to assist the Government of Lower Volta in the establishment and maintenance of pump repair shops, not only for the

repairing of water pumps purchased by the projects, but for pumps which existed prior to the conception of the project.

Beneficiaries

The target beneficiaries of this project are the subsistence cultivators, who may or may not already be millet/sorghum cultivators, but in any case are to be found on the lowest rung of ladder of the economically productive population. Vegetable production in Lower Volta is a relatively recent undertaking. In some cases therefore, the beneficiaries will be traditional grain farmers, in other cases the beneficiaries are of have been date palm cultivators, and, in some cases, notably around the capital, the beneficiaries may be newly sedentary people whose previous occupation was that of nomadic herder. In any case, all of the intended beneficiaries are subsistence cultivators producing vegetables primarily for the consumption of their families and secondarily for sale of the surplus on the local market. Very little inter-regional commercialization of vegetable production is possible at present due to insurmountable transportation problems.

If the consumption effects are considered as well, even larger numbers will be affected. It is not possible at this time to make any estimation of the population that will be affected by increased vegetable consumption, however, a few statistics can be cited. Lower Voltans probably do not consume more than 2 to 5 kilograms of vegetables per capita each year. Many in the nomadic population consume no vegetables whatsoever, and this situation is not expected to change as a result of the project. Consumption of vegetables among the sedentary and urban population should, however, increase significantly. The increased production of vegetables

that is expected as a direct result of this project will be roughly 3 to 4 thousand tons per year at the end of three years.

If commercial production and other production by non-participating cultivators increases as well, consumption could increase even more. As a result, the dietary and nutritional effects should be profound. No estimation of these latter effects can be made at this time due to lack of available technical expertise in this field. Some evaluation of these dietary changes should be made during the course of the project.

No modification in the 'values' of the intended beneficiaries is necessary for the success of this project. Some change in tastes both for vegetables as a group and for particular vegetables will occur inevitably among the rural sedentary population as production becomes available. However, there is no program of education or promotion of the use of vegetables at present as the demand for the production is latent and rapidly developing. Where demand for a particular vegetable is not forthcoming, production will be reduced, or at least not increased, through the natural play of supply and demand. The government should consider, however, some program of education in the preservation and storage of various vegetables, and other nutritionally beneficial food items, as part of a campaign to improve the diets in general. Such a program is not absolutely necessary to the success of this project, but should be considered.

Feasibility

Technical Considerations

It is apparent that in Lower Volta there is only a limited amount of land capable of sustained crop production and that the annual precipitation

is the only reliable source of water, apart from the Fleuve River. The productive land, except for scattered oases already planted with date palms, lies mostly south of the 00th parallel North and is bound by the Fleuve River to the East.

The cultivation of vegetables is not a new idea in this country, but such culture does not currently contribute sufficient support to the endemic population in terms of nutrition or income development.

Soils in the agricultural area generally are sandy, sandy loam, and occasional areas of clay loam. All are fine textured, absorb water quickly, and are suited to the production of vegetable crops. Salinity is a problem chiefly in coastal areas where shallow wells are supplied by infiltration of rain water which forms a layer of fresh water over salt water coming from greater depths. Such wells, if subjected to heavy pumping, will soon supply water which is too salty for most crops. Water pumped from perennial streams or impoundments appears to be suitable for vegetable crops.

Data with respect to the area devoted to vegetable production are very limited and unreliable. The Directorate of Agriculture has estimated that there are appoximately 50 hectares of vegetable production throughout the country.

Economic Issues

There are three commercial markets in Lower Volta which must be considered in any planning concerning vegetable production in this country. These markets are 1) the mines area at the Western frontier, 2) the seven to thirteen hectare garden area in the Capital and 3) the modern, mechanized 60-70 hectare area near the River for the market in the Capital. In

all three areas, however, there is still a very important subsistence market. Some of the production resulting from this project may enter into commercial channels when and where there is a market for it. In general, however, transportation difficulties will make it almost impossible in most areas for the commercial markets listed above to be used as an effective outlet for the cultivators' surplus. At present there apparently is no preservation of vegetables in Lower Volta. This could serve to alleviate many of the market problems which currently exist. It is recommended that a TDY technician be brought out during the early part of the project to recommend an appropriate course of action.

The Directorate of Agriculture and the Ministry of Rural Development, as well as AID, have looked upon this project, at least until now, as essentially an emergency program to provide an alternative for dispossessed herders who have lost everything in the drought. It has also been considered a program to expand vegetable production as a nutritional and income supplement for cultivators in general, and as a means of fostering the cooperative movement. As such, economic and cost considerations have played no role whatsoever. Nearly all planting inputs (seed, tools, fertilizer, insecticides, water pumps, etc.) have been provided free of charge.

In order to reduce progressively the heavy dependence upon outside assistance to which the vegetable cultivator is rapidly becoming accustomed, it has been proposed, and the Directorate of Agriculture appears to have accepted in principle, to establish a revolving fund into which the cooperatives and cultivators would pay for at least some inputs at the time of harvest. These funds would be used as a credit source by

other cultivators for the purchase of planting inputs and could be the basis for a general agricultural credit program. The details of this proposal have yet to be worked out by the Directorate.

Given an adequate water supply, there are relatively few limiations on the kinds of vegetable crops that can be grown in Lower Volta. However, only about ten or twelve crops provide most of the production. These are beets, cabbage, carrots, cauliflower, leeks, lettuce, onions, tomatoes, radishes, and potatoes. The relatively high temperature and a day length of 11-13 hours limits the use of a few crops; green peas, head lettuce, and asparagus cannot be grown successfully. Potatoes can be grown, but yields will be low.

Summary Findings

An analysis of the various findings confirm that the project is ready for implementation. Findings reveal that:

1. Farmers are eager and willing to participate in vegetable production providing that information, training, materials, commodities are supplied.

2. Those farmers who presently grow vegetables eat them, although the proportion of vegetables devoted to auto-consumption, as opposed to sale, cannot be determined and varies widely.

3. For many groups now engaged in vegetable production, vegetables have been a part of their traditional diets. This is especially true for groups living along the river valley who have long prepared millet, sorghum, and rice dishes with sauces topped with or made with vegetable.

4. Field observations reveal that the demand for and consumption of vegetables is increasing in Lower Volta. However, due to lack of data, the magnitude of this increase cannot be measured.

5. Those farmers presently involved in vegetable production view it primarily as a viable means for increasing their incomes and as a means for providing variety to their diets.

6. In order to insure success, the intervention should integrate itself into existing organizational structures and channel its resource support through existing centers for implementation.

7. The GOLV extension capacity must be up-graded if techniques introduced by the project are to be successfully diffused to the target population.

LOGICAL FRAMEWORK

VEGETABLE PRODUCTION Project

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Goal: To promote the development of the rural population of Lower Volta by increasing small farmers' incomes and strengthening the capacity of Lower Vol institutions to respond to the development needs of the rural sector.	Measures of Goal Achievement: 1. Increased per capita food production 2. Increased per capita food consumption	1. Statistics of food production and consumption provided by GOLV in their annual Statistical Abstract. 2. Statistics of food production and consumption provided by FAO, World Bank and other donors and interested parties.	1. Continuing and increasing interest and support of GOLV to the agricultural sector. 2. Alleviation of general drought conditions over the next several years. 3. That GOLV can resolve adequately its internal or external security problems.
Purpose: To establish a vegetable Production Service within the Agricultural Directorate of the Ministry of Rural Development and to promote vegetable production among small farmers and cooperatives in rural Lower V. through the operations of the newly created service.	Conditions: 1. The Vegetable Production Service will be a permanent, established division of the Directorate of Agriculture headed by a qualified host country nt 2. Per capita vegetable production increased significantly 3. Per capita vegetable consumption increased 4. Revolving fund or other credit device established by Directorate. 5. Cooperative movement strengthened qualitatively.	1. Official act establishing Service published. 2. Increased budget for Directorate to include Service. 3. Departure of French technical assistant. 4. Statistics on vegetable production and consumption in the GIRM annual Statistical Abstract. 5. Staff, volunteers and other donors' reports and evaluations.	1. A qualified, trainable and interested L.V. can be identified. 2. Sufficient GOLV financial resources are available to support budget. 3. GOLV interest in small farmer and cooperative movement remains high.
Outputs: 1. New, small-scale subsistence vegetable plots established. 2. Viable and profitable vegetable production on these plots underway. 3. Small farmers and cooperatives organized on national basis. 4. L.V. agricultural agents trained in vegetable production extension techniques. 5. A nationally operated and controlled Vegetable Production Service.	Magnitude: 1. Ten new hectares under cultivation in each of nine agricultural regions and Nouakchott every year for a total of 300 hectares. 2. 3 to 4 thousand tons of vegetables produced and consumed on these plots. 3. 6000 cultivators and their families directly involved in vegetable production. 4. 1 agriculture agent in each region working full time on vegetable production. 5. One L.V. as Chief of Vegetable Production Service.	1. Manager's reports, site visits. 2. Directorate's internal production reports. 3. GOLV statistical abstracts. 4. PCVs or IVS monthly and annual reports. 5. AID evaluation after 1st growing season. 6. Reports of USAID resident staff.	1. That the rapidly growing supply and demand for vegetables can be kept in reasonable balance. 2. That the GOLV can implement a rational scheme of distribution of farm production inputs. 3. That sufficient land is available in each region for new vegetable production. 4. That vegetable production remains profitable for the majority of cultivators.
Inputs: U.S. - 1. Contract Services 2. Voluntary agency 3. Commodities 4. Vehicles 5. Training GOLV - 1. Personnel 2. Distribution system 3. Counterparts	Target: U.S. - 1. One manager/horticulturist plus 18 mm of consulting services 2. Nine PCVs or IVS 3. Planting inputs and tools 4. 10 Land Rovers and 2 Ten-ton trucks 5. OJT and 3rd country U.S. participant training GOLV - 1. 10 agricultural agents. 2. Several drivers and mechanics. 3. One individual to head Vegetable Production Service.		1. Voluntary agency must receive official request nine months prior to arrival of trainees, i.e., before approval of P.P.

ACTIVITY III:

INDEPENDENT READING

Lower Volta, Sahelian Vegetable Production Project

(632-7886)

- Project Paper Evaluation Summary
- Summary of Project Events

PROJECT PAPER EVALUATION SUMMARY

Activity III
Handout 1

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

Date: March 10, 197_

Reply to
Attn of: AFR/DR/AG Fred Lowse

Subject: Lower Volta Vegetable Production PP (632-7886)

To: AFR/DR/P

I have reviewed the PP and have serious reservations. I recognize that the project arises out of an appropriate desire to assistn some truly impoverished people living in a difficult envrironment. The project idea no doubt initially appeared plausible. There has now been 21 months of intermittent planning, design, and review.

There are basic problems with respect to the nutrition rationale or nutrition economics. Basically, will vegetable production fill a high priority nutrition need in rural Lower Volta either through direct consumption or through food (and other) expenditures made possible through income derived from marketing. Supplemental reviews, which are attached, and my own analysis do not support the project from this standpoint.

The prospect of successful marketing is highly doubtful. This judgement is based on the review by USDA (attached), and my own experience. The setting involves serious handicaps including small-scale production, short growing season, poor roads, distance between producing and urban areas, limited transport equipment, and limited managerial manpower.

These and other problems raise serious questions about long-term cost effectiveness and economic viability of vegetable production on any significant scale in the area. I doubt that production amounting to the level of the proposed pilot project (200 HA by 3,000 families) will be implanted permanently, much less a higher level probably required to really justify the proposed project activities. Total project costs of $2,181,000 (all sources) amount to $727 per family. This level of expenditure for a relatively small-scale activity per family, appears to demand a future spread of the practices.

Statements about project purpose are inconsistent, as discussed below. If we view this as a production activity, there should be a rather direct demonstration of internal logic and probable technical, economic, and social viability, including in this case a strong showing that the vegetables will satisfy a high priority nutritional need. Even if the intent really is one of experimentation and testing, we should apply logic and available experience to determine a realistic probability of success.

I conclude that the project fails to meet adequate requirements even for an experimental undertaking. I recommend that it not be approved, and design efforts be discontinued.

Efforts to design and implement research, production, or marketing activities related to mixed farming systems, or cereals, or legumes, may be given new priority.

More detailed comments on these and other topics follow. Some of the questions could be resolved, if it is determined to proceed. For example, the project purpose can be made consistent throughout, and if an experimental project is intended, the project description and technical analysis can be rewritten accordingly.

NUTRITION ECONOMICS/PROBABLE REAL RURAL DEMAND:

I raised the problem of nutrition economics at the PP review of November 15. This topic was recognized in State 123456, reporting on the PP review. The Office of Nutrition has reviewed the PP. The Office supplied a memo on November 23, 197_ which is attached. This review raised substantial questions about the nutrition contribution of the proposed project, in the specific context.

The PP only deals with this issue by asserting that people of Lower Volta sometimes or in certain locations have produced and eaten vegetables. Otherwise, the topic is dropped by saying data are not available.

There is inadequate discussion of the nutrition issue. I assume there is a calorie deficiency which results from the loss of milk and meat from herd destruction by the drought.

The November memo brought out the low contribution of vegetables to caloric needs. This fact appears to have been overlooked or evaded in the PP. The question was raised at the November PP review, why make all these inputs and efforts on vegetable vs. more grains and legumes? This topic has not been addressed. Farmers give priority to their millet and sorghum during periods of peak labor requirements. This should tell us something about how the farmers view their needs.

There are several statements about the lack of familiarity of people with vegetables. This usually is in the context of explaining the need for home economics type of inputs on the utilization of vegetables. This should have drawn our attention further to potentials for expanding output of cereals, beans, peas, etc. At least the cereals require no efforts at familiarization.

Vegetables produced are to be consumed by producers, other rural dwellers, and in urban markets, in some unspecified proportions. I infer that most of the vegetables are expected to be consumed by producers, or certainly in their villages and nearby.

I have tested the hypothesis of auto-consumption with some estimates and data which I located. Recent analysis of expenditure patterns in rural Sierra Leone indicates that persons at comparable income levels spent about 3 percent of that income on fruits and vegetables. One might arbitrarily

estimate 2 percent for vegetables. Data for Northern Nigeria, taken in 1970-71, indicated a maximum or 6 percent of income spent for vegetables.

I applied this maximum 6 percent estimate to the estimated income level in the project area of Lower Volta: 3,000 producing families x 5 persons per family x $70 per capita income yields total income of $1,050,000. At 6 percent, this represents $63,000 expenditure for vegetables. The fragmentary price data presented point toward a maximum producer value of perhaps $0.25 per Kg., which would represent 252 tons of vegetables. Available data suggest a yield of perhaps 26 tons per HA. Thus, producers might consume the production from only 9.7 hectares.

If we reduce the estimated value per Kg. or reduce the estimated yield, this of course raises problems about the long-term benefit/cost results of the project. A yield of 10 tons and a value of only $0.10 would represent the consumption from 63 HA, but at a farm value of only $1,000, per HA, vs. $6,500 per HA, with the more "optimistic" assumptions. If we assume 3 months of production and consumption, the range of estimated quantities per person is from 0.18 Kg. to 0.46 Kg. The lower estimate appears much more realistic than the higher. This reasoning about consumption patterns, prices, and yields raises further question about the nutrition economics of the project. It simply does not conform to plausible expenditure/consumption patterns of this extremely low income level.

COST EFFECTIVENESS

It is troubling to brush aside cost effectiveness approaches to economic analysis entirely by referring to data limitations. I believe that project approval should require comparison with favorable results in some analagous situation(s) in other countries. The setting includes numerous handicaps: small-scale production, extremely low incomes, doubt about the nutritional relevance, distance between producing and urban areas, poor roads, lack of familiarity among producers and consumers, etc. My "memory search" (not including any search for documents), does not bring back any successes under such conditions.

Handout 2

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

November 23, 197_

SUBJECT: Project Paper for Project (632-7886) Comments on the Nutrition Outputs

This proposed project, Vegetable Production, is expected to upgrade the welfare of the rural population by increasing small farems' incomes, productivity, and consumption. Further, increased production will result in increased consumption which will improve the nutritional diets of the affected population. Thus, nutritional benefits are expected to be achieved in two ways: (1) through direct use of the vegetable crops produced by the participating farm households and (2) through increased purchasing power resulting from the sale of some of the vegetable crops.

A brief analysis of the PP document does not demonstrate that direct nutritional benefits are likely to be significant, particularly with regard to the major nutritional problem in Lower Volta, that of caloric insufficiency. Neither does the information given in the PP support the projected increase in farming household incomes, especially after the project period when free inputs will no longer be available. Expected returns are overstated in value terms, costs are understated, and the relationship of increased vegetable production to improved incomes is uncertain.

These points are discussed in more detail below. A number of other issues could be raised, especially regarding integration of the proposed vegetable production into the farming system, labor availability and utilization, and the lack of marketing facilities and services. We assume, however, that others will be addressing these issues and confine the discussion here to the nutrition-related ones.

Direct Consumption (Auto-consumption)

Evidence for current consumption of the proposed vegetable crops is qualitatively and sketchily presented in the Project Paper. While the traditional diet apparently emphasized the consumption of meat and milk, the 1968-73 drought decreased the cattle population sufficiently to make the components of this diet less available. Vegetable-growing was proposed in 197_ as a short-term answer to this decrease. People did apparently eat the vegetables, and this project now proposes to make vegetable production a longer term component of the post-drought diet.

The nutritional reasoning behind the designation of vegetables, especially tomatoes and onions, as substitutes for meat and milk is not clear. Legumes (or pulses), the more obvious substitutes for the protein provided by animals, are not envisioned to be part of this project. While the solution of vegetable production does not contribute significantly to improved protein supplies, it does not provide the answer to the calorie deficiency problem either.

No dietary information is apparently available on the amounts of meat and milk consumed in an average diet in pre-drought times so the projected consumption of vegetables cannot be compared with that. There is adequate information, however, to project the additional calorie availability if the vegetable project as proposed is 100 percent successful. If every vegetable listed is produced at maximum levels,[1] no production is lost or wasted, and every ounce of production is available for consumption by the target population, each person in the three target regions can be expected to consume a grand total of nine additional calories per day. This is a small impact indeed when estimated calorie consumption is at least 100 and more likely 200-300 calories below required levels.

As only 3,000 farming households[2] are to be involved in actual production, however, it is probably more realistic to calculate the calorie impact if just these households are assumed to consume all of the output (100 percent auto-consumption). To do this, the target group size can be adjusted down from the total population of the regions involved down to the population of only those households involved. On this basis, assuming that there are approximately five persons per producing household, the per capita availability level for this target group of persons would be about 150 calories per day, a more significant amount. This figure implies, however, that these households will be eating diets composed of fairly large quantities of vegetables—1.8 pound of tomatoes, or a pound of onion, or over three pounds of lettuce per person per day. And since production is expected to be primarily in the December - May period, this would imply daily intake levels of twice these amounts in season. Such excessive quantities of vegetable consumption seem unlikely to appeal to palates accustomed to a grain staple and probably exceeds the amount that small children can physically eat. It is unlikely then that the full impact of calorie availability would be translated into calorie intakes by the producing households.

In order to avoid changing the composition of the diet so drastically, it is likely that the producing households will sell some of their produce and buy other foods for consumption. This brings us back to the earlier levels of relatively insignificant calorie impacts and directs us to look at the nutritional benefits brought about by the income effect.

Incomes and Nutrition

When farming households' cash incomes are increased, it can be expected that some of the additional money will be spent on food. Just how much "some" is depends on the relative needs for both food and non-food items.

---

[1]"Maximum levels" being defined as average U.S. production levels as figures on that were readily available (Appendix Table 1). The only empirical information in the PP on output—for the 5th Region, Tables 4.B. and 2 in Annex B—is somewhat out of line and PP projections of expected output vary from 2,000 tons per year to 4,000.

[2]Original 5,000 figure was revised to 3,000.

As the Lower Voltan population under discussion appears to be undernourished, it is reasonable to expect that a fairly high proportion of additional income, say, 80%, will be devoted to food purchases. If vegetables are relatively high value crops and grains are relatively low (i.e., in terms of cost per 1,000 calories or 100 grams of protein), then it is reasonable to expect that a family's diet will be improved if they sell tomatoes and spend 80 percent of that money to purchase sorghum, for example.

Unfortunately, the PP does not give adequate information on prices to enable the nutritional effects of such an income reallocation to be calculated. It must be taken on faith by the reader, as it is by the PP authors, that by selling some vegetables, an additional amount of nutrients will be purchased by the farming households.

One question bearing on the income effects can be addressed in the context of the economic analysis of the PP. How much of the vegetables production must the farmers sell in order to meet cash costs of production (seed, fertilizer, water) once the period of free inputs is over and how many nutrients (calories and protein) does this leave for auto-consumption?

Costs

According to the information on costs of seeds, the data on fertilizer, malathion, and rodenticide/insecticide costs, and the cost-of-water estimates, the average farmer should have non-labor costs of $664 per year. As no labor requirements and no information on labor costs are given, it is impossible to put a value on this input and costs are understated by this amount. Land is also assumed bo the free. In short, each household must produce and sell $664 worth of vegetables on their 0.13 ha. of land in order to supply the costs of production.

Profit

These costs must then be tallied against expected output. The quantity of output anticipated (2,000-4,000 tons) can be approximated by applying U.S. average production figures per hectare to the projected number of hectares as was done to get calorie availability above.[3] The evaluation of the output is more difficult to do. The method used to value monetary output expected in the PP is quite crude—4,000 tons of undifferentiated product (expected to be produced in December - May) are valued at a "representative kilo" price based on observations made in the Capital in October, 197_. No estimation of the transport/storage/marketing component of that "representative" price is made to get an estimate of a farmgate price. The problems of seasonal oversupply and dumping of cheap Senegalese vegetables are also not taken into account in this pricing effort, although they are

---

[3]On the basis of the sales of the cooperative these production estimates would appear to be exorbitant. See Appendix Table 2.

mentioned twice. The resulting total value of output (and farming household gross incomes) of $1,573 is likely to be substantially overstated. Only marginal improvements in this very shaky economic assessment can be made given the facts at hand. By applying the average River commodity prices wwhere available to the commodity output list (Appendix Table 1) and filling in with the October Capital commodity prices only when no other prices are available, the value of output from 12 commodities, accounting for 2,572 metric tons of output, is only 70 percent that which would have been projected for this tonnage using the "representative" price. The commodity-based method still does not take into account the marketing margins, storage losses, or the seasonal oversupply problem. It does reduce expected gross value of output per household, however, to $1,143. The margin between gross value of output and variable costs of inputs drops to $480, compared to the estimated profit per participant of $1,425.

Adjustment of Estimated "Profit"

If transport, storage, and middleman costs are expected to account for 50 percent of the total value of crops calculated by the retail-price approaches the total value of the participants' benefits is negative, a loss of $93 per household. This would certainly mean a net nutritional loss as well. By marketing the crop themselves, farming households may be able to increase their incomes by some portion of the marketing margins, but there are still a lot of unknowns to be reckoned with—the possibility that seeds may have to be replanted, inevitable storage losses, rising costs to fuel to transport commodities, and an unstable price situation. The positive nutritional impact of such a tenuous income increase may well be offset by the nutritional stress of the arduousness of transporting water to the garden. If in fact production levels are below the expected, positive nutritional impacts will be even more in doubt.

Recommendations from a Nutritional Point of View

It seems unlikely that this project will have any significant positive nutrional impact on the problem of calorie deficiencies either through direct consumption of the vegetables produced by the farming households using free inputs or through increased purchases of food resulting from increased household incomes due to the sale of vegetables produced. Nor does immediate subsidization of the vegetable producing enterprise appear to lead to the development of a viable agricultural enterprise under the conditions given.

If there is still a felt need to find a dietary substitute for meat and milk, activities which result in increased protein availability—such as poultry production or legume production—should be investigated. The increased output of vegetables and grains which are already well-known and widely grown may also be suggested as a focus for research and extension activities.

Appendix 1. .e 1

mmodity	Final Year Hectares	Metric tons per ha. in the U.S.*	Total kg. production	Calories per kg. A.P.	Protein (g) per kg. A.P.**	Price per kg. UM/kg.	Value of output U.S.$ 45.45 UM=$1
lons	20	19.8	396,000	345.4	13.64	36	313,663
rots	20	29.9	598,000	246.4	6.38	30	394,719
atoes	20	22.0	440,000	193.6	9.68	20	193,619
en Beans	10	3.6	36,000	281.6	16.72	--	?
ermelon	10	7.7	77,000	118.8	2.20	60	101,650
ash	10	19.9	199,000	354.2	9.90	60	262,706
nip	10	11.1	111,000	165.0	5.50	--	-
nach	10	6.8	68,000	158.4	19.58	--	-
t	10	11.4	114,000	171.6	6.38	100	250,825
per (Dried)	10	2.2	22,000	203.2	128.70	90	43,564
on (Seed)	10	?	?	?	?	70	?
bage	10	17.5	175,000	189.2	10.34	15	57,756
plant	10	10.9	109,000	202.4	9.68	20	47,965
k	5	?	?	?	?	50	?
sschard	5	?	?	?	?	--	?
umber	5	8.2	41,000	143.0	8.58	60	54,125
tuce	5	13.9	69,500	114.4	8.36	50	76,458
ato	20	16.6	332,000	613.8	16.94	56	409,065
			2,787,500				

Outside Sources for Appendix Table 1

*Watt, B.K. and A.L. Merrill. Composition of Foods. Agricultural Handbook No. 8, USDA: Washington, D.C., December 1973

**Mortenson, E. and E.T. Bullard. Handbook of Tropical and Subtropical Horticulture. Department of State: Washington, D.C., 1970.

Appendix Table 2:
Input Estimates

	All 400 ha.	Per Participant
1. Costs - cash:		
Vegetable seed	50,000	
Potato seed	36,000	
Alfalfa seed	4,000	
Fertilizer	80,000	
Rodenticide/Insecticide	9,000	
Malathion	34,000	
Sub-total	$213,000	$71.00
2. Costs of water (uncertain as to whether cash or not) @ 10¢/liter at nursery rates for 180 days/year = $4,447.8/ha	$1,779,120	$593.04
3. Labor	?	?
4. Land	?	
5. Machinery	Nil	Nil
TOTAL INPUTS	$1,992,120	$664.04
Output Estimates		
Paper, p. 9	2,000 m.t.	667 kg
Paper, p. 2	4,000 m.t.	1,333 kg
Appendix Table 1	2,787.5 m.t.	929 kg
In example p. 24	487.6 m.t.	162.5 kg

Activity III
Handout 3

UNITED STATES DEPARTMENT OF AGRICULTURE
ECONOMIC RESEARCH SERVICE
WASHINGTON, D.C. 20250

March 9, 197_

SUBJECT: Review of Project Paper on Vegetable Production in Lower Volta

TO: Fred Lowse, USAID/AFR/AG

FROM: Joe Blough, USDA/ESCS/NEAD

First of all, let me tell you what I did not do. I did not—

1. —specifically address points in the sections on agronomy and soils.

2. —comment, in any detail, on the social analysis.

3. —attempt any analysis of the budget statements.

Before I address the marketing considerations of the paper, Fred, let me note a few rather general questions and observations. I could not be certain that the proposed project areas were already populated, especially in the Tipa (Region 5) area. Officials are there but are farmers on site in all proposed areas? If not, the project faces the need to "colonize" which can be a very difficult proposition, as some past personal experiences (yours and mine) will confirm.

Would it perhaps be advisable to save the fifth region, which is not on the river for a second phase of this project? Wouldn't the rather limited resources of USAID/GOLV be more efficiently invested in the on-river sites where chances for a successful demonstration project seem to be better? These two regions could make up the first phase of the project and their success could be used to promote the expansion of such efforts to areas farther to the north, into the Sahel zone, away from the Fleuve River.

A two-phase approach might also allow time for some improvement in the Region 5 infrastructure. As far as my maps show, Tipa is neither on a river nor a paved road. It might also give those livestock herders who want to return to the transhuman life after the drought a chance to get back to it, perhaps leaving the project to deal with established sedentaries on the vegetable project. It could be noted, too, that Tipa area soils are quite different from those found in the other project areas.

The paper indicates that the regions selected have known vegetable production. Good, but have the farmers who are now involved, or who are planning to be involved, had experience with vegetable production? Is there any real enthusiasm for growing and eating vegetables among the potential growers? If not, could they somehow be encouraged?

Selection of project areas has been based upon:

a) availability of water

b) experience with vegetables

c) market accessibility

Are each of these factors actually to be found in each of the project areas, in all seasons of the year, among all potential, or already selected, program participants? We'd better be certain because the project's success hinges on these factors.

Is it realistic to expect 200 hectares and 3,000 farm families to eventually become involved in vegetable production in the selected project areas? Is the assumption of political and military security a realistic one?

The project paper states that this job is partly a data gathering project. The USAID/GOLV participants should not expect more than such a project can deliver.

In terms of marketing, it seems obvious that any surplus vegetable production for off-site sale is several years away. We don't yet know how many hectares or what sort of yields might be involved in the project areas. Besides, the problem of an inadequate infrastructure for marketing fresh produce is repeatedly mentioned in the paper. Lower Volta's single paved highway hardly qualifies as an infrastructure. Even given some immediate surplus production on the project plots, the chances are slim to zero that such produce would find its way to, for example, the Capital City market in a saleable condition.

This might logically lead to consideration of on-site methods of preservation. Such practices could be taught to the villagers by the PCV home economist types at the time they are passing on information regarding methods of vegetable preparation for immediate consumption. Canning and/or drying methods might well utilize the potential surplus from the project lands in such a way that preserved vegetables are available to the growers and to nearby villagers at times other than the harvest season.

I certainly see the point of an economic analysis, and consideration of alternative approaches or methods, but I would expect such analysis to have been a continuous input to the paper's development. It seems to me the project paper, even a draft, should represent one's "best shot." In any case, I would strongly agree not to reduce the time on the job scheduled for the technical assistants. It's my opinion that the value of continuity of program and personnel and rapport with one's host-country counterparts cannot be overemphasized. The training efforts and upgrading of skills outlined for participating GOLV personnel seems reasonable. It's my feeling that these should be kept intact.

What with tax problems, security questions and language requirements, I would agree that recruiting for this project in this locale will be a real challenge.

If I may be of help on later drafts of this propcsal, or on future project papers which involve marketing activities, please call on me.

Joe

Joe W. Blough
Agricultural Economist
Distribution Analysis Program Area
National Economic Analysis Division

SUMMARY OF PROJECT EVENTS

Lower Volta Vegetable Production Project

I. Project Approval

-- Although the project was approved for LOP for $1.470 million, the purpose presented in the original PP was revised to "determine feasibility of expanded vegetable production in 3 regions of the host country" in order to get through the authorization process.

II. Project Implementation

— Actual implementation of the project was delayed 2 years: the contracting procedure was prolonged due to the difficulty in finding qualified technicians with French language capability and negotiations of rights and priviledges was protracted.

— Peace Corps volunteers arrived a year in advance of the technical contract team and project inputs.

III. Project Amendment

— Due to time and cost overruns, the AID Mission requested a Project Amendment after 1½ years for an 18 month extension and an additional $1.248 million, which was rejected by the Africa Bureau (ECPR), and the Project terminated.

IV. Conclusions

The Project Committee concluded that:

- $2.6 million constituted a very expensive feasibility study on an agricultural sub-sector which did not represent a principal food crop and was not a significant percentage of calorie consumption for people who do not traditionally consume significant amounts of vegetables.

- Progress in the critically important technical and economic feasibility areas was very limited in the 1½ year Project's performance.

Essential baseline studies on (1) nutritional intake levels, (2) costs and returns of production, (3) the extent of the market, (4) assessment of transport economics, and (5) consderation of producers, competitive position vis-a-vis neighboring exporters were not carried out.

- Further investment in the Project was not justified due to the Committee's economic concerns, even with allowances given for very poor data availability.

- Questionable technical aspects of the Project included: (1) limited short-term and likely redundant research efforts; (2) the structuring of on-farm production plots with subsidized inputs; (3) inadequate economic monitoring for costs, yields, and returns; (4) dependence for viability and repercability on water management and control devices that were most unlikely to be evolved quickly; and (5) dependence upon nutritional extension work to spread vegetable recipes acceptable to consumers in order to enlarge the market.

- The Project Committee, therefore, stated that

> "The problem with the project reflects the type of costly and often unavoidable learning experiences that occur in harsh economic development environments...
> The Project Committee, therefore, doubts that an incremental investment of $1.248 million will yield returns comparable to other alternative investments that might be undertaken."

PHILIPPINES:

Palawan Integrated Area Development Project

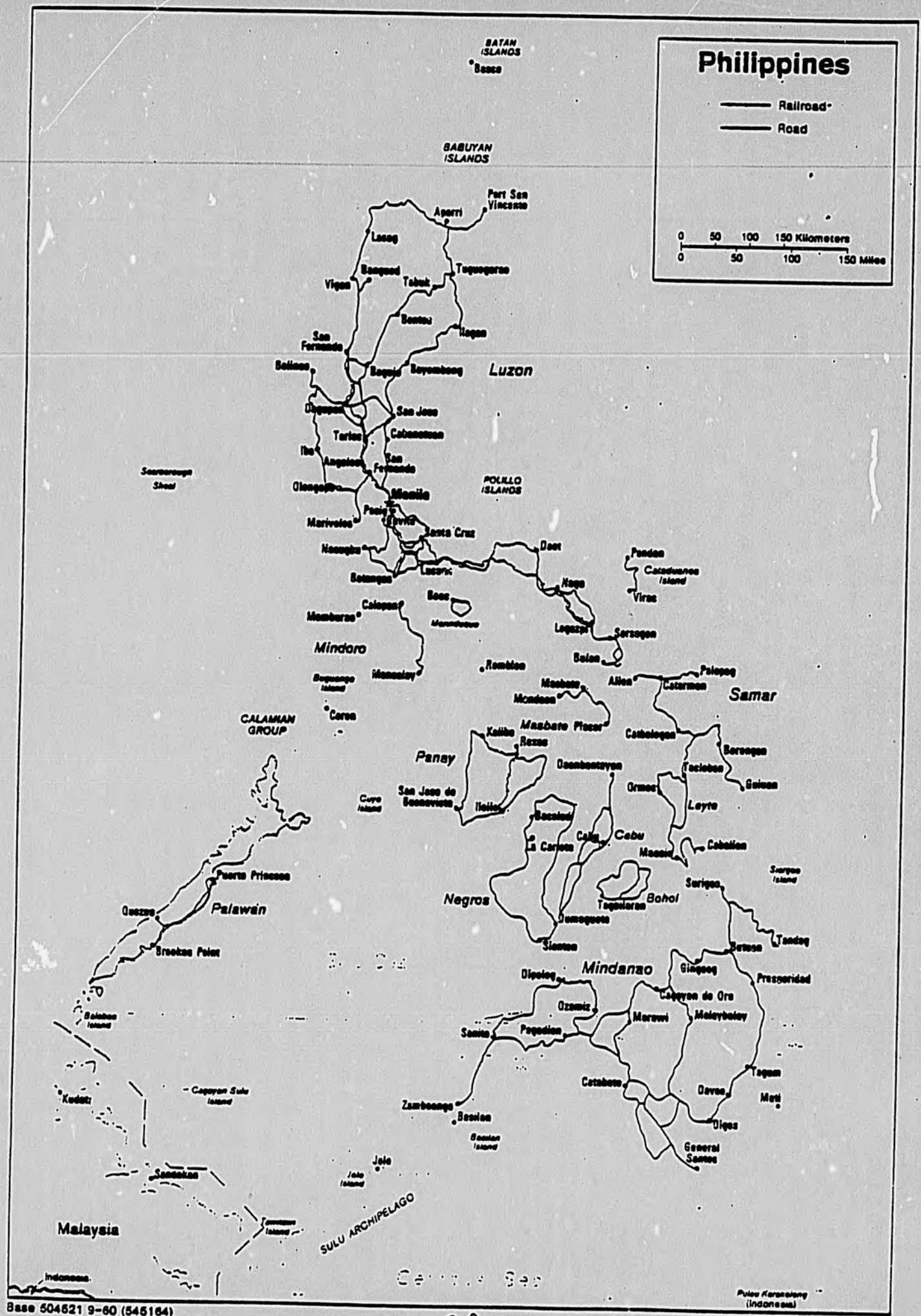
Training Case Study

August, 1982

prepared by:

Marito Garcia
Brenda S. Gardner
Jeffrey Merriam
Charlotte Miller
Patricia Rader
Gary Smith

Training materials prepared for the United States Department of Agriculture, Office of International Cooperation and Development, Technical Assistance Division, Nutrition Economics Group under PASA STB-0000-P-AG-2103, Nutrition Strategies Training Program, and RSSA 3-77, Economic Analysis of Agricultural Policies, under agreement with the Agency for International Development's Training Division (Personnel Management) and the Office of Nutrition (Bureau for Science and Technology)



Base 504521 9-60 (545164)

Introduction

Location. The Philippine Islands are a large archipelago in Southeast Asia, located southeast of Indochina, east of Indonesia, northeast of Malaysia and south of Taiwan. It is made up of 7,107 islands, of which only about 500 are larger than a square kilometer. The largest and most important islands in order of size are Luzon, Mindanao, Palawan, Panay, Mindoro, Samar, Negros, Leyte, Cebu, and Bohol. The capital city of the Philippines is Manila, located in a booming metropolitan area of over 6 million inhabitants, situated on the largest island, Luzon. The population of the Philippines as a whole is now well over 50,000,000 inhabitants.

History and politics. The Philippines colonial legacy includes rule by Spain, the United States and Japan. On July 4, 1946, the islands were granted independence, creating a nation state out of an amalgam of religious, cultural and ethnic groups who historically have few ties of national unity other than geographic proximity. There are still 77 native languages in the archepelago of which 9 are widely used to conduct business. The colonial heritage continues to affect the Philippines, through linguistic usages (e.g., the speaking English and the adoption of many Spanish words), cultural traditions, educational system, political structures and social customs.

The Marcos family, headed by President Ferdinand E. Marcos, rules the islands politically and economically through a strong central government and through its considerable wealth. The political strength of Marcos has managed to establish a sense of Philippine nationhood, despite Moslem dissatisfaction and rebel activities on Mindanao and problems created by

the dissident New People's Army. Economic problems include a high rate of inflation, as well as economic dualism between the elite and the poor, urban and rural populations, and Luzon and other areas. For example, per capita income in Metro Manila was significantly higher than the national average (US$630/year), while that of Palawan was significantly lower.

Philippine food/nutrition policy. In the current Five Year Plan and the Food and Nutrition Plan of 1980, the Government of the Philippines (GOP) has made explicit a policy to develop rural areas for "growth with equity." The Palawan Integrated Area Development (IAD) project is one of several such projects intended to carry out this policy.

Malnutrition in the Philippines has been described as broad but not deep; that is, wide spread but generally not debilitating. Survey data has found that the two major problems resulting in malnutrition are insufficient caloric intake and insufficient oil in the Philippine diet. The Food and Nutrition Plan of 1980 was prepared in recognition of these problems which are particularly acute in rural areas. The plan advocates increasing and diversifying food production to improve diets for all Filipinos and to insure a minimum diet for the undernourished. To accomplish these objectives, the strategies suggested by the plan include:

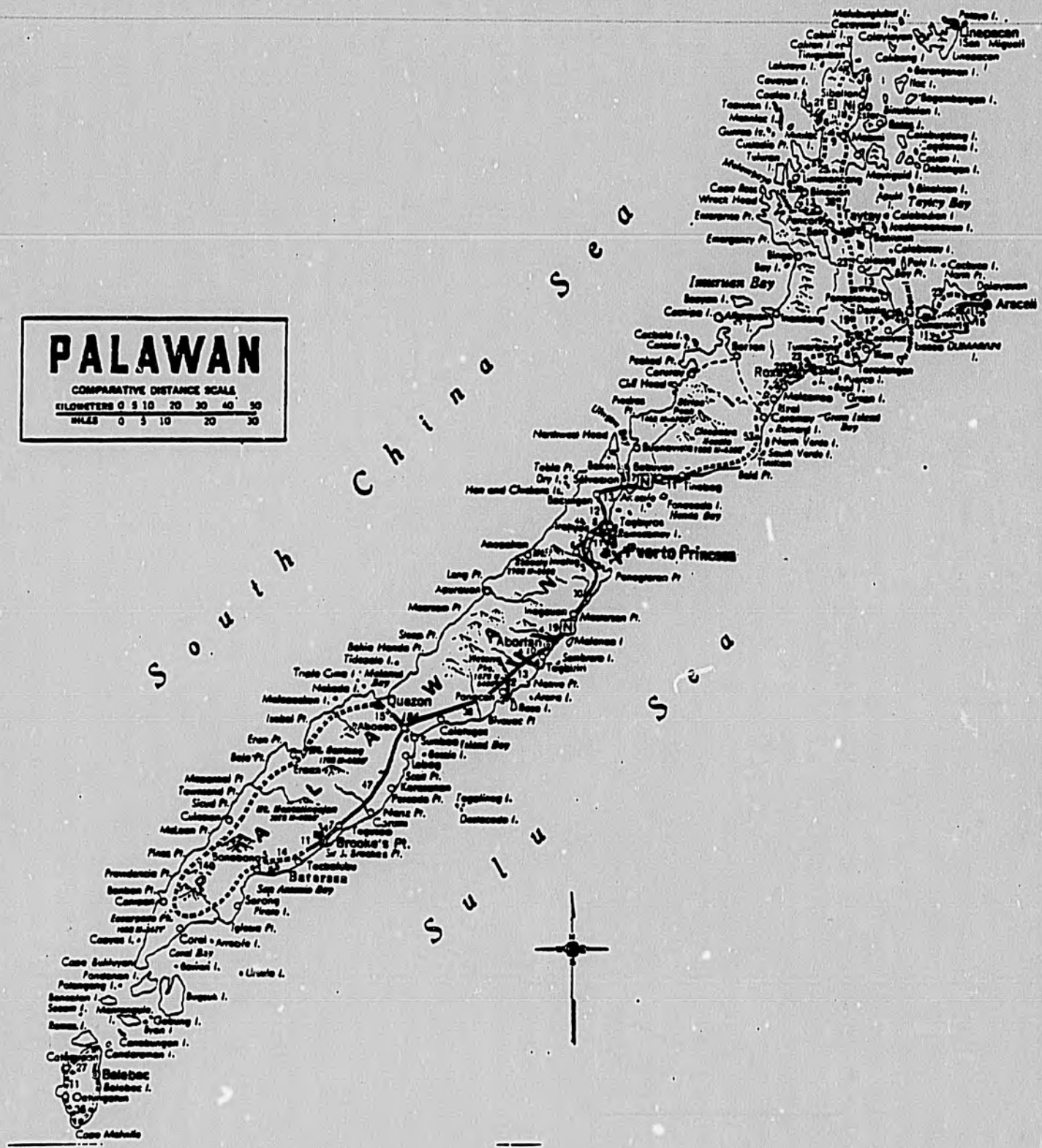
1. stimulating the growth of the food economy;
2. increasing export earnings while encouraging domestic substitutes for higher priced food imports;
3. maintaining food prices at equitable levels;
4. targeting government investments on the most critically malnourished groups.
5. and moving immediately to correct the most serious nutrtional deficiencies.

In this context, the nutrition design activities of the Palawan IAD project gave the GOP an opportunity to experiment with innovative tactics to achieve policy ends with the support and technical assistance of FAO.

Palawan geography, history and culture. Palawan is the third largest and most remote (from Luzon) island of the Philippines. Geographically peripheral to the other islands, it has been used as a relocation point for outcasts from Luzon and other islands, including a leper colony, a prison farm, a resettlement site for reformed anti-government rebels, and, more recently, a camp for Indo-Chinese refugees.

Palawan is a poor island, largely inhabited by indigenous ethnic groups and migrants from other Philippine islands. Among the major problems faced in development of the area are malaria and communications between island segments. The communications problem is caused by a lack of good roads and two major barriers to free travel and communication on the island: the first, separating east and west, is the island's mountain range; the second, separating north from south, is the large Iwahig prison farm, just south of the capital city of Puerto Princesa, in the island's most densely populated area. Many of the scattered coastal villages maintain communications with Puerto Princesa and Manila only through marine transport--long rides in outrigger craft. The population density of the island is far below the norm for the Philippines as a whole. The population of Palawan was put at 229,000 in 1970 and estimated at over 400,000 at present.

Economic activities. The two major food production activities on the island are fishing and agricultural production. Rice, corn, beans and sweet potatoes are the most prevalent crops; rice, in both paddy and dryland forms of cultivation, is the major crop. The prison farm possesses some of the island's finest rice producing land, but its production is totally utilized within the prison system, largely in prisons outside of


PALAWAN
COMPARATIVE DISTANCE SCALE
KILOMETERS 0 5 10 20 30 40 50
MILES 0 5 10 20 30
South China Sea
Sulu Sea
Puerto Princesa
Quezon
Brooke's Pt.
Batarasa
Coron
Balabac
Aborlan
Araceli
Linapacan
El Nido
Taytay Bay
Imuhuan Bay
Roxas
Cape Melville

Palawan. Other economic activities on Palawan include wholesale and retail marketing of fishery and marine products, mining of mercury and manganese, lumbering and growing tourism and handicrafts production. Government salaries due to numerous regional offices located in Puerto Princesa add a substantial cash input into the local economy.

Over the past ten years, the development of Palawan has been dualistic. Large mining and lumber corporations have moved on to the island bringing in large numbers of workers. This influx has driven local inhabitants, particularly the lowland paddy farmers, into upland areas where they continue subsistence farming with traditional slash and burn technology, a practice which aggravates economic, social and ecological problems.

In the mid-1970s petroleum was discovered off the western shore of Palawan at El Nido in the South China Sea. Palawan therafter experienced a short speculative boom in the lodging/tourism industries. However, at present, most travel and communications with El Nido are being conducted directly from Manila. Certainly this discovery promoted GOP interest in and concern for Palawan.

Project Identification

The Palawan Integrated Area Development Project (PIADP) started its investigation of the project area in 1978 with the organization of its Project Office in Manila under the National Council on Integrated Area Development (NACIAD). By NACIAD mandate, the PIADP office would be able to gain assistance from 13 major government agencies in the preparation and implementation of the project, including those agencies dealing with food and agriculture, extension, ports, highways and heavy industries. In mid 1979 the National Nutrition Council (NNC) was appointed as a full member of the steering committee establishing an institutional link for launching coordinated nutrition programs for projects under NACIAD's mandate. This was the first time the major nutrition agencies of the Philippines, through the NNC, had been included in national planning and implementation activities for integrated projects.

A description of the project objectives and scope as decided by NACIAD with donor input follows:

> "The Project is production-oriented and is designed to raise production, income, nutrition and living conditions of people in the Project area. This objective will be achieved through the development of some of the natural resources of the province with care for the protection of the environment.... Activities to be considered for priority attention in the Project should be selected, inter alia, from among the following, with emphasis on production-oriented and production support activities.
>
> °Improvement of crop production systems in the lowlands and inland valleys and development of other lands in these areas with the most potential. Development of communal irrigation schemes as well as pump irrigation should receive high priority in lowland areas.

°Replacement of shifting cultivation in upland areas with stable and rational systems of mixed farming (including livestock) and reforestation of seriously erroded areas.

°In the lowland and upland areas, pilot projects for development of existing coconut plantations and for the expansion of the small crop areas under rubber and cocoa.

°Completion of land development work in the Narra settlement....

°Development of potential in inland and coastal fisheries and in livestock.

°Development of rural industries based on processing and utilization of agricultural, fisheries and forestry products.

°Improvement of research, extension, input supply, credit, processing, storage and marketing services and farmers' organizations such as cooperatives....

°Provision of basic physical and economic infrastructure (roads, ports and domestic water supply--to serve the project areas).

°Development of human resources (through formal and non-formal education, etc.) and socio-economic conditions (through land tenure improvements, land titling, etc. and health and community facilities and special programs for tribal groups).

°Measures for strengthening management, implementation, coordination, monitoring and evaluation of development projects and programs proposed in the first phase project.

About the same time that NNC was given committee membership, the Food and Agricultural Organization of the United Nations (FAO) became interested in using the Palawan project as a test case for a six country study of methods used to incorporate nutrition in agriculture and rural development projects.

In October 1979 the NNC and FAO sponsored a 4 day site visit by a multi-disciplinary Food and Nutrition Planning team. The team was made up of an NNC economist, an NNC nutritionist and a FAO nutrition planner. Their objective was to gather data on the islands' nutritional status and to examine ongoing nutrition programs. Unfortunately the only data available were from secondary sources which were scanty and not detailed. The team came to some broad conclusions, reported in the following section, which are based on the limited data available on Palawan (anthropometric measures and RDA percent of food energy).

Food and Nutrition Planning Team

Initial Assessment

I. Team Findings

Child Malnutrition. At the time of initial assessment, it was estimated that 27 percent of the children under 6 years are moderately or severely malnourished based on anthropometric data (2nd and 3rd degree underweight). Although these data strictly applied to the children weighed in the 1978 Operation Timbang (OPT) (a nationwide child weighing program conducted annually), the coverage was reported to be around 70-90 percent. Although these figures are not necessarily representative, they are still useful since analysts can assume that even where there is some kind of bias in the count, the relative degree of magnitude of the problem is defined with this size of coverage.

Child Mortality. Reliable data on child mortality were not available. However, based on a report from the provincial health office, the team agreed that under 5 mortality was probably high.

Diseases. The Ministry of Health reported that malaria was by far the most frequently reported disease in Palawan. (Malaria particularly affects young children and contributes substantially to malnutrition, child mortality and anemia.) Gastro-enteritis was also prevalent, another major cause of mortality and malnutrition in children. Among other diseases, tuberculosis and repiratory tract infections were widespread. A frequently found unanticipated consequence of irrigation for agriculture is an increase in fresh water areas which promote the breeding of malaria mosquitoes.

Food Consumption. Food and Nutrition Resource Institute (FNRI) data for Palawan on food consumption for 1978 give a mean of 1,813 kcal/head/day, which is 93 percent of the recommended daily allowance (RDA) of 1,950 kcal/head/day. The protein/calorie ratio is 10.8 percent, which was adequate; this meant that on the average, energy requirements were also met, even for young children. Of the micro-nutrients, Vitamin A intakes and riboflavin are particularly deficient.

Energy foods constitute about 79 percent of the Kcalories in the average diet, the remainder being made up of legumes, nuts, seeds, fish, meat, poultry, eggs, milk and milk products at 11%, fruits and vegetables at 9%, and miscellaneous at 1 percent. In terms of bulk intake, energy foods constitute 46%, body-building foods, 20%, fruits and vegetables, 32% and miscellaneous, 2%. (Data was taken from a national survey sample; the Palawan subsample consisted of 35 of 2800 possible households. The method used was 24 hour recall.)

Food Production. The National Grains Authority reports that since 1978 the province has been self-sufficient in rice and has exported 45,000 cavans (2,250 metric tons) to other areas in the Philippines.

Although Palawan as a whole produces a surplus in rice, the average consumption appears inadequate to meet nutritional needs. This could be due to the following reasons:

a) economic demand for rice too low to meet nutritional needs (maybe seasonal);
b) insufficient rice is retained for home consumption among farmers; and
c) food preferences are such that there is no further demand for rice, and the deficit needs to be made up from other foods (i.e., income elasticity for rice of around zero).

Another major contribution to the food supply is maize; 2,500 metric tons were produced in 1979. Corn and cassava partly supplement the food needs of an average Palaweno; these contribute at least 8 percent of the

total food energy intakes, based on the FNRI (Palawan) results for 1978. Less than one percent of the agricultural areas is devoted to root crops and tubers, mostly produced for home consumption.

Among the protein foods, there exists shortfalls in eggs, milk and milk products and legumes, and to a lesser degree fish, meat and poultry. Total meat production (pork, poultry, beef) is placed at only 2,360 metric tons (1979), substantially below the total requirement for the province. Significant shortfalls in green, leafy vegetables are also noted; these are main sources of Vitamin A. In 1979 around 5,300 metric tons of vegetables covering beans, eggplant, squash, pechay (a leafy green vegetable), okra, cucumber and watermelon were produced in the province with a significant portion used for home consumption. The province is virtually dependent on external sources, like Manila, for vegetables and some fruits such as cabbage, carrots and mango.

Groups Affected by Malnutrition - Malnutrition patterns in Palawan as reflected from the OPT (weight for age) survey of 1978 tend to indicate the following characteristics:

a) Municipalities located in relatively higher terrain slopes (El Nido, Taytay, Busuanga, Coron, and Araceli) have higher rates of malnutrition than the low municipalities (Bataraza, Brooke's Point, Narra, Quezon, Puerto Princesa, Roxas, and San Vicente) with the exception of Aborlan. This provides indications that topography and accessibility are contributing factors to the problem of nutrition in Palawan.
b) Northern Palawan municipalities generally have higher levels of malnutrition than Southern Palawan;
c) The best rice-producing areas (in the southern lowlands) have the lowest rate of malnutrition (average: 23 percent 2nd and 3rd degree) in the province;
d) The islands have rates of malnutrition lower than the Cagayancillo island group, and in fact lower than the average for the province.

In terms of occupational groupings, the FNRI (Palawan) 1978 food consumption survey indiates that:

a) Calorie intake of farmers and fishermen are approximately 12 percent below the recommended levels, whereas professionals and other workers generally have sufficient calories in their diet.
b) Protein intakes of farmers and fishermen are 5 percent below the required levels.

II. Team Recommendations

The PIADP Nutrition Intitial Assessment Paper was formally presented to the PIADP planners and project financing agency (the Asian Development Bank -- ADB) in late October of 1979. The PIADP implementation team members were quite open to dealing with the issues raised in the paper, realizing the importance of achieving the improvement of rural diets as a key objective of the project. They admitted that in the past NACIAD had been paying only lip-service to so-called social criteria in their project citing a lack of an effective and acceptable method by which social and nutrition criteria could be incorporated on a routine basis.

The following recommendations for insuring impact on desired target groups were proposed by the team for incorporation during the process of the project preparation, including:

1) Directing the project components to the more inaccessible jurisdictions called barangays to the smaller and less efficient farmers, and to the subsistence fishermen.

2) Designing certain components so that income and food accrue to those in need e.g. small fishermen obtain maximum income from their catch; and

3) Strengthening certain services which could improve health status of the population and therefore improve nutrient absorption and utilization, e.g. malaria control and health services, potable water supply for most affected areas.

Although it was assumed that project beneficiaries would be nutritionally better off, the FNP team expressed concern about potential unanticipated negative consequences resulting from the following factors:

1) Change in cropping patterns, particularly any shifts from food crops to cash crops;

2) Improvements in marketing causing less retention of food produced by household (e.g. rice, fish) for home consumption without a commensurate increased availability of marketed food stuffs;

3) Increased malaria prevalence resulting from irrigation systems; and

4) Changes in food habits and child-rearing practices due to changes in employment and income.

FNP team suggested that monitoring and evaluation should assess these issues in order that on-going redesign could counter any intolerable negative effects.

Project planners anticipated that implementation also might have had adverse effects on non-beneficiaries. They identified three possible sources of such effects:

1) Diversion of existing resources, e.g. water, land, fuel, agricultural inputs, services;

2) Diversion of food to areas or population groups with increased demand, causing either supply shortages or rising prices in residual areas; and

3) Ecological side effects affecting production (e.g. erosion, flooding) and health (e.g. malaria).

The team identified a need for better distribution of food in Palawan. They recommended that project designers should analyze where food was needed and categories of foods required in specific areas. The team concluded that further research in these areas would be necessary for an effective nutrition component to the project. They found that the data available to them in the rapid assessment was not sufficient to plan this component. They proposed a sample survey in the project area which was intended to provide the following data:

1) Information at the local jurisdiction (barangay) level, such as location, physical characteristics, services, etc.;

2) Information about the household: food consumption, occupation, main crops, technology, wealth;

3) Indications of the nutritional situation of the family: nutritional status, morbidity, mortality of young children and sanitation.

It was decided that such a survey should be coordinated with other required PIADP surveys; e.g. socio-economic, soil surveys, etc.

TABLE I

MEAN ONE DAY PER CAPITA FOOD AND NUTRIENT
INTAKE COMPARED WITH RECOMMENDED DAILY ALLOWANCES (RDA)
IN PALAWAN, 1977

	Intake	%Kcals[1]
Energy Foods (cereals, roots, sugar, fats)	46%	79%
Body-Building Foods (beans, nuts, meat, milk, etc)	20%	11%
Regulating Foods (vegetables, fruits, etc)	32%	9%
Miscellaneous (other)	2%	1%

TABLE II

CHECKLIST
DATA AND ANALYSIS REQUIREMENTS AT PRE-PROJECT SELECTION PHASE
PALAWAN IAD PROJECT

ANALYSIS REQUIREMENTS	DATA REQUIREMENTS AND SOURCES
itritional situation by area id group	. Anthropometry, mainly weight for age of 0-6 year old children from the OPT (weight survey) Data level: by municipality, given in terms of percent children who are moderately (2°) and severely (3°) underweight. Specific groups with problems cannot be identified by secondary data.
. Health situation	. Data can be given in terms of morbidity rates, given at provincial level only, from the Ministry of Health.
. Food Consumption	. The Food and Nutrition Research Institute conducted a nationwide survey (1978) of 2,800 households. Only 35 samples were taken from Palawan. The indications from these are: . Per capita calorie intake is deficient by at least 7% of RDA, or approximately 1813 kcal per day. . Vitamin A and riboflavin are particularly deficient. . Average diet composition: Cereals 40% Fish, Meat, Poultry 14% Fruits/Vegetables 33% Fats and Oils 1% Roots/Tubers 4% Other 8%
. Food Production	. National Grains Authority figures indicate that in 1978, Palawan was a net exporter

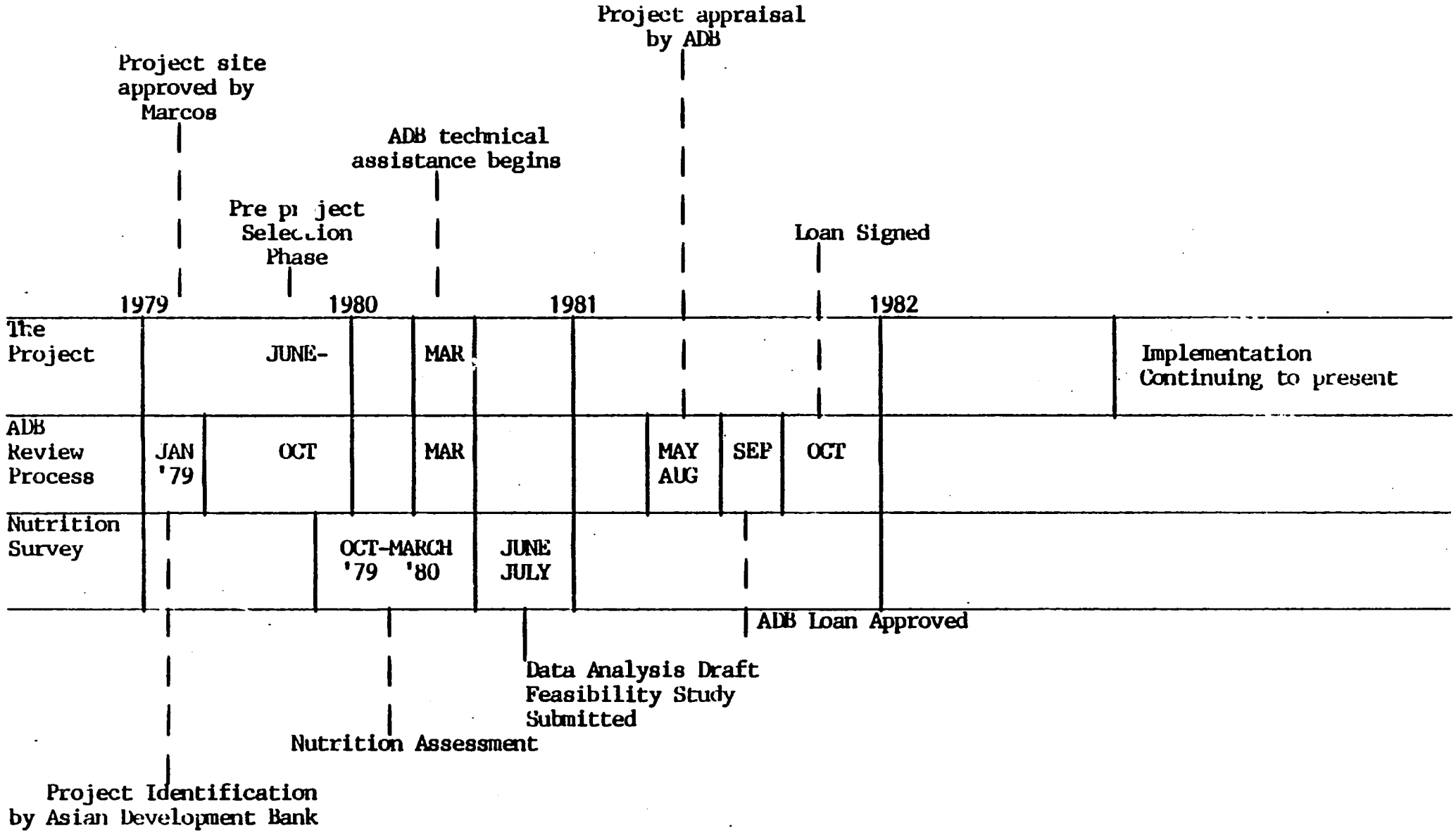
ANALYSIS REQUIREMENTS	DATA REQUIREMENTS AND SOURCES
	of rice - about 2,250 metric tons. Despite the surplus, average consumption appears inadequate to meet nutritional needs. • Some vegetables were imported from Manila. • Meat production was substantially below requirements. • Corn production was 2,500 metric tons in 1979. • Rootcrops and tubers are produced mainly for home consumption.

TABLE III

Nutritional Significance and Uses of
Selected Agricultural Crops and Fishery Products

COMMODITY	Nutrition	SIGNIFICANT USES			
		Alcogas	Feed Potential	Home Yard Production	Export Potential
Cereal and Cereal Products					
Rice	Makes up 82% of local cereal consumption and provides higher percentage of energy and protein intake. Calorie per 100 grams: 368; Protein per 100 grams: 7.4	xxx	Rice, bran by product as livestock feed	xxx	Significant
Corn	Contributes 11% to total cereal intake and 8% to total energy intake. Calorie per 100 grams: 188; Protein per 100 grams: 4.9	xxx	Major source of animal feed	xxx	
Fats and Oils	Fats and oils provides 5% of total energy intake. Coconut (grated and processed as cooking oil) makes up 92% of total fats and oils intake.				

PALAWAN TIME LINE



PALAWAN CASE STUDY

TEAM TASK I

1) What are the key issues in this project?

2) What priorities would your team recommend in developing and defining a detailed nutrition strategy, specific nutrition inverventions in the IRD project?

3) What project components are most amenable to successful nutrition/consumption reports?

HANDOUT I

Project Identification

In March 1980 a large multi-disciplinary team, including the FNP team, headed by an agronomist/planner, began a six month study of the project--the first two months for project identification and the latter four months for the feasibility study. Baseline data compiled by PIADP in the previous six months was provided for the team. In addition to the original FNP team, new specialists were contracted to perform the various tasks of this phase, including a sociologist to undertake attitudinal and sociological studies of various occupational groups, a regional planner to investigate project design features bearing on nutrition and food consumption, an agriculture economist to assist in the analysis of food consumption data, 4 survey supervisors, 32 survey interviewers, and a programmer/statistician to carry out data processing.

Although the FNP team recommendation for combining PIADP office's socio-economic survey with the food/nutrition survey was considered, it was decided that the technical requirements of the latter survey and its experimental nature required separate administration.

The stated purposes of the survey were to measure variations in malnutrition among various populations groups in the project area and relate those variations to possible causal factors. Since by this time the Palawan IAD project area had been limited to the central and southern parts of the Palawan mainland, the survey was conducted in the following six municipal jurisdictions of the PIADP area: Puerto Princesa (including the provincial capital), Brooke's Point, Narra, Aborlan, Quezon and Bataraza. These jurisdictions included 75% of the provincial population.

The survey utilized a 2-stage sampling procedure wherein each household in the municipal jurisdictions to be sampled had an equal chance of being selected. Twenty-five sub-jurisdictions were randomly selected from a total possible field of 125. In terms of topographical characteristics, the sample barangays were distributed in the following way: upland (4), lowland (9), coastal (3), island (1), mixed topography (8). In the sample barangays, households were randomly selected from a pre-existing list of residents provided by a local leader called the barangay captain. A minimum of 40 households were chosen for each barangay.

Two sets of questionnaires were utilized in the survey--barangay questionnaire and household questionnaire. The barangay questionnaire, with the barangay captain as respondent, covered area information of topographical characteristics, agro-economic zoning, distance-to-market centers, health facilities, presence of irrigation systems, electricity, and prevalence of malaria.

The second set of questionnaires was designed to obtain information on household and child characteristics as listed in Table 2. The survey covered respondents' main sources of income and topographical location, and size of landholding (for farmers). Farmers were asked to identify themselves as kaingeros (slash-and-burn farmers), rainfed land farmers, (upland/lowland), or irrigated land farmers. Farmers groups were also classified according to the size of land holdings, type of crops cultivated, their tenurial status, and degree of subsistence. For the fishermen, the surveyors collected information on whether they were predominantly commercial or subsistence, whether they owned boats, whether the boats were motorized, types of fishing activity (trawl, hook and line,

etc.) and catch retention for home consumption. Service workers were classified into regular or casual workers.

TABLE IV

HOUSEHOLD QUESTIONNAIRES:
QUESTIONS COVERING HOUSEHOLD AND
CHILD CHARACTERISTICS

i. Nutritional status of young children (0-83 months) are collected using anthropometric measurements (weights and ages only). For purposes of the survey, children below the 75 percent weight for age (WA) cut-off (or second or third degree malnutrition) are defined as malnourished. The Philippine growth standard is used to evaluate weight for age in the survey.[1] The Philippine Standard is based on FNRI Classification of WA (1977), and its application in the analysis of Palawan survey makes the results compatible and comparable with other nutrition surveys carried out elsewhere in the Philippine achipelago. Children with protein-calorie malnutrition (a condition resulting from a deficiency in calories and/or protein) typically have low WA. Thus, comparing WA values to the reference growth standard provides an indicator of the nutritional status of the particular group.

.. Food Consumption Data are collected in order to describe the variations in food consumption and nutrient intakes, and relate these to income, occupational and topographical variations.[2] The survey

---

[1]Technical Note: The Philippine growth standard follows the Harvard growth norm for the first two years and then declines to about 90 percent of the international reference at age 60 months.

[2]The FAO methods did not recommend the collections of food consumption in the case studies. However, the NNC-NORDPLAN Team believed at the time of the survey that these data could be crucial to influencing project planning towards nutrition goals. Furthermore, the survey team had the capability and experience to handle, process and analyze food consumption information.

utilizes a 24-hour food recall procedure (based on FNRI Method), whereby recall of foods eaten in meals by the household is obtained through an interview of the mother, normally the person who prepares the meal. The weights of the various food items are converted to grams, or household measures. Food quantities, as converted to gram weights by FNRI (1975) nutrient values are calculated (calories, protein, iron, vitamins, etc.) using the FNRI Food Consumption Tables (1968). Household level food intake is translated into per capita intake by dividing the total daily consumption by the household by the number of consumption units (C.U.) in the household. (One C.U. is equivalent to an individual present in all three meals.) Comparing food and nutrient intakes with the recommended dietary allowance (RDA) would provide a description of the inadequacy of the various population groups. Prices of each food item are likewise collected in the interview, and are likewise validated through market survey of barangays. This permits the collection of typical food patterns among households.

iii. Health Variables covered by the survey are mortality rates of children under 5 years of age and morbidity (fever, cough, diarrhea) three days prior to the interview.

iv. Sanitation Variables include type of potable water supply (piped, artesian wells, springs, rain, etc.) and its distance from houses, types of toilet facilities (open pit, closed pit, water sealed, or none) and type of garbage disposal system (dump, burn, collected, buried).

v. Wealth Variables are used as proxies for income assessment, and cover: housing (type, number of rooms, housing materials, ownership), livestock ownership (number of cattle), and children's education.

vi. Demographic Variables include family size, sex and age composition.

The detailed schedule of the survey activities is listed in Table V. The preparation of the survey questionnaire and sampling plan was carried out by the FNP team in consultation with the PIADP Office planners. The field supervisors of the survey included a survey team leader and three supervisors (all graduates from the University of the Philippines with BS degrees in nutrition). They were hired for 40 days; 30 days in the field and 10 days in Manila for the final editing. Thirty-two enumerators, based in Palawan, were mostly graduates from Palawan Normal College, of whom about 35% had had past experience in socio-economic surveys.

Training of the enumerators was conducted for 4 days in November, 1979. The training covered methods and manner of interviewing, conduct of the weight survey and food recall, comprehensive analysis of the questionnaire content, and group dynamics to strengthen rapport of field operations. Field tests were conducted after each lecture to acquire first-hand experience. Initial interviews were conducted in Puerto Princesa under direct supervision of field supervisors, and two days were spent assessing and simulating the procedures before field launching of the survey.

Measures were taken to check and validate each interview schedule: first, immediately after the interview, checked by the enumerator herself; second, at field headquarters, checked by the supervisors; another editing in Manila by the supervisors; and fourth, prior to computer processing, (i.e., if Weight for Age--WA figures were outside a reasonable parameter, they were deleted.).

TABLE V

SCHEDULE OF SURVEY ACTIVITIES

PERIOD	ACTIVITIES
October 1-19, 1979	Survey Planning . Initial gathering of data from secondary sources to establish socio-economic conditions (reconnaisance level). . Design interview schedule based on variables gathered from secondary sources, and discussions with PIADP office. . Design of sampling procedure.
October 20-23, 1979	Communications and Logistics Link-up . Establish communications link with local government. . Pre-testing of interview schedule. . Gather information on barangay location, transportation network, cultural minority groups, on-going projects.
October 23 to November 7, 1979	Finalization of Detailed Survey Plans . Revision of interview schedule. . Drawing of sample barangays. . Preparation of interview schedule, logistics. . Hiring of 3 field supervisors.
November 8-12, 1979	Pre-Survey Preparation . Hiring of field enumerators-interviewers. . Finalize sample barangays. . Training of field enumerators-interveiwers in the methods of food recall, conduct of OPT, interview for socio-economic variables.
November 13-27, 1979	Survey Phase . Protocol visit to local officials. . Data collection. . Field editing of questionnaires by the interviewers.

PERIOD	ACTIVITIES
	. Validation of edited questionnaire by the supervisors. . Market survey (kind, price) of selected food items in each sample barangay.
November 28 to December 6, 1979	Post-Survey Phase . Comprehensive re-checking of questionnaires at Puerto Princesa, Palawan. . Pre-processing of food recall data: condensation of various household (food) units into standard units, coding of food items.
January to March 1980	Data Processing (UNIVAC 1100/10 and Microcomputer (Commodore PET) . Encoding. . Data Cleaning and File Creation. . Analysis Runs.
June to July 1980	Data Analysis (Manila) . Data analysis using UNIVAC 1100 computer (stage 1). . Data analysis using Commodore PET microcomputer (stage 2).

To incorporate nutrition formally as a criteria for project analysis, the FNP team felt that some nutrition evaluation indicators should be used together with those traditionally used by economists in economic evaluation. An experimental indicator for assessing potential nutrition benefits of the project was used. This indicator provided a measure of the extent to which nutrition goals were to be achieved relative to other project goals.

The attempt to quantify nutrition benefits of PIADP began with defining "food consumption" as the total intake of Kcalories in order to relate this variable to income for the various target groups. This act of quantification assumed that the income elasticity of demand for Kcalories was positive and, thus, that increases in income would be followed by increased consumption of foods thus increased intake of Kcalories. Therefore, this would constitute an increase in the "benefits" of the project.

An economist on the team justified using the indicator, although the income/Kcalorie relationship may not capture all of the beneficial effects of the project. Its use seemed practical to the group for two reasons. First, reasonably reliable methods for quantifying Kcalorie intakes exist. Second, the measurement of food consumption in terms of energy intake is superior to the use of "nutritional status" in terms of anthropometric measurements, since the latter are too far removed from project outputs for planning purposes. Calculation of this indicator requires information about concerning Kcalorie consumption by functional population group, estimated income elasticity of demand for Kcalories, and projected rates of increase in real income generated by the project.

It was expected that the project would result in a net increase from 88 to 176 Kcalories per person per day for the entire province. The overall impact would vary from one area to another and among population groups, depending on the level of project outreach and the degree of participation by the various groups. For example, it was estimated that a participating farmer from the irrigated lowlands who might experience a ten percent increase in income would thereby increase his Kcalorie intake approximately ten percent, achieving RDA levels in five years. On the other hand, a subsistence level fisherman, starting from a lower initial Kcalorie intake, would not reach minimum RDA following a ten percent income increase.

Thus, the nutrition indicator, used with other indicators was designed to provide a more accurate measure of project benefits and, conversely, to yield valuable information concerning progress towards achievement of other project goals (such as economic efficiency) consistent with the goal of adequate nutrition for all groups.

TABLE VI

SUMMARY TABLE

Table 1 (See Detailed Table)
Actual Cost of Incorporation Process

Personnel	US Dollars (1981)	Percent to Total
Local	$ 29,100	33.8
Expatriate	24,000	27.8
Survey	12,500	14.5
Data Processing	14,500	16.8
Other Operating Expenses	6,000	7.1
	$ 86,100	100.0

Table 2
Comparative Cost Analysis

COST ITEMS	Actual Cost in 1981 US Dollars
. Food/Nutrition Study Activities in Palawan (Table 1)	$ 86,100
. Project Preparation (Feasibility Studies) of Palawan IAD Project, derived from ADB Technical Assistance and Philippine Government Counterpart	$ 826,000
. Detailed Design, Planning and Engineering of Palawan IAD Project	$ 2,550,000
. Total Investment of Palawan IAD Project (1981-88) 37% Financed by Asian Development Bank Loan	$85,000,000

Table 2a
Comparative Cost Analysis: Palawan Project

The cost of the Food and Nutrition Study and Activities:	
As a Percent of the Total Feasibility Study Cost	10.4%
As a Percent of the Detailed Planning, Designs and Engineering Cost	3.30%
As a Percent of the Total Project Cost	1/10 of 1%

Compared to the total feasibility study cost, the nutrition study appears rather high at 10% of total expenses. If the nutrition study is however reflicated in future project preparation, substantial reductions in cost can be made; probably only a third of the cost of the Palawan exercise. It should be noted that the testing of the methods are under experimental conditions; for instance, a micro-computer was acquired, etc.

Cost Analysis: Incorporation of Nutrition in Palawan IAD Project (1981 Prices)

1	Personnel Expenses	Actual Person-Mos.	Rate/Month	Cost
	Local			
	Economic (Contract consultant)	7.0	$ 2,500	$17,500
	Nutritionist (NNC)	6.0	600	3,600
	Sociologist (consultant)	2.0	1,700	3,400
	Regional Planner consultant)	1.0	1,700	1,700
	Agriculture Economis (Research Assistant)	2.0	600	1,200
	Programmer/Systems Analyst	1.0	1,700	1,700
		Sub-Total		$29,100
	Expatriate Consultants			
	Nutrition Planner (FAO)	3.0	$6,000 (Incl.	18,000
	Economist-Data Analyst (FAO)	1.0	6,000 Int'l Travel & Per Diem)	6,000
		Sub-Total		24,000
		TOTAL PERSONNEL COST		53,100

2	Food/Nutrition/Socio-Economic Survey	
	Field Supervisors (4) each 6 person-months each $300/	$ 1,800
	Field Enumerators (32) each 32 person-months each $200/	6,400
	Inland and Sea Travel	2,800
	Supplies, Materials and Miscellaneous Expenses	1,500
	TOTAL SURVEY COST	$ 12,500

3 **Data Processing Expenses**

A. Acquisition Cost: Micro Computer (Commodore PET) Peripherals (Diskette Drive, Tape, Printer)	$ 7,500
Software Development Cost	1,500
B. Computerization at UNIVAC 1100/10 (Coding, Data entry, CPU Time and Programming)	5,500
TOTAL COST OF DATA PROCESSING	$ 14,500

4 **Other Operating Expenses**

Travel to and from Palawan	$ 2,500
Reproduction Expense	1,500
Miscellaneous	2,000
Other Operating Expenses	$ 6,000
TOTAL COST	86,100

TABLE VII

PIADP Components and Types of Survey Analyses

Project Component	Potential Areas for Analysis
1. Roads	Little input forseen from survey. Roads may decrease subsistence ratio on holdings and generate employment for service workers. Possibly, use of priority nutrition areas in road alignment.
2. Ports	Probably none.
3. Inland Fishing (Fishponds)	Probably none.
4. Communal Irrigation	How nutritional status, health factors and wealth compare between households with irrigated and non-irrigated holdings. Relationship between nutrition and holding size among households with irrigated plots.
5. Resettlement	Comparisons by main crops, percent of production retained for home consumption, size of holding, kaingin versus non slash-and-burn farmers. Prioritization for targetting areas.
6. Agricultural Diversification	First, cross-tabulations of main crops with livestock holdings to establish frequent combination; then rank groups with certain combinations using nutrition and related indicators. Outcome would be which groups to emphasize and possibly in which directions to diversify. Data may be too general to make informed suggestions regarding crops or livestock to expand into.
7. Reforestation and Agro-forestation	Kaingin and rainfed upland households versus other groups.
8. Coastal Fishing	Boat owners versus share fishermen; motorized versus non-motorized. Perhaps little input, but project may affect motorization rates through credit.
9. Rural Industries	Service workers versus fishing and farm families, perhpas combined. (As assessment of relative need.) Lower priority for analysis.

Project Component	Potential Areas for Analysis
10. Water Supply	Find average distance to water for each barangay. Also get distribution of distance for entire sample, divide into three ranges, compare by nutrition and related indicators. Cross-tabs of distance ranges with water source types. Create a variable to code certain combinations. Then cross-tabs of barangay codes with these combinations of distance and type to find locations. Some morbidity questions may also apply.
11. Malaria Control	Probably little input, but can use the malaria question from the barangay questionnaire. Perhaps divide into three groups of barangays on basis of malaria prevalence.
12. Nutrition and Health	Probably rank municipalities with just the nutrition and health variables (excluding wealth and more indirect measures.)

MISSING PAGE

NO. 39

HANDOUT II

Project Appraisal

The draft report of the feasibility study, including the nutrition annex prepared by the NNC team, was submitted to the ADB and Philippine Government in October of 1980. After a series of revisions resulting from comments of participating agencies in the project, the scope of project investments was finalized in April of 1981. In August of 1981 the ABD Board of Directors approved the loan. The agreement was formally signed by the Philippine Government and ADB in October; the total cost was estimated at $85 million, with ADB financing $32 million and the rest financed by GOP counterpart funds. Grants totaling $4.2 million were given by the European Economic Community for various components.

Three FNP members, the economist, NNC nutritionist and FAO consultant on nutrition planning, participated during the appraisal phase of the project to present and discuss nutrition issues with PIADP office and the ADB appraisal team. Specific recommendations are included in Table VII.

The ADB was generally open to the recommendations and issues raised by the nutrition group. A good number of the nutrition recommendations were taken under consideration by the consultants in deciding project input, scope and activities. Many, however, were seriously challenged on technical grounds. For instance, soil and land capability criteria take precedence in deciding location of agriculture programs. The ADB re-emphasized that the PIADP was first and foremost a production-oriented project designed to raise agricultural production, and thereby the income and living conditions of Palawan's population; they felt that incorporating

of project intervention and, through the choice of agricultural crops should be balanced with the economic objectives in order that the economic rate of return on the project would meet the requirements for ADB loan money.

Specific nutrition components such as nutrition education, supplementary feeding programs, extension, etc., were not included in the project. The appraisal recommended that such direct intervention components be addressed by other on-going nutrition programs such as Philippine Nutrition Program. It was recommended that the Palawan IADP concentrate on rural development components which have clear economic and technical justification, are integrated into the mainstream of national development policy and which also have high potential for nutritional improvement. Actual project components and objectives are discussed below.

Target Groups. The appraisal team concluded that the project should be targeted at the groups identified in the nutrition analysis. The lowland agriculture component was intended to improve rice, coconut, and corn farming systems to increase production in the most needy areas of Bataraza, Aborlan, Narra and Brooke's Point. Targeting porject inputs to smaller farmers was accepted as one of the guidelines in project implementation. For upland agriculture, the target groups were the slash-and-burn farmers and the ethnic minorities; the programs were targeted at upland farmers because other program components, e.g. roads, irrigation were unlikely to reach these people.

Crop Emphasis. The ADB team also recognized the need to balance food and cash crops in the agricultural diversification and intensification

programs. Vegetables were emphasized as crops for promotion in the program because of Palawan's under-production and low consumption of green leafy vegetables and legumes. As part of the balanced approach the project would help develop multi-storey cropping of coconuts, coffee, cacao, pepper, and annual crops like corn, mungbeans and peanuts by providing suitable planting materials, extension and training. The farmers were also provided with credit for developing multi-storey cropping, vegetable growing and improved coffee and cashew cropping.

The decision on which crops to be promoted in upland areas was withheld, pending detailed analysis of soil conditions. The steeper sloped upland areas were to be addressed by an upland agriculture stabilization program to test upland crop technologies.

Fishery Component. The appraisal mission deleted the fishery component from the loan package, since project preparations of this component were considered to be unsatisfactory at the time of the appraisal. However, the findings relating to the extremely low food intake of subsistance fishermen were noted by the appraisal mission.

Drinking Water Supply. The Program was designed to rehabilitate all existing sources of water supply where feasible and develop suitable springs, install shallow and deep wells, and introduce sanitary measures to ensure the provision of potable water to the rural population in the main project area. The source to be developed depended on the population within the area to be served, hydro-geological conditions and water quality. Selection and prioritization at areas to be served was informed partly by the presence or absence of malnutrition.

TABLE VIII

Highlights & Conclusions of the Nutrition Analysis

1. In terms of the population groups and areas, the following are considered most nutritionally deprived, using prevalence of pre-school children under-nutrition (2nd and 3rd degree) as the "need" and "ranking" indicator.

	Priority Groups and Areas	Incidence of Child Malnutrition[1]	Nutrition Priority Ratio[2]
A.	Narra and Aborlan: Kaingin Farmers	40.7%	1.70
	Narra: Rainfed Lowland Farmers	46.9%	1.96
	Aborlan: Self-employed and Wage Earners	36.7%	1.53
B.	Narra and Aborlan: Lowland Areas	36.0%	1.50
	Narra and Bataraza: Coastal Areas	37.3%	1.56
C.	Subsistence Fishermen	24.0%	1.01 (1.18)[3]
D.	Tribal Minorities	High	High

[1]Percent of second and third degree malnourished among pre-school children.

[2]Ratio of malnutrition prevalence in the group over the provincial average.

[3]This NPR used calorie intake as indicator.

2. The slash-and-burn farmers, particularly those in Narra and Aborlan require particular attention as they have been forced to be doubly at risk nutritionally than is indicated by the provincial average.

Contrary to initial hypotheses, the kaingin farmers are not more malnourished than the settled farmers. Some pockets of malnutrition among slash-and-burn farmers in Narra and Aborlan must be considered in planning.

3. It appears that irrigated farmers are not better off than the rainfed farmers. This is a unique situation for which explanations are not yet known. The potential advantage of agricultural productivity in irrigated areas may possibly be offset by increased exposure to malaria, of which Palawan has the highest prevalence in the country. Irrigation canals have running water, ideal breeding places for malaria mosquitoes. Malaria infection in turn can affect nutritional status.

4. For the beneficiaries of the project who are farmers, the results of the nutrition analysis indicate that efforts to improve nutrition may be more effective if PIADP components on lowland agriculture are targeted to small landholders (less than three hectares). The nutritional status of farmers with small landholdings is found to be worse than farmers with large landholdings. Actual ownership of land does not appear to be related to nutritional status. What is important is the actual amount of land cultivated. (For those growing rice, the size of area cultivated is not associated with nutritional status.) However, if the total area cultivated for all crops is considered, those farms with greater than 3 hectares are better off than

those with less than 3 hectares. It seems that increased production of crops other than rice is positively associated with nutritional status, while increased cultivation of rice is not.

5. The fishermen, particularly the subsistence groups, were found to have the lowest calorie intake among all occupational classes. Special attention with respect to project activities is needed for this group. Most of the small fishermen have lower standard housing (76.9 percent with one room); poor sanitation (85 percent with no toilets); high mortality (21.5 percent); and morbidity (34.6 percent).

6. The source of drinking water is found to be strongly linked with nutritional status. Thus, improving the quality of water supply would greatly improve the chances for better nutrition. Households dependent on springs and rivers have higer prevalence of pre-school malnutrition that those with artesian wells and piped water.

TABLE IX

INCORPORATING NUTRITION SUR FINDINGS AND RESPONSES

SURVEY FINDING/CONCLUSIONS AND RECOMMENDATIONS	RESPONSES/ATTITUDES OF PLANNERS AND CONSULTANTS	FINAL OUTCOME
. Certain population groups and municipalities have significantly higher rates of malnutrition.	. Location of project sites for upland and lowland agriculture components are mainly based on soil and land capability. Certain adjustments can, however, be made in locating specific villages for project investments to reflect 'need' based on nutritional deprivation. For instance, slash-and-burn farmers in the municipalities of Narra and Aborlan will be priority groups in the upland agriculture components. Small subsistence fishermen are targetted for credit and technical assistance.	. Half of all recommended sites are accepted in the project plan. The rest remain "gray areas" because of conflict with technical criteria, e.g. soil and land capability.
. Farmer groups with less than 3.0 hectares cultivated are generally worse-off than those with greater than 3.0 hectares. Therefore, lowland and upland agriculture should be also selectively targetted (where technically feasible) to small farmers.	. The small farmer criteria cannot be generally applied. The agriculture planning process uses technical criteria as first filter, that of land potential. The small farmer criteria can apply in the second filter; that is, having defined the potential cultivableland, the question of beneficiaries is determined.	. The issue is to be decided during the detailed engineer and design stage. However, "small farmer" criteria still remains.
. Irrigated rice farmers were not nutritionally better-off than rainfed rice farmers. In Palawan, it is theorized, that the potential advantage of agricultural productivity in irrigated areas might be offset by exposure to disease in particular, malaria.	. Malaria control would be one of the main components (with a budget line). The original proposal on malaria control, however, is in relation to overall malaria program. Nevertheless, issues raised with regards to potential dangers in irrigation canals would be among those for investigation.	. Issues raised are to be included in the comprehensive irrigation - malaria control studies.

SURVEY FINDING/CONCLUSIONS AND RECOMMENDATIONS	RESPONSES/ATTITUDES OF PLANNERS AND CONSULTANTS	FINAL OUTCOME
• In rice-growing areas, the size of the cultivated landholding is not associated with nutrition. But if all crops are considered, those with larger cultivated holdings are better-off. Hence, increased production of non-rice crops is positively associated with nutrition, but cultivating more rice is not. The recommendation is for multi-cropping and crop diversification in lowland agriculture.	• Lowland agriculture component will not only deal with rice, but also with the intensification of coconut and corn production, with inter-cropping. This strategy is consistent with the original plan.	• Intercropping is adopted in lowland agriculture.
• Small, non-boat owning fishermen have extremely low food consumption levels. About 61.3% of these subsistence fishing families consume less than 1500 kcals per day, about 400 kcals short of the required levels. Attention to these groups is imperative.	• Design of fishery component will give attention to subsistence fishermen, thru credit, motorization and fishing gear improvement.	• Fishing component is dropped for lack of information.
• Households dependent on spring or river for water supply have higher prevalence of pre-school malnutrition than those with artesian or piped water. Springs and rivers are often contaminated, use of this water perpetuates cycle of malnutrition and infection. Hence, strong water supply component is required to achieve nutrition goals.	• Construction of 150 units of deep wells; rehabilitation of 40 existing wells will be implemented. The water supply component is one of the main project inputs.	• Prioritization of areas and location for water points use nutritional status as one of the criteria.

SURVEY FINDING/CONCLUSIONS AND RECOMMENDATIONS	RESPONSES/ATTITUDES OF PLANNERS AND CONSULTANTS	FINAL OUTCOME
• (Issues not directly derived survey, but are based on general knowledge) In upland agriculture, component crops like cashew, cacao, rubber and coffee are proposed for propagation in upland resettlment areas. The FNP team warned the planners of possible negative impact on food security resulting from shifts from food to cash crops in isolated areas. Thus the FNP team recommended intercropping with food crops like corn, cassava and vegetables to obviate food problems.	• For upland areas, the PIADP soil specialists and agronomists do not recommend crops that would involve plowing and harrowing (like rice and corn) and uprooting crops like cassava, peanuts, and vegetables like pechay, onion, cabbage, potatoes and camote because they destroy soil stability in fragile upland areas that support the watershed, e.g. it is ecologically harmful.	• Food crops that do not endanger upland soil will be selected in the detailed designs. Candiates are fruit-bearing vegetables like eggplant, tomatoes and mungbeans. Also vines with fruit vegetables like squash, ampa winged bean and string beans.
• Specific sub-groups of the population and certain villages have dangerous levels of malnutrition and low food consumption. Short-term interventions such as feeding, nutrition education and health protection are needed. Therefore, it is proposed that the ADB loan should cover specific nutrition components, not necessarily part of the project per se.	• ADB does lend money on productive projects with proven economic viability. It cannot cover special projects like direct consumption loans (e.g., feeding). It is proposed that the Philippines government bear the cost of these components.	• It was decided to expand existing Philippine Nutrition Program components being implemented in Palawan.

PALAWAN INTEGRATED AREA DEVELOPMENT PROJECT

Project Monitoring & Evaluation Design

The implementation of project activities was initiated in October of 1981, including detailed engineering and designs of the infrastructure components (roads, ports, irrigation, water supply), detailed planning for agriculture components, and the organization of field offices to carry out monitoring and supervision activities.

The task of the FNP team at this stage was to prepare a system for nutrition monitoring and evaluation to assess whether the objectives and planned targets for nutritional improvement were met along with other project goals. It was intended to provide the project management office and policymakers with data to align project plans during implementation and design toward the nutrition and other objectives of the project.

The ADB loan included an "Environmental and Project Benefit Monitoring and Evaluation" component covering two main sub-components: (1) integrated environment program; and (2) project benefit monitoring and evaluation.

Two types of evaluation activities relevant to the implementation of the Palawan development projects, on-going evaluation and ex-post evaluation, were part of the nutrition monitoring and evaluation module. On-going evaluation was intended to continually analyze project outputs, effects and impacts during implementation to provide project management and policymakers with up-to-date information; ex-post evaluation refered to an analysis after completion of the project of its impact and effects; it would incorporate the on-going evaluation studies and supplementary studies if necessary to provide information and analysis for future planning and/or inform the public of project results.

necessary to provide information and analysis for future planning and/or inform the public of project results.

The key indicators in the nutrition module to be collected on the target groups of the project are included as Table X The overall responsibility for data generation and analysis lies with the PIADP Office "Project Benefit Monitoring and Evaluation Unit" established as requirement of the ADB. The NNC will supervise the data collection/analysis process for the nutrition module and will contribute counterpart staff during the evaluation process.

The NNC specialists involved in this phase include an economist, systems analyst, nutritionist and statistician.

The key indicators in the nutrition module to be collected on the target groups of the project are included as Table X The overall responsibility for data generation and analysis lies with the PIADP Office "Project Benefit Monitoring and Evaluation Unit" established as requirement of the ADB. The NNC will supervise the data collection/analysis process for the nutrition module and will contribute counterpart staff during the evaluation process.

The NNC specialists involved in this phase include an economist, systems analyst, nutritionist and statistician.

TABLE X

Nutrition Monitoring and Evaluation Module
Palawan IAD Project

INDICATOR	COLLECTING AGENCY OR PROCEDURE	LEVEL	COLLECTION FREQUENCY
1. Nutritional Status . Weight for Age (0-6 yrs.)	By Household Survey and OPT	Household	OPT-Annual Survey Mid-Project and End of Project
. Health of School Entrants	Ministry of Education from School Records		Annual
2. Food/Nutrient Consumption	By Household Survey by 24-hour Food Recall	Household	Mid-Project and End of Project
3. Health			
. Proportionate Mortality of Children (Ages 1-4)	Records from Rural Health Units	Barangay	Annual
. Morbidity (Diarrhea Frequency, etc.)	Records from Rural Health Units	Barangay	Annual
. Infant Death Rate	Municipal Registry and Rural Health Units	Municipality	Annual
. Birth Weight Below 2.5 kb.	Rural Health Units	Municipality	Annual
4. Wealth Indicators			
. Housing (Type, Number of Rooms, Roof Materials, etc.) . Livestock Ownership . Children's Education	By Household Survey	Household	Mid-Project and End of Project
5. Sanitation Indicators . Source and distance of drinking water supply . Toilet facilities	By Household Survey	Household	Mid-Project and End of Project

INDICATOR	COLLECTING AGENCY OR PROCEDURE	LEVEL	COLLECTION FREQUENCY
. Garbage disposal system			
6. Health Services	Records of Municipal Health Office	Barangay	Annual
. Physicians per 10,000 population . Number of Rural Health Units			
7. Prices of Critical Food Items	Price Reports from Bureau of Agricultural Economics	Municipality	Monthly

Explanatory Notes for Table X

Food and Nutrition Composition. Kcalorie intake is one of the main evaluation parameters in our rpocess. Income elasticity of demand for food energy (measured in kcalories) is used as a predictor for future levels of energy intake, given income growth rates.)

Explanation. The modes of data collection that will be used are:

1. By household survey of the project area. Sampling plan will be coordinated with the PIADP Unit in charge of monitoring and evaluation. This will permit possible merging of data files.

2. By collection from routine statistics in the project areas (e.g. health clinic, school reports, etc.)

3. Retrieval from monitoring reports on project activities of PIADP.

TRAINING SIMULATION

TELEPHONE CONVERSATION between member of steering committee and ex-patriate consultant

Consultant:

"I am concerned about the successful integration of the nutrition concerns into the Palawan Integrated Rural Development Project. It seems that the project has become largely politicized making objective assessment and appraisal difficult.

There seem to be three basic and inter-related problems with the process to date: timing, quality of data and policy commitment. First of all, there is a major problem of timing. The nutrition concerns were not presented early enough to be incorporated into the project design and acceptance process. The nutrition input was pulled together hastily and as a result, the conclusions were premature, weak and in some cases inaccurate. Work on the nutrition component should have begun earlier in order that more solid conclusions could have been integrated more completely into the final process.

The unfortunate result of this time lag is that the powers that be can continue to pay lip service to including nutritional concerns into agricultural projects and not really make substantive changes in project design.

This brings up a second problem namely, that of policy commitment. This must exist and it must be made early to form the basis for incorporation of nutrition concerns into project design and insure that the design is implemented. In the Palawan case, there was in fact commitment on the part of the Philippine government. This was a very good starting point.

However, the Asian Development Bank was and continues to be unreceptive to these concerns. The consultants who prepared the appraisal report were likewise unreceptive. The project began as a production project and to date remains a production project. This is in spite of Philippine government efforts to integrate nutrition concerns. The consulting firm was titularly employed by the Philippines but in fact answered more directly to the ADB.

What we find is, that to convince people at ADB and their consulting firms, we must have hard evidence on nutrition impacts and constructive suggestions prepared on a timely basis.

The quality of the data is potentially very good. In fact, one of the land grant universities has continued to analyze the data collected and has come up with more solid conclusions--for example, specific farmers to be targetted, and detailed affects of water systems on nutrition.

I am not yet pessimistic as the project may soon be entering a Phase II Design. I sincerely hope that these detailed fundings can convince the ADB and be incorporated."

PALAWAN CASE STUDY

TEAM TASK I

1) What are the key issues in this project?

2) What priorities would your team recommend in developing and defining a detailed nutrition strategy, specific nutrition inverventions in the IRD project?

3) What project components are most amenable to successful nutrition/consumption reports?

PALAWAN CASE STUDY

TEAM TASK II

1) What is your evaluation of the strategy described above?

2) How useful do you think the conclusions of the survey described above will be
   a) in understanding the food consumption situation on Palawan;
   b) in gaining acceptance to incorporate nutrition/consumption concerns into the project?

3) What alternatives would you recommend
   a) to the strategy?
   b) to the survey design and implementation?
   c) to the conclusions drawn?

POSSIBLE CONCLUSIONS FROM PALAWAN CASE STUDY

In general, the experiment done in the context of the planning of the Palawan Integrated Area Development Project (PIADP) appears to have gained considerable ground in dealing with nutritional issues in project preparation. Several conclusions from the experiment are derived to guide future activities in the area of incorporating nutrition objectives in agriculture and rural development projects. There are:

1) A necessary condition for incorporation of nutrition and social objectives as a criteria in deciding project design is that it should not cause unacceptable losses in the other project objectives (e.g. economic rate of return, etc.). Sometimes, lower but acceptable economic rate of return on the project might result from changes in project design that imply large nutritional gains. Beyond this, the nutrition criteria becomes a political criteria (by political will and commitment to nutrition objectives.)
2) There is ample latitude in a project design to balance nutrition with other project objectives. It requires basic understanding of the nature and causality of nutrition to uncover nutrition issues that bear on the project design. (Guidelines for these are summarized in the attached Primer on NORDPLAN, as Document No. 1.)
3) Nutritional status and food consumption are powerful indicators in describing quality of life and impact of projects on the population; and therefore should be routinely used in project preparation.

4) Five main groups of indicators related to nutrition are adequate to characterize nutrition problems, namely: nutritional status (by anthropometry), food consumption, health indicators, sanitation, and wealth (income proxies).

5) If nutrition is to receive the same recognition as other objectives of the project, it must be inputed into the decision making process on the project design at an early stage of the project cycle;

6) To predict project impact we found that food energy consumption in terms of kcalories intake could be used. The indicator is tied with per capita income of population groups that benefit from project inputs.

PROBLEM SOLVING EXERCISE ON FNRI SAMPLE DATA

The Food Consumption Data presented in this document is based on a 1978 national survey conducted by the Food and Nutrition Research Institute on Palawan. The survey sample consisted of 35 households out of a universe of 2,800 households which make up Palawan's population of 400,000+. You have been given this data with the assurance that it is a random sample and therefore, representative and asked to derive strategy for nutrition on the island. Can you do it and how?

1) How can you be sure that the sample is really random? Why do analysts prefer the random principle in data collection?

2a) How confident do you have to be about this type of data: consider the margin of error you have in this particular case vis-a-vis a) a road project, b) a parachute jump (e.g. wind speeds, etc.)

2b) Considering the above case, how and where would you set your confidence level?

2c) Given a sample size of 35 out of 2,800, how confident can you be?

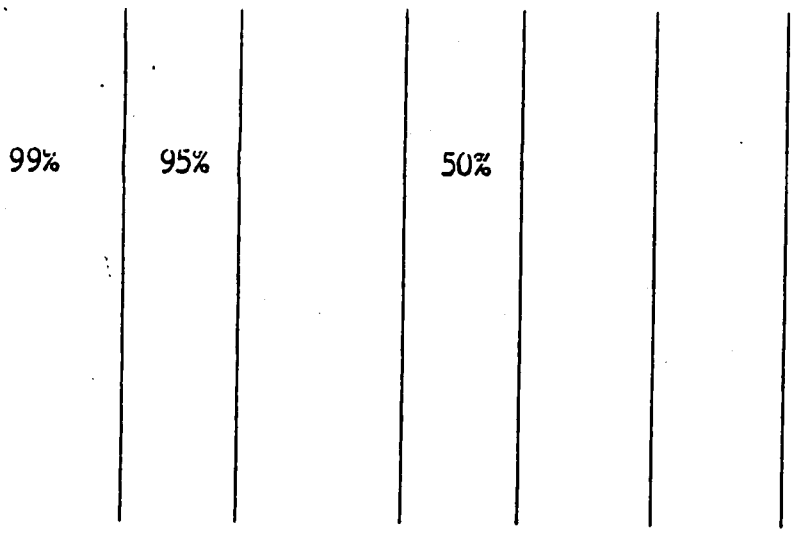
3) How can you expand the data to represent the whole population?

4) Assuming that the data lacks credibility, what use can you derive from it?

NOTES FOR INSTRUCTOR

1) A random sample is one in which every individual and every combination of individual has an equal chance of being selected.

2) Graph



3) Data can be useful in setting up hypotheses to be tested.

PERU:

Puno Integrated Rural Development Project

Training Case Study

August, 1982

prepared by:

Brenda S. Gardner
Hector Martinez
Charlotte Miller
Jeffrey Merriam

Training materials prepared for the United States Department of Agriculture, Office of International Cooperation and Development, Technical Assistance Division, Nutrition Economics Group under PASA STB-0000-P-AG-2103, Nutrition Strategies Training Program, and RSSA 3-77, Economic Analysis of Agricultural Policies, under agreement with the Agency for International Development's Training Division (Personnel Management) and the Office of Nutrition (Bureau for Science and Technology)

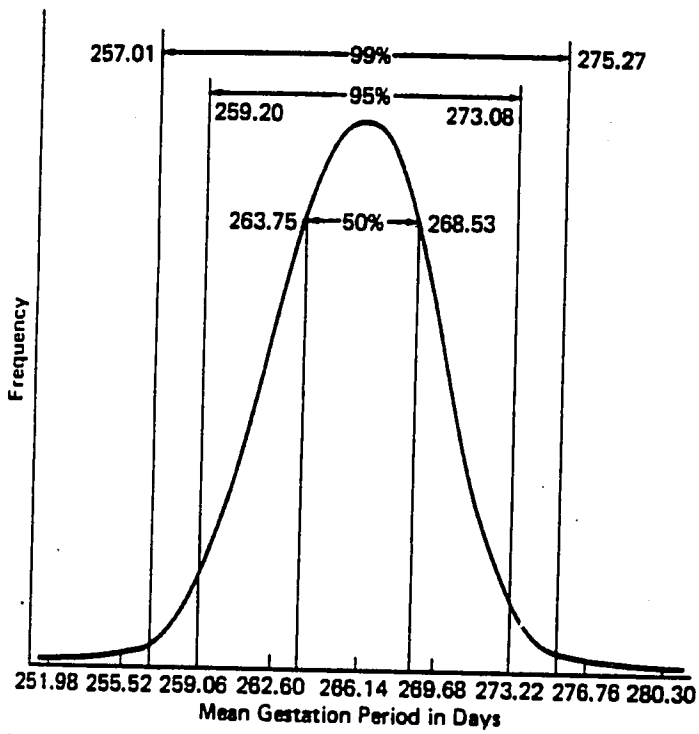


Figure 7-2 Theoretical sampling distribution of means. The figure is simply the normal curve where $M=266.14$ and S, which is $S_M=3.54$. The figure also shows the 50%, 95%, and 99% confidence limits for the mean. These were computed as follows: (1) the 50% confidence limits are $266.14 \pm .6745\ (3.54)$; (2) the 95% confidence limits are $266.14 \pm 1.96\ (3.54)$; and (3) the 99% confidence limits are $266.14 \pm 2.58\ (3.54)$. Two of these numbers—$M=266.14$ and $S=3.54$—should pose no problem. The other numbers—.6745, 1.96, and 2.58—are the Z scores that bracket the middle 50, 95, and 99% of the area in a normal distribution. That is, for example, the middle 50% of this area is in the range from $Z=-.6745$ to $Z=+.6745$.

Hypothesis Testing

Very similar ideas allow us to test specific hypotheses about the value of the mean. Since this is mostly review I shall not dwell heavily on the topic. But suppose one wanted to test the hypothesis that the mean human gestation period is 270 days and had the data we have been using to make such a test. The question becomes this: If the true mean is 270 days, what is the probability of obtaining a mean of 266.14 days? On the assumption that the distribution of means is normal, methods involving a Z score are appropriate:

$$Z=\frac{270-266.14}{3.54}=\frac{3.86}{3.54}=1.09$$

A. Background

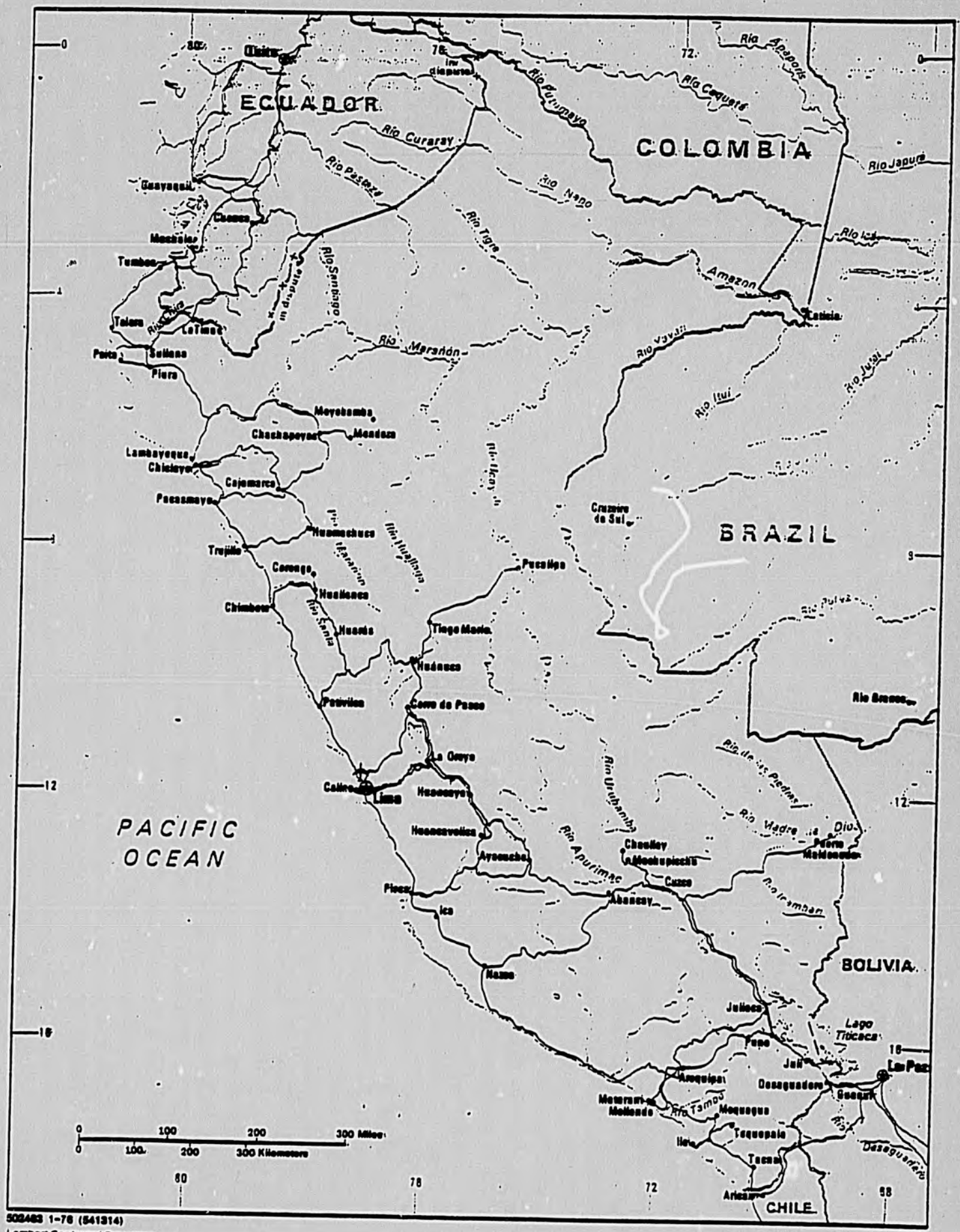
Geography. Peru is country located on the West Coast of South America, bordered by Ecuador, Columbia, Brazil, Bolivia, Chile and the Pacific Ocean. The Department of Puno is situated in the southern part of the country, on the border with Bolivia.

Peru is known for the high Andes mountains which divide its desert coasts with its irrigated valleys from the tropical lowlands of the Amazon basin. The Department of Puno contains both highlands (sierra) and Amazonian lowlands, although the vast majority of its population reside in the highlands, on the borders of Lake Titicaca and in the altiplano, a relatively arid highland plain.

Political situation. Puno has been a remote region of Peru, prone to social unrest and fraught with economic and ecological problems. In 1968, a military junta took over the Government of Peru (GOP) and instituted an number of populist reforms aimed at quieting the sort of unrest expressed by the inhabitants of Puno, including agrarian reform, worker protection legislation, and regulation and/or expropriation of industry and agribusiness. More than a decade later during the period 1979-1980, a new constitution was written, elections were held and political power was returned to elected civilian leaders.

Food and agricultural policies of military government. During the military rule, a number of policies and programs were introduced by the Peruvian government in an attempt to influence food production, supply and particularly consumer prices. These policies had both intended and unintended impacts on the country as a whole, including Puno.

Peru


ECUADOR
COLOMBIA
BRAZIL
BOLIVIA
CHILE
PACIFIC OCEAN
Quito
Guayaquil
Cuenca
Machala
Tumbes
Talara
Piura
Sullana
Paita
LaTimes
Rio Curaray
Rio Pastaza
Rio Putumayo
Rio Caquetá
Rio Apaporis
Rio Japurá
Rio Negro
Rio Tigre
Rio Santiago
Rio Marañón
Amazon
Leticia
Rio Yavari
Rio Ituí
Rio Juruá
Rio Madeira
Rio Ucayali
Rio Purus
Rio Beni
Rio Mamoré
Rio Madre de Dios
Rio Urubamba
Rio Apurimac
Rio Ucayali
Rio Tambo
Rio Desaguadero
Lago Titicaca
Moyobamba
Chachapoyas
Mendoza
Lambayeque
Chiclayo
Cajamarca
Pacasmayo
Huamachuco
Trujillo
Corongo
Huallanca
Chimbote
Huaraz
Tingo Maria
Huánuco
Pucallpa
Cruzeiro do Sul
Pasco
Cerro de Pasco
La Oroya
Callao
Lima
Huancayo
Huancavelica
Ayacucho
Pisco
Ica
Nazca
Cuzco
Abancay
Puerto Maldonado
Juliaca
Puno
Arequipa
Moquegua
Tacna
Arica
La Paz
Oruro
Cochabamba
Sucre
Tarija
Iquique
Rio Branco
0 100 200 300 Miles
0 100 200 300 Kilometers
502483 1-76 (541314)
Lambert Conformal Projection
Standard parallels 3°00' and 15°20'
Scale 1:10,000,000
Boundary representation is not necessarily authoritative
Railroad
Road
Airport

Some of the most important reforms were in the areas of land redistribution (via agrarian reform), producer price controls, retail food price controls, and transportation fare setting. One effect of the agrarian reform was to decapitalize the agricultural sector. Large landowners realized their land was to be expropriated, so they sold off what ever machinery and livestock they could, leaving little more than the land and peasant labor. The Department of Puno had some large estates expropriated and converted into government-managed agricultural cooperatives and enterprises during the 1969 reform.

The military government also set farm gate or producer prices at artificially low levels to keep consumers contented. In addition, the government took over the marketing of certain staples, including rice and sugar. conditions served to discourage private investment in the agricultural sector. Many farmers ceased to produce controlled products for market.

At the same time, on the consumer side, the government designated certain foods as essential for life and fixed their prices at fairly low levels. The most important of these commodities were rice, wheat products, sugar, milk, and vegetable oil. Beef was rationed in Lima, the capital city, by restrictions on marketing to the last half of each month. This policy was designed to promote the growth of the beef cattle herds which had been decimated by the slaughtering of cattle prior to the agrarian reform.

Eventually, in 1976, due to pressures from international lenders and the International Monetary Fund (IMF), the GOP was required to institute an austerity program including raising consumer prices and

dramatically devaluating the currency formerly fixed at a politically popular low level, which had created an active black market for foreign currencies. Widespread demonstrations occurred in coastal and highland cities. Despite the demonstrations, the military slowly instituted the required changes to improve economic conditions, including allowing official food prices and exchange rates to slowly creep upwards to levels more in line with real levels.

By 1979, the military government planned the return of civilian elected government, after 12 years of military rule, leaving Peru in its worst economic conditions in over 30 years. The agricultural sector had been declining as a percentage of the gross national product (GNP). For example, in 1960, agriculture represented 20% of the GNP, but by 1980, it had fallen to 12%. Rural-urban migration had been growing quickly. In 1960, for example,, the urban population represented 47% of the total Peruvian population, but by 1980 it had increased to 67%. Most of this migration was out of the highlands into coastal cities. In many areas of the highlands, the net population growth was zero or negative, due to the fact that the carrying capacity of the land, with given traditional production techniques, had been reached. The sole success story in Peruvian agriculture was the increase of average income generated by coca plantations in jungle areas, whose products were destined for the international drug trade, thus creating serious problems for local and international police.

Nutritional consequences. After 1972, the nutritional status of Peru's populace deteriorated both quantitatively (in terms of caloric intake) and qualitatively. Nevertheless, severe nutritional problems were not widespead. Malnutrition was most prevalent in the highlands,

and Puno was the most nutritionally depressed area of the highlands. Caloric intake there per day was estimated to be as low as 72% of FAO recommendations, as opposed to the 96% level found in the capital city of Lima.

Civilian policies. The new civilian government recognized that nutrition was a problem, especially in light of the fact that subsidies on food were being eliminated. It articulated a political concern for nutrition in a law issued in December, 1980 setting up an experimental food coupon program (since discontinued), expressing a priority for meeting needs of the rural poor, the most malnourished portion of the population. Also expressed were hopes to increase demand for indigenous or locally produced foods through programs aimed at increasing yields and reducing food imports.

Food and agriculture in Puno. The Department of Puno (see Appendix A for map), a predominantly rural area, has extremely limited natural resources. A high percentage of the land is non-arable due to shallow top soil, rocky outcroppings, glacial areas and altitudes too high to produce food crops. These problems are compounded by a general lack of water resources and climatic conditions such as unpredictable frosts, hail and erratic, sometimes heavy rainfall, which make agricultural activities very risky. Because of Peru's proximity to the equator, hours of daylight are not greatly variable from season to season.

The major crops produced in the Puno area are potatoes, barley, tarhui, broad beans, indigenous tubers (oca and olluco), and native grains (canihua and quinoa), which form the bulk of the traditional diet. Due to government subsidies, wheat products, rice and refined sugar have become increasingly common in the diet of highlanders.

Studies done in the 1950s showed that the traditional diet was supplemented by wild greens, mostly "weeds" which came up in cultivated fields along with planted crops. The people of the altiplano also consume some meat and milk, although rarely. They keep animals including cattle, sheep, llamas, alpaca, swine, and guinea pigs. According to the National Food Survey of 1970 (ENCA), Puno is one of the most underfed regions in Peru.

There is a significant amount of variation among the population's agricultural and dietary practices due to differences in climate and micro-ecology. For instance, there are zones along Lake Titicaca where certain crops such as maize may be grown which normally only grow at lower altitudes. There are other zones where few crops other than bitter potatoes, oca and olluco will grow, and the residents devote themselves primarily to herding activities. Most small farmers attempt to diversify their plantings by using various tiny fields in different zones, following a typical strategy to avoid risk. Interzonal trade between ecological niches is an ancient Peruvian activity which is still found as an adaptive response to these ecological variations.

Population and landownership. The population of Puno primarily consists of indigenous people living in rural areas, sharing common culture, languages (Quechua, Aymara and Spanish) and traditional technology. There is a high index of illiteracy in the population which has poor access to services. Land reform has left the large estates in tact, although supposedly operating in the interests of their residents, a fact which engenders envy and hostility from other communities of small landowners, who make up the bulk of the population.

Most of the land in Puno is controlled by the large government-run enterprises which were products of the agarian reform: agricultural cooperatives (CAPs) and agricultural "societies of social interest" (SAISs). In the project area, for example, 49% of the total area of 715,175 hectares of pasture and arable land belongs to 6 enterprises, and the rest to peasant communities. 80% of the approximately 300,000 families settled in the area live in the peasant communities. The population living outside the enterprise-owned lands, therefore, has much less land per family (see Table I).

Table I
Comparison of Productive Land per Family
for Residents of CAPs and SAISs
with Land per Family
for Residents of Community or Individual Holdings

Source: H. Martinez, 1982

	Number of families (%)	Amount of Land # hectares (%)	Land per family (ha.)
Enterprise-owned lands	60,000 (20%)	350,436 (51%)	5.84
Peasant community owned or individual lands	240,000 (80%)	364,739 (49%)	1.52

History of project activities. Puno has been the headquarters of a number of international development projects since the 1950s. Table II lists these projects. In general, a common characteristic of these projects is that they have developed independently, without the benefits learning from shared experiences. Furthermore, it appears that each was designed and implemented without utilizing prior studies and experiments.

Table II, Part A

International Development Projects Conducted in Puno
1950 to the Present
Source: H. Martinez, 1982

Name of Project	Dates	Description	Donor Agency
Plan Regional para el Desarollo del Sur del Peru (Regional Plan for the Development of the Peruvian South)	1956 to 1958	Covered 7 departments, including Puno, resulting in a series of connected studies of natural resources, agriculture, cattle raising, communications, etc. Included technical assistance and credit programs, especially given to big and middle-sized landowners	U.S. Interamerican Cooperative Food Service
Programa Puno-Tambopata (Puno-Tambopata Program)	1954 to 1961	Part of the Andean Program of the United Nations which covered Bolivia, Ecuador and Peru; activities covered community development, including (1) training outreach workers to act as health, agricultural and community improvement auxilliaries, (2) training midwives, (3) training professionals, (4) conducting basic education programs, and (5) establishing communal workshops.	United Nations International Labor Organization, Food and Agrcultural Organization, World Health Organization, UNICEF and UNESCO
Plan Nacional de Integracion de la Poblacion Aborigen (National Plan for the Integration of the Native Population)	1961 to 1965	A continuation of the previous project, expanded to cover 5 departments, including Puno.	GOP
Proyecto Integrado de Nutricion y Alimentacion (Integrated Food and Nutrition Project)	1961 to 1965	Covered the initiation of demonstration agricultural and horticultural plots, including school and kitchen gardens, Mothers' Clubs and pre-school education.	UNICEF WHO

Table II, Part B

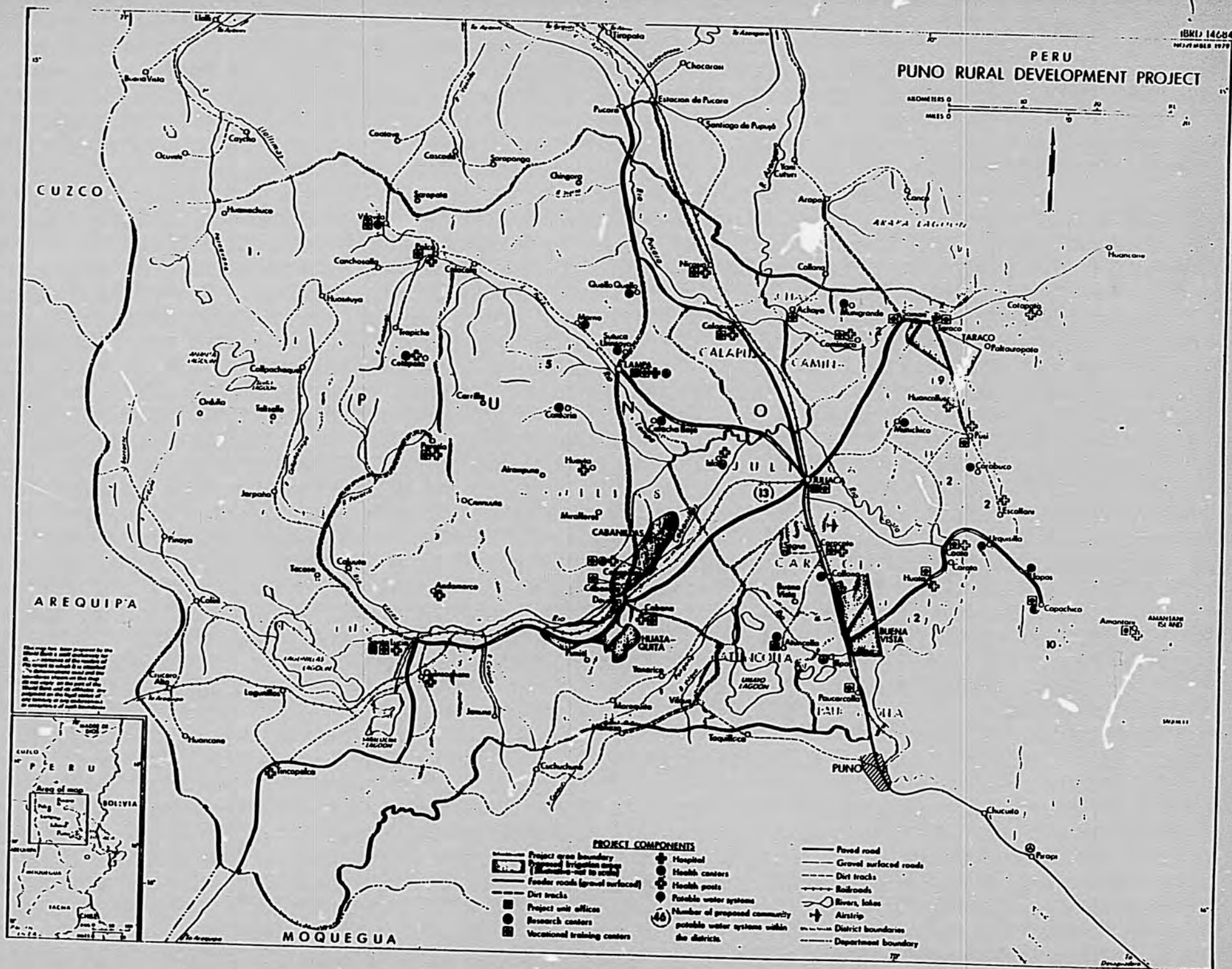
International Development Projects Conducted in Puno
1950 to the Present (Continued)

Name of Project	Dates	Description	Donor Agency
Proyecto de Desarollo e Integracion de la Poblacion Aborigen (Project for the Development and Integration of the Native Population	1966 to 1970	Covered 5 zones in Peru: its activities and methods were identical to those of the Puno-Tambopata Program (see above) except that it includ- strong participation by several ministries and other government agencies	Interamerican Development Bank and the GOP
Programa de Servicios Integrados de la Region de Puno-PROSIRP (Program for Integrated Services for the Puno Region)	1974 to present	A series of health, basic education, pre-nutrition activities, emphasizing the the family, youth and children; included most of the same features as the Integrated Food and Nutrition Project, 1961-65	UNICEF and the GOP
Juliaca Micro Region Integrated Rural Development Project	1980 to present	Also known as the Puno Integrated Rural Development Project, the subject of this report.	World Bank and the GOP

I. Pre-Project Selection & Analysis

Beginning in the 1970s, the initiation of rural development projects in the Peruvian highlands was been the subject of numerous conversations between representatives of the World Bank and the GOP. In 1971, a team from the Food and Agricultural Organization of the United Nations (FAO) and the Interamerican Development Bank (BID) together with its Peruvian counterpart drew up the Agricultural Development and Marketing Plan for the Lampa-Capachica area in the Department of Puno as a part of a more extensive general plan covering three other areas of the country. The plan was to be implemented with a US$24 million loan from BID and a US$23 million contribution from the GOP. Part of the plan was designed to specifically benefit 9,000 families belonging to seven CAPs and SAISs located in the area of Puno between Lampa and Capachica. The plan called for agricultural development activities on nearly one-half million hectares, the improvement of peasant organizations in the cooperative system and the construction of facilities for processing and marketing agricultural production. The plan did not specifically contain any food and/or nutrition component. The financial justification predicted a good rate of return to the proposed investments (27% for Lampa-Capachica), as well as the reinforcing of the positive impacts of the agrarian reform on the target beneficiaries through more jobs, increased cash income, and increased family production.

As a result of a joint FAO/World Bank project identification mission in 1977, the Food and Agriculture Ministry took charge of the preparation of a rural development project in Puno for the micro-region


IBRD 14684
NOVEMBER 1979
PERU
PUNO RURAL DEVELOPMENT PROJECT
KILOMETERS 0 10 20
MILES 0 10
CUZCO
AREQUIPA
MOQUEGUA
BOLIVIA
PUNO
TARACO
CABANILLAS
CALAPUJA
CAMINACA
CARABAYA
HUATA-QUITA
BUENA VISTA
ARAPA LAGOON
PROJECT COMPONENTS
Project area boundary
Proposed irrigation areas (Alternative-not to scale)
Feeder roads (gravel surfaced)
Dirt tracks
Project unit offices
Research centers
Vocational training centers
Hospital
Health centers
Health posts
Potable water systems
Number of proposed community potable water systems within the districts.
Paved road
Gravel surfaced roads
Dirt tracks
Railroads
Rivers, lakes
Airstrip
District boundaries
Department boundary
Area of map

of Juliaca because it had been the object of previous studies and was included in the plan of several development projects, in particular the one prepared by the FAO/BID Cooperative Program described above.

It was estimated that the total surface of the project area was 855,000 hectares and covered a rural population of 29,000 families (26,500 "mini-fundistas"--small rural property and middle-size and small owners, and 3,000 families belonging to the 7 agrarian reform enterprises).

The World Bank was motivated to finance the project due to (1) a decision to enlarge its credit assistance to Peru, including 11 agricultural loans for agricultural credit, irrigation, colonization and improvement of the drainage systems; (2) the feasibility of the project, particularly considering the estimated 27% rate of return; and (3) the strengthening of the formal democractic system after more than a decade of military government.

The GOP's motivations for the project included (1) the acknowledgement that Puno constituted an over-populated zone with limited natural resources, especially for agricultural use; (2) the recognition that Puno is one of the most depressed zones in Peru, inclined to social conflict, and that it constitutes an important source of migrations to coastal cities; and (3) the priority of implementing a project with economic and social concerns to reinforce the policy of economic decentralization aimed at increasing administrative authority and responsibility in the interior.

On the basis of the agreement and with the support of the FAO/IBRD Cooperative Program, a team was named in 1977 under the leadership of the Director of the Agrarian Region of Puno and coordinated by a public official specially designated at the national level to carry out a study project with the purpose of defining a food strategy for Peru with emphasis on Puno. The project was financed by the Swedish Government with US $85,000.

The following five pages include some basic economic and food consumption background data reported by that teams to the GOP during early discussions of project design.

Graphic: I

Table: Characteristics of Economic Strata used in Histogram (Rural Puno)

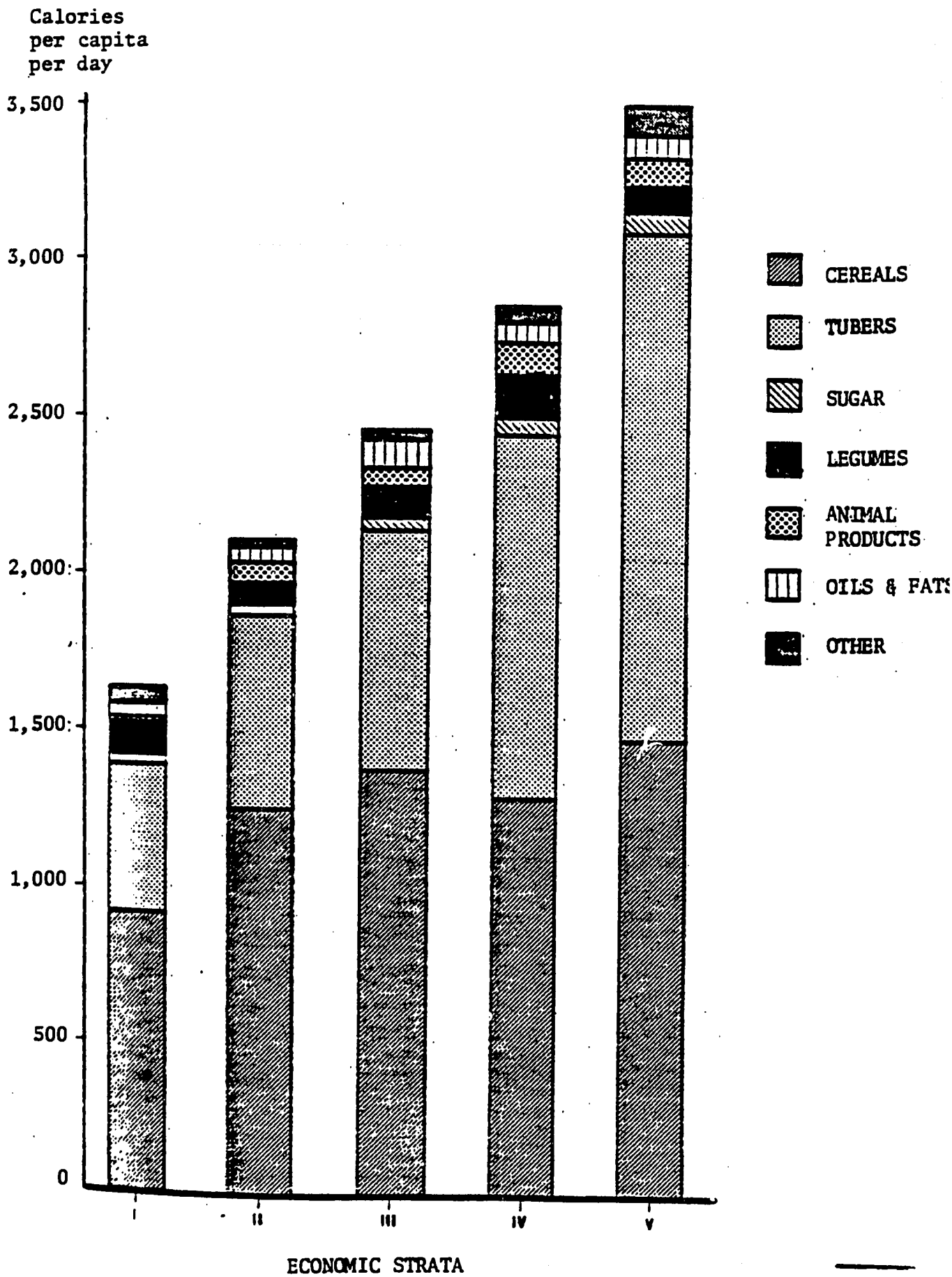
Strata	Category of Expenditures (in sols* of 1972)	Percentage of production used for home consumption	Percentage of families
I	0-1999	81	20
II	2000-2999	78	19
III	3000-3999	75	16
IV	4000-4999	72	14
V	5000 and up	74	31

*The sol is the Peruvian monetary unit, equivalent in 1972 45 sols = US $1.

SOURCE: Informe del Proyecto Sobre Estrategia para Alimentos, Peru, Organizacion de las Naciones Unidas para la Agricultura y la Alimentacion, Rome, 1979, FAO/SWE/TF ESN: TF/SWE/79, p. 81.

Graphic: II

Histogram: ENCA data: Consumption of Calories per capita per day by food groups and economic strata, Rural Puno sample



Source: Informe del Proyecto Sobre Estrategia para Alimentos, Peru, Organizacion de las Naciones Unidas para la Agricultura y la Alimentacion, Rome, 1979, FAO/SWE/TF ESN: TF/SWE/79, p. 83

TABLE: ENCA data: AVERAGE CONSUMPTION OF CALORIES PER CAPITA, PER DAY, OF SELECTED FOODS BY LEVEL OF SELF-SUFFICIENCY IN FOOD CONSUMPTION FOR RURAL PUNO

FOODS	Levels based on index of self-sufficiency, calculated by dividing the market value of home produced food by total expenditures, a statistic designated as A/G	
	Level I (Calories per capita per day) $0.00 \leq A/G \leq 0.66$ Low Level of self-sufficiency (High level of market dependency)	Level II (Calories per capita per day) $0.67 \leq A/G \leq 1.00$ High Level of self-sufficiency (Low level of market dependency)
Rice	40	12
Quinua (a cereal)	294	369
Barley	402	508
Bread	40	23
Macaroni products	21	10
Chuno (potato starch)	371	351
Potato	364	568
Sugar	45	32
Dried broad beans	83	81
Lamb/mutton	23	2
Animal and vegetable oil	73	56
Fresh milk	16	15
All vegetables	8	6
Other foods	504	397
Total calories from home production	1827	2188
Total purchased calories	457	242
Total calories	2284	2430

SOURCE: Informe del Proyecto Sobre Estrategia para Alimentos, Peru, Organizacion de las Naciones Unidas para la Agricultura y la Alimentacion, Roma, 1979, FAO/SWE/TF ESN: TF/SWE/79, p. 85.

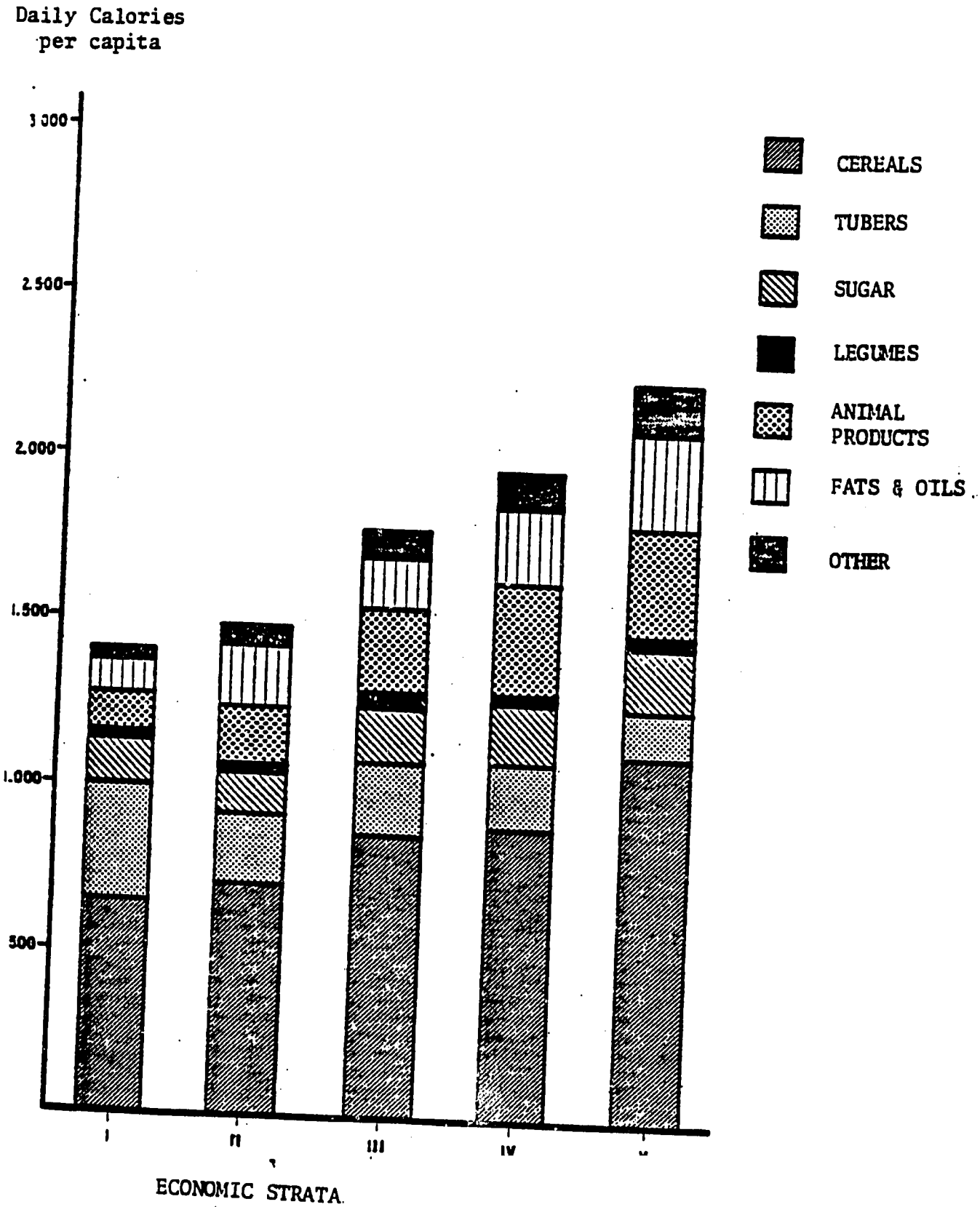
Table: Characteristics of Economic Strata used in Histogram (Urban Project Area)

Strata	Category of expenditures per capita by year (sols)	Percentage of families
I	0-2999	26
II	3000-4999	12
III	5000-6999	15
IV	7000-8999	12
V	9000 and up	35

SOURCE: Informe del Proyecto Sobre Estrategia para Alimentos, Peru, Organizacion de las Naciones Unidas para la Agricultura y la Alimentacion, Rome, 1979, FAO/SWE/TF ESN: TF/SWE/79, p. 86.

Graphic: V

Histogram: CONSUMPTION OF CALORIES PER CAPITA PER DAY BY FOOD GROUPS AND ECONOMIC STRATA, URBAN SAMPLE, PROJECT AREA (covering the Departments of Puno, Arequipa, and Madre de Dios)



SOURCE: Informe del Proyecto Sobre Estrategia para Alimentos, Peru, Organizacion de las Naciones Unidas para la Agricultura y la Alimentacion, Rome, 1979, FAO/SWE/TF ESN: TF/SWE/79, p. 87.

Task I

Based on information now available to you in this case, what do you see as the major issues for further project identification and analysis to design a nutritional component for the Puno Integrated Rural Development Project?

Be sure to treat the following points in your answer:

a. component objectives
b. monitoring and evaluation design, including possible base-line survey and any follow-up on nutritional status
c. selection criteria for target communities
d. organization and staff requirements

Project Identification and Analysis

In June 1979 an IBRD team visited the project sight to observe the project in operation. Supported by local staff, each expert prepared a report on each of the project components; health, drinking water, roads, etc. The major result of the visit was the addition of a nutritional component which roughly corresponded to the existing UNICEF project for integrated nutritional outreach.

The resulting project appraisal (similar to a PP) was presented for GOP review in February 1980. The appraisal briefly examined the Peruvian crop and livestock sector's behavior since the 1960's, rural poverty in the sierra region and a concise analysis project area's geographical and climatic subtleties. Project goals and objectives were stated along with the strategies by which they were to be achieved and the detailed budget. The final section contained the commitments of GOP with respect to the loan, and the guidelines for project implementation.

The report recommended that the nutritional component be incorporated into the above mentioned (1973) UNICEF project which was targeted at women and children in the most depressed areas of the project. In addition, the team supported the idea of regional study of nutrition problems and potential solutions. The study was carried out in cooperation with the National Planning Institute and the offi-offices of health, education and agriculture.

The result was the Preliminary Report for recommending a Program of Integrated Services in Puno which proposed extension services to the rural areas, an integrated approach toward social change and the integration of nutrition component.

HANDOUT

Contractor's Recommendations for Nutrition Component

July 1979

PERU

Juliaca Micro-Region Integrated Rural Development Project

Nutrition Component

The Problem

1. The nutrition component addresses the serious malnutrition problems prevalent in the Micro-region of Juliaca. Other Project activities will not reach many of the seriously malnourished families, since these are concentrated among the very small landholders. The component will also increase nutritional benefits of the Project among malnourished families served by other Project activities, using nutrition extension to improve consumption patterns related to increased income.

2. There are no surveys of nutrition status available for the Project Area, but indirect evidence and related surveys indicate presence of major calorie and nutrient deficiencies. Most conclusions about Peruvian nutrition status, including that of the Project Area's population stem from ENCA (Encuesta Nacional de Consumo y Alimentacion), a major survey completed in 1972. Later minor investigations indicate that little improvement has occurred. Recent droughts in the Puno area make nutritional deterioriation in the Project Area more likely.

3. Although the ENCA sample did not permit extrapolation at the Micro-region level, department figures for Puno are a reasonable indicator. They show that more than 50 percent of the children under five and pregnant and lactating women are at risk of serious malnutrition. An average calorie availability exceeding requirements, and failure to consider impact of health on needs, mask the serious deficits likely among the bottom 30 percent in socio-economic status. Protein deficiencies were closely associated with calorie

deficits in the typical protein-calorie malnutrition pattern. Calcium (average 90 percent of need) and vitamin A deficiencies (average 80 percent of needs) are also significant.

4. Protein-calorie malnutrition showed a high inverse correlation with size of family farm plot, with more than 90 percent of protein-calorie malnutrition found among families with three hectares or less of cultivable land. The clear concentration of malnutrition among the smallest holders is the main factor influencing nutrition component emphasis.

5. High correlation of vitamin, mineral, and micronutrient deficiencies with protein-calorie gaps indicates a general under-nutrition that calls for increased availability of basic staples (potatos, quinua) to malnourished families, despite a food balance sheet for the Department that shows average per capita availability to be close to requirements. There is general agreement that the general deprivation found in the micro-region produces an incidence and severity of malnutrition that constitute a critical problem. The nutrition component addresses that problem, bringing to the project a focus and set of goals that would otherwise be neglected.

Component Objectives

6. The nutrition component's principal objective is to improve nutrition status of 4,000 subsistence farm families in 40 communities of the Project Area. This target group are among the bottom 20 percent in socio-economic status, present the greatest concentration and severity of nutrition problems, and are unlikely to benefit substantially from other project activities.

7. Related sub-objectives include:

a) increased food production

b) increased consumption of home-produced food and other improvements in food habits, and

c) improved community distribution of nutrients in relation to nutritional needs.

8. The component will also improve nutrition status of 2,000 smallholde ("minifundista") farm families, whose incomes are expected to increase through other Project activities, by assuring that income improvement leads to increased consumption of nutritionally appropriate foods.

Baseline Data

9. A sample survey of baseline data will be carried out by the Peruvian National Institute of Nutrition. Anthropometric measures (height, weight, arm circumference) will be used. The Institute will work closely with local communities, to assure that the survey plays an important educational role in sensitizing the target groups to the nature and extent of their nutrition problems.

Selection of Target Communities

10. Choice of communities for inclusion in the nutrition component will depend on the following criteria:

a) The locality has, or is scheduled to get, a health promoter. Government commitment to multi-sectoral intervention at local level, and the synergistic nutritional impact of linking consumption and health activities, make this criterion essential.

b) The community must be reasonably receptive to participation. Intra-community rivalries and widespread disillusionment with past development efforts make many communities reluctant to participate in new programs. Component staff will initiate motivation activities among many groups, thereafter eliminating those which seem least promising for community development.

c) The community has a prevalence rate of 40 percent or more malnutrition among pre-school children and pregnant and lactating women. Widespread malnutrition in the Project Area makes this criterion of little screening value, but preference will be

given, if other criteria are met, to those with the highest prevalence and severity of malnutrition.

d) The community must be reasonably accessible and have soil, water and related conditions adequate for potential achievement of nutrition self-sufficiency. Where minor irrigation work, terracing or other action is required to satisfy this criterion, it will be included as part of the community nutrition plan.

e) The community has not received, and is not scheduled to receive adequate agricultural extension services. The nutrition component is intended to reinforce and complement other agricultural extension services. Where these seem likely to generate enough food production and income for nutritional self-sufficiency, the component's nutrition-oriented services will be unnecessary.

11. With more than sixty health promoters planned for the project area, over 140 primary schools already operating, selection of forty appropriate target localities will not be difficult. Those chosen will average approximately 100 households, with at least five people per household, and the community nutrition component will reach 20,000 people. Additional nutrition extension services, in areas that have substantial malnutrition despite adequate production and income, will reach another 10,000 during the loan disbursement period. These services will be concerned primarily with channelling more calories and nutrients to the malnourished through community feeding activities and improved family consumption.

Description of Component

12. The nutrition component will provide extension services, emphasizing improved subsistence agricultural practices and nutrionally favorable modification of community and family consumption practices, to farm families with holdings too small, or otherwise inappropriate, for receiving services through

other Project activities. The target group is found among those classified by ORDEPUNO as "comunidades, parcialidades, y minifundistas." (A parcialidad is an informal organization, when legalized it becomes a community.) This group, distinguished from Agrarian Reform enterprises and other medium to large-scale farmers, includes at least 70 percent of all farm families, most farming five or fewer hectares, and can be further subdivided to identify those most vulnerable nutritionally. With fewer than two hectares, the risk of serious malnutrition within families is enormous, despite the possibility that many could, with assistance, achieve nutritional adequacy and independence. Although both groups and some Agrarian Reform Enterprises will benefit nutritionally from the component's social extension services, the group most at risk will be the focus of component agricultural services.

13. The nutrition component fills the "interstices" of the project by providing a community-oriented (including non-legalized communities) multi-sectoral approach to improving nutrition. Other project components provide a framework within which the component operates and builds, through the critical additional activities required to convert general economic improvement into specific nutritional gains for the most deprived.

14. Peruvian and other experience indicates that community development, extension and related services can achieve significant improvements in the quantity <u>and</u> disposition of nutrients among subsistence farming communities, otherwise helped little by surrounding "development". The use of para-professional and community volunteer promoters reduces the cost of these improvements to affordable levels. Emphasis on community chacras (food-planting areas), huertos (vegetable gardens), viveros bajo plastico (protected fruit and vegetable seed-beds), and granjas (small-animal raising), using tested low-cost practices, also keeps costs low.

15. Communities within the project area have traditionally used sale of animals to meet cash needs. The proposed nutrition extension plan accepts this practice and seeks only to assure that increased output results in higher food consumption through auto-consumption and purchase. Improved nutritional efficiency of purchases will often make sale of animals to buy other foods an efficient consumption pattern.

16. Use of a simple community nutrition plan, prepared by community promoters and others with extension help, links food production directly to nutritional needs. Emphasis on collective efforts to fill gaps left after family commitments reinforces nutrition education and distributes the burden of foregoing alternative consumption. Puno communities lead the country in contributions to school feeding projects. The nutrition component builds on this and other traditional cultural practices of the beneficiary groups. It also draws extensively on experience of PEAN (Agro-Alimentary Extension Project) and PNA (Applied Nutrition Project), two UNICEF-funded pilot projects, in the Puno area, that have yielded impressive results.

17. The component includes agricultural extension services in food production and storage, including animals and vegetables, addressed to individual farmers and to community cultivation in schools and on collectively owned parcels. These services will be accompanied by nutrition extension services, emphasizing improved food habits and preservation among the same families and communities, seeking to assure that increased output leads to better consumption and nutrition status. Extension services will be community-oriented, to have nutritional adequacy accepted as a local responsibility, and will emphasize local capacity to meet nutritional needs. Professional extensionists will be assisted by sub-professional "sectoristas" and by community volunteers, called promoters. This extends the reach of, and reinforces, extension. It also assures language compatibility and reduces the per-family cost of extension services.

18. The typical first-year program for a target community in the nutrition component will include:

1) Initial orientation, motivation, and promotion (one month).
2) Community agricultural, socio-cultural and health study, including nutrition status, with assistance of promoters from the community (two months).
3) Development of community nutrition plan, identification and planning for target families (one month).
4) Preparation of land for planting, delivery of inputs and credit advances, construction of enclosures to receive animals (two months).
5. Agricultural, livestock, nutrition (food habits, etc.) and health extension services.

19. During subsequent years, extension services will be extended to additional families and will continue with communities for expansion and improvement of school and community gardens, animal production, and related small-scale self-help capital projects. Pilot projects experience indicates that extension services over a five-year period will be required for optimal and permanent increases in productivity and changes in consumption patterns. Entry into a community at least six months before planting offers a high probability of significant output increases during the first growing season.

Organization and Staff

20. The nutrition component will benefit from health extension services, but these will be provided through the health services delivery system under the Loan's health component. Health promoters and their supervisors will collaborate with nutrition component staff at community and administrative levels, to assure a community-oriented multi-sectoral approach. Component agricultural extension will complement and reinforce other Project agricultural efforts.

21. The nutrition component will be administered by a separate Subsistence Agriculture-Nutrition Group in the Project's Farm and Rural Enterprise Development Unit. In accordance with UNICEF Pilot Project models, a skeleton professional staff will manage and participate in field work to be conducted primarily by agricultural sectoristas and community promoters specializing in health, agriculture, live stock, and family nutrition.

22. The Nutrition Group will include two senior specialists in agro-alimentary extension, the optimization of auto-consumption and income from family farms at two hectares or less. Their orientation will be toward community nutrition and they will be drawn from the substantial number of available professionals who have demonstrated capacity in this work. They will be supported by two nutrition extension specialists and three social workers, who will work in communities well-served by other project agricultural extension but clearly involved in family and community consumption practices that produce serious malnutrition.

23. These professionals will be supported by seven para-professional sectoristas, who will work directly with community agricultural and livestock promoters. The project contemplates group extension for small farmers on individual crops and animals, making the sectorista role more that of motivation reinforcement and community extension than direct instruction and demonstration.

24. This staff will train, monitor, and provide technical assistance to approximately thirty agricultural and forty social promoters, oversee community studies, administer a revolving fund for small no-interest loans, and coordinate with health and other sectors to bring multi-sectoral, integrated assistance, directed to nutritional and other goals, to the nutritionally most vulnerable groups in the project area.

Vehicles, Equipment and Supplies

25. Although the Nutrition Group will work closely with other project services and many community visits will include multi-sectoral teams, independent transportation is essential for proper supervision and response to field needs. The component provides for three four-wheel drive vehicles, to be shared among professional staff. Pilot project experience showed that providing motorbikes to sectoristas and bicycles to agricultural promoters broadened their coverage and reduced the numbers needed to serve a given number of communities. Accordingly, the component includes fourteen motorbikes and eighty bicycles to be purchased during the project period, including allowance for wear-and-tear, loss and damage.

26. The component requires no special expenditures for seeds, animals, or construction materials. These will be obtained at cost from Project sources and will be financed from a revolving fund. This fund will also finance the small purchases of fertilizers and pesticides required for the component. The packages of practices used emphasizes organic fertilizers and pesticides, so that credit needs per hectare average under $50. A revolving fund of $80,000 will suffice for achievement of the four-year targets of 100 school gardens and 40 community gardens, 40 seed-beds, and 400 home gardens. Animals, poultry, and construction materials for enclosures will be financed as part of the related sub-components in the agricultural component of the project.

27. The revolving fund, providing no-interest in-kind laons with minimum administration, permits the component to meet credit needs that fall outside the criteria or feasibility of other Project activities. Small loans are preferred to grants, despite slightly higher administration costs, to avoid dilution of the self-help tradition that is still widespread and productive among the target group.

28. For more significant community expenditures such as silos and other storage units, the component will draw on conventional credit facilities available through the Project's credit component. The UNICEF pilot projects have developed and tested a five-ton silo for food crops, built by community volunteer labor, that requires $2000 for materials and supplies. Participating communities are likely to need additional storage facilities as output increases and the credit component has provided for funding of them.

29. Additional equipment requirements include such minor items as sleeping bags and protective helmets for sectoristas, demonstration and audio-visual materials for nutrition extensionists, small tools for schools and communities, and office needs. Since the professional staff will assist communities to generate resources from outside the project, through bilateral and charitable donors, nutrition component equipment and supplies are needed primarily for training purposes.

Training

30. Implementation of the nutrition component requires training of sectoristas, agricultural and small-animal promoters, and community nutrition extensionists. PEAN and PNA, the UNICEF pilot projects, have developed and tested an eight-week continuous training program for sectoristas and three-phase six-week cycle of intermittent field-oriented training for promoters, with each phase limited in scope to facilitate learning by these community volunteers with little formal education.

31. Although the UNICEF pilot projects have maintained contact with, and drawn on technical resources of, CENCIRA, they have conducted their own training. The nutrition component proposes to continue this practice, rather than transfer the training to CENCIRA, since the personal relationships between the trainers, who are PNA and PEAN professional staff, and trainees are fundamental to the component. Trainers maintain continuing relationships with sectoristas and promoters throughout their later service.

Training Assistance

32. Nutrition component staff will require technical assistance to strengthen their community nutrition extension skills. The pilot projects, though emphasizing well the relation between agriculture and nutrition, show weakness in linking food strage to nutrition goals and in preparing production plans that respond clearly to calorie and nutrient gaps. Similar projects in Colombia and Panama have staff with better skills in planning and carrying out community-oriented nutrition extension. The nutrition component provides for intermittent technical assistance from experts associated with these projects.

Monitoring and Evaluation

33. Although a baseline nutrition status survey is essential to the Project and is included in the component, few additional special evaluation efforts are needed. Improved nutrition status, ultimate component goal, will be monitored through the information system of the health component permitting both assessment of project-induced change and surveillance to anticipate exogenous impacts. Routine data collection within the agricultural components will contribute to evaluation of output increases at family level. Nutrition component evaluation design therefore concentrates on results of collective cultivation, changes in food habits, magnitude of community nutrient gaps, and changes in community nutrient distribution patterns. Baseline information will flow from the initial community studies that are an essential element of component activities.

34. Community nutrient distribution and nutrient gaps, more aggregate measures, will be calculated at the Project Evaluation Unit level, from information received through the foregoing routine reporting systems. Linkages to the health information system will ultimately permit assessment of the component's efficiency in improving nutrition status.

35. Nutritional impact of the component is difficult to isolate, because any nutritional improvements in the project area will also reflect overall economic effects of the project, results of the health and potable water components, and other factors. Significant nutrition impact is unlikely before the fourth year and, with Bummian inflation, may be masked by negative influence of exogenous variables.

36. Intermediate output estimates, based on pilot project experience, indicate significant values for increased production of subsistence crops and vegetables (at retail prices). In school gardens, for example, the typical huerto of 300 square meters, showed gross return ~~on a 10 x 10 meter garden~~ ~~shows:~~

225 kilos of lettuce at US$.40	=	$ 90
450 kilos of cabbage at US$.40	=	180 (4 crops planted in equal area
180 kilos of carrots at US$.40	=	72
150 kilos of onions at US$.25	=	37.50
		$373.50

37. With no labor costs (students and volunteers) paid and other charges estimated at 25 percent of gross (95.10), the small garden shows a net of $283. The component's small professional staff, with the help of teachers using the gardens as educational demonstrations, will easily manage 75 gardens by the project's fourth year, generating a return of more than $21,000. With promoters also generating an equal amount through community gardens, or the equivalent in family gardens, plus additional returns in animals, fruits and vegetables under plastic, and improved productivity in huertos, total increased value becomes more substantial. Increases of 40 percent in potato output, egg production and weight of chickens are feasible. For a typical community with all four elements of component extension, total value of increased production could approximate:

school garden	-	$284
community garden	-	284
granja	-	272
chacra	-	375
hothouse	-	300
		1515

, or total of $60,600 for the forty localities projected.

38. This illusory precision hides the difficulties, frustrations, inaccuracies, and failures involved in working with the least prepared, most deprived group. The figures are not presented to support rigorous economic calculations, but to emphasize that physical outputs are significant, especially when related to present target group per capita income and nutrition status.

39. The nutrition component, though not directly and exclusively responsible, will contribute to achievement of adequate nutrition status for at least 15,000 people by the end of the Project period. These include 10,000 of the 15,000 malnourished likely to be found among the 20-25,000 people in communities to be served by all activities of the component. An additional 5,000 people, reached by other Project activities and nutrition extension, will also reach adequate nutrition levels. These beneficiaries, primarily infants but also many adults, will be from the poorest and most deprived groups in the Project Area, for whom improved nutrition is the first and most important evidence that they are sharing in the benefits of development.

40. Future incidence of malnutrition in the Project Area; assuming negative exogenous influences do not increase, should diminish by 50 percent from current high rates, if Project goals, including those of the nutrition component, are attained.

PERU

Micro-Region of Julinca Integrated Rural Development Project

Nutrition Component - Detailed Table of Costs
(US$000)

	Year 1	Year 2	Year 3	Year 4	Total
Equipment and Supplies					
(a) Office Equipment and Supplies 1/	4		2	2	10
(b) Education Equipment and Supplies	5	3	3	3	14
(c) Miscellaneous (sleeping bags, helmets, etc.)	5	3	3	3	14
(d) Agricultural Demonstration Equipment, Tools for Communities 2/	15	15	10	10	50
(e) Building Materials	10	10	10	10	40
	39	33	28	28	128
Training Costs 3/	38	21	21	21	101
Revolving Fund 4/	80	20	20	20	140
Technical Assistance 5/					
(a) Compensation	15	9	9	9	42
(b) Travel and Per Diem	7	5	5	5	22
	22	14	14	14	64
Surveys and Evaluation 6/	15	15	15	15	60
Administration 7/					
(a) Salary Support	33	33	33	33	132
(b) Per Diem 8/	8	9	11	12	40
(c) Vehicles and Spare Parts 9/	56	14	21	21	112
(d) Maintenance and Fuel	14	14	14	14	56
	111	70	79	80	340
Total Base Costs	305	173	177	178	833

Footnotes

1/ Illustrative lists of office and education equipment and supplies are found in PEAN grant renewal application to UNICEF.

2/ Forty communities will each receive $500 worth of agricultural tools during Project period. Balance of $30,000 in agricultural equipment based on lists in PEAN grant renewal application.

3/ Training costs include $2,000 of special instructional materials in Year 1 and per diem, at $5 per day, during 60 days ($300) for 120 sectoristas and promoters in first year and 70 in subsequent years.

4/ Revolving fund for small non-interest bearing loans will start at $80,000; amounts in later years are for replenishment and expansion.

5/ Technical assistance compensation is at average of $3,000 per month. Travel and per diem are calculated at averages of $500 per trip and $40 per day, with two consulting visits each ye

6/ The National Institute of Nutrition has agreed to provide baseline nutrition status survey and annual surveillance surveys at fixed price of $15,000 per year, a subsidized rate since the institute makes no charge for supervision and administration.

PERU NUTRITION COMPONENT

Footnotes, Cont'd

/ Salary support includes eight professions at average of $200 per month, seven sub-professional sectoristas at $120 per month, and three clerical-janitorial employees at $100 per month.

/ Per diem is $5 and fifteen employees will travel average of 100 days during first year and increase travel in later years.

/ Vehicles include six four-wheel drive wagons ($10,000 each), fourteen motor bikes ($600 each and 80 bicycles ($200 each), during life of Project.

Team Task II

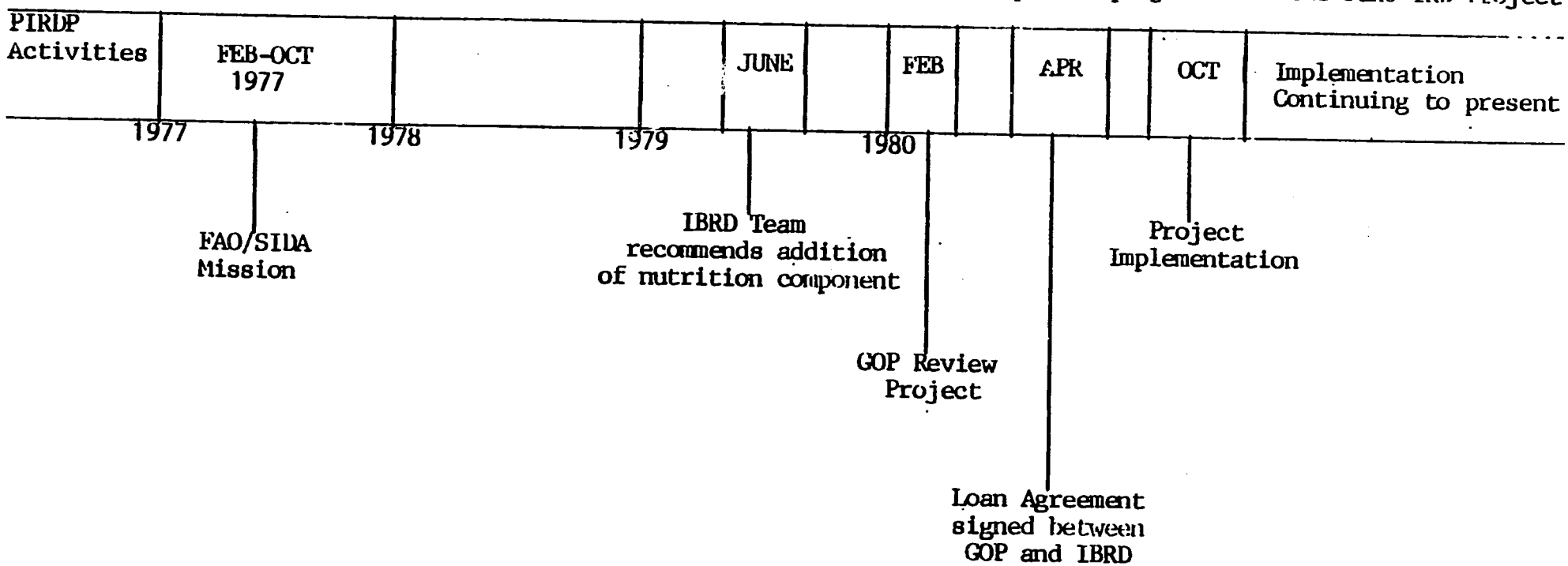
Given what you now know about the Puno Integrated Rural Development Project, please formulate solutions to the following questions:

1. How would you evaluate the project identification process undertaken in the actual project?

2. Given the project appraisal information, what would your team have done differently to improve the nutritional component of this project and why?

TIME LINE: PUNO INTEGRATED RURAL DEVELOPMENT PROJECT (PIRDP)

1974 to present: Program for Integrated Services for the Puno Region
Implementation and funding by UNICEF/GOP. This is a separate project from the Puno IRD Project



Project Appraisal

The loan agreement between IBRD and GOP was signed on April 28, 1980 for $15 Million. It established that (1) the loan for the crop and livestock components would be executed by the Banco Agrario del Peru, and other components through the Oficina Regional de Desarrollo de Puno (now Puno Development Corporation--CORPUNO); (2) the development of some components by subsidiary arrangements with the corresponding sectorial organizations; and (3) the use of consultants and experts for the execution of some activities.

The stated objectives of the project were: (1) the increase of crop and livestock production in an area of approximately 20,000 hectares of upland, arable land and pastures of secano (pastures and lowing land cultivated only with the aid of rain), and of 4,100 hectares of irrigated land to increase the revenues of approximately 17,000 low-income rural families; and (2) the improvement of life conditions of the peasant families in the area.

Except for the crop and livestock credit activities, all others were to be performed through the CORPUNO, an organization of departmental development, distributing the responsibility between the participating regional sectorial organizations. The Project Unit created within CORPUNO was charged with the administration of all activities and coordination of the participating institutions; it was also to be the coordinating element between the institutions and the ministries. It was charged with the approval of the annual programs and reports on the progress of the activities prepared by each of the institutions;

it was to execute the subsidiary agreements (with the INIPA, among others) and advise the CORPUNO on political areas.

A Coordinating Committee, to meet at least once each trimester, was charged with everything related to the project's progress. It was presided over by the CORPUNO Chief and included representatives of Agriculture, Transportation, Education and Health ministries, the Agrarian Bank (Juliaca Branch) and the Regional Office of the National Institute of Planning (INP); there was also a representative of the small and middle producers and another of the agrarian reform enterprises. The Director of the Unit Project could participate but had no voting rights.

Table 2 lists the activities proposed to achieve their objectives; it must be noted that $12 million 300 thousand GOP and beneficiaries' contribution should be added to the $15 million IBRD loan.

The principal objective of the nutrition component was the improvement of the nutritional situation of 4,000 peasant families in 40 communities. The target group represented 20% of those families with the greatest economic and social needs. In addition 2,000 minifundista families (very small land holders) were added to the target list.

The selection of target communities was to be based on several criteria: 1) availability of a health extension officer; 2) a demonstrated will to participate by the community; 3) 40% or more of the pre-school children being malnourished; 4) accessibility of community and existence of sufficient arable land and water in that

20 Table 2

Project Activities, Executing Agencies Costs and Beneficiary Families

	Activities	Executing Entity	Investment and Operat. US $	Benefic. Families
1.	Agricultural credit to finance on-farm investments and incremental production costs.	Banco Agrario	6,992,139	14,000
2.	Rehabilitation and construction of small irrigation systems, benefitting about 4,100 ha.	Regional Directorate of Agriculture and Food (DRAA)	3,582,410	2,500
3.	Planting some 1,500 ha. of forest trees for soil conservation and fuel.	DRAA	629,120	2,850
4.	An intensive crop and livestock extension program and technical aid to improve and strengthen small rural communities.	Project Unit	1,937,320	13,500 and 7 enterprises
5.	A nutrition program for 40 communities.	PROSIRP	651,500	6,000
6.	Support to applied crops and livestock research programs, an associated training and demonstration program and an irrigation training center.	National Institute of Agrarian Research and Promotion (INIPA)	887,335	
7.	Rehabilitation and upgrading of 515 kilometers of rural roads, strengthening the road maintenance capability of the Transport and Communication Ministry, and construction of six post offices.	Regional Directorate of Transport and Communication (DRTC)	1,859,315	
8.	Construction and equipping rural health facilities (6 health posts and 6 health centers), training and equipping rural health agent, and equipping the already constructed small hospital.	Regional Directorate of Heath (DRS)	380,103	
9.	Installation of small communal potable water systems in 46 localities.	DRS	744,742	53,000
10.	Constructing and equipping of 23 training centers.	Regional Directorate of Education (DRE)	321,112	4,200 persons

Activities	Executing Entity	Investment and Operat. US $	Benefic. Families
11. Studies to prepare a second-phase project covering a much larger area in the Southern Altiplano.	Project Unit	929,378	

Source: The World Bank: Report No. 273-E.

Table FOOD PRODUCTS: Projected increase in per capita daily food availability due to project in calories, protein (grams) and kilograms of commodity

	Minifundistas less than 2 Ha. below 3800 M. altitude			Ladera dwellers (Minifundistas less than 2 Ha. above 3800 M. altitude			Small farmers 2-20 Ha. below 3800 M. altitude			Medium-size farmers more than 20 Ha. below 3800 M. alt.			Members of state-owned cooperatives and enterprises		
Number of individuals →	4,080			2,500			9,370			740			3,000		
	KG.	CAL	PROT.	KG.	CAL.	PROT.	KG.	CAL	PROT	KG.	CAL	PROT	KG.	CAL.	PROT.
Potatoes	0 25	195	4 50	0.197	153.2	3.32	0.305	232.8	5.04	1 46	1132	24.5	1 09	850	18 6
Bitter Potatoes	0.144	112	2.50	0.493	382.2	8.27	0.127	97	2 1	0 199	154 2	3 34	0 14	113 5	2 33
Quinua (grain)	0 012	43	1 50	0.033	121.6	3.63	0.017	70.8	2.12	0 078	27.6	0.83	0 04	155.8	4 66
Canihua (grain)	0.004	-13	0.50	0.033	118	4.8	0.0013	4.5	0.18	0 005	15.8	0.64			
Barley	0.007	-25	0.50				0.0014	4 7	0 19	0 088			0.265	911.6	37.1
Tarhui (legume)	0.003	3.92	0.40				0.005	604	0.45	0.019	22.6	1 69	0.023	63 7	4 0
Broad beans	0 003	8.86	0.60				0.005	13.8	0.86	0.019	52.6	3 28	0.023	27 2	2.03
TOTAL		365	8.8		774.8	20 02		430	11		1405	34 3		2122	68 5
% of RDA		17%	19%		30%	35%		20%	24 6%		46%	53%		100%	153%

Source: ENCA data as reported in Proyecto de Desarrollo Rural en el Departamento de Puno, Micro Region de Juliaca Anexo No. 18, Nutricion, Informe elaborado con la asistencia del programa cooperativo FAO-Banco Mundial, Ministerio de Agricultura y Alimentacion, Republica del Peru, July, 1978, p. 17.

Table 1

Classification of Food Groups,
According to Their Caloric and Protein
Importance for Rural Puno

Food Group	Percentage of Total	
	Caloric	Protein
Cereals	46-49.0	47-50.0
Tubers	39.0	26.0
Legumes	4.0	11.0
Oil and fats	2.0	-
Sugar	1.5	-
Vegetables	-	-
Meat	2.0	6.0
Eggs	3.3	3.0
Fish	2.0	5.3
Milk and Milk Products	0.5	1.5
Spices and Condiments	-	-

Source: ENCA Survey, 1972, as reported in Proyecto de Desarrollo Rural en el Departmento de Puno, Micro-Region de Juliaca, Anexo N.18, Nutirition, pg. 3.

Table 2

Percentage of Families with Nutritional Deficiencies

N = 397; N(rural) = 337; N(urban) = 60

Deficiency	Percentage of Families
1. Vitamin A	92.2
2. Calcium	31.9
3. Vitamin C	9.3
4. Riboflavin	6.5
5. Iron	6.2
6. Thaimin	2.3

Source: ENCA survey, 1972, as reported in Proyecto de Desarrollo Rural en el Departamento de Puno, Micro-Region de Juliaca, Anexo N. 18, Nutirition, p. 10.

community; and 5) the community having inadequate agricultural extension services.

The activities of the nutrition component were intended to 1) provide extension services to improve subsistence agricultural patterns and to modify consumption patterns in manner that improved nutritional status; 2) provide each community with a multi-sectoral strategy to improve nutrition; 3) improve traditional family diets by adding such items as fruit, vegetables and meat to overcome specific inadequacies; 4) produce a surplus of food beyond subsistence to provide families a source of revenue to purchase food necessary for a better diet and items necessary for agricultural production; 5) train semi-professionals and volunteers from Puno to cut costs and establish a strong link between the project and community; 6) with the aid of extension personnel and volunteers; to establish and carry out a simple nutrition plan.

The component's sub-objectives included: (1) increasing food production (crops and livestock); (2) increasing consumption of family-produced food and improving of consumption habits; and (3) improving food distribution in relation to nutritional needs. The key to the success of the project was the linkage and interaction between production-agriculture and consumption-nutrition.

The selection of these strategies was based on the experience of the Program of Integrated Services in the Puno Region (PROSIRP), the implementing agency of UNICEF's Food and Agriculture Project. PROSIRP's nutrition activities were performed by the Agriculture and

Nutrition Group, which was made up of two senior agro-nutrition extension specialists and seven sub-professionals. The Group worked directly with village level community development, agriculture and livestock sub-professionals.

Table 3

Nutritional Component - Investment and Operating Costs

(Percentage Distribution)

Investment, Technical Assistance and Training	%
- Equipment and supplies for Project Unit (Based on programs supported by UNICEF in Peru)	6
- Tools for participating communities (To be provided to approximately 40 communities)	4
- Building material for participating communities	6
- Staff training (Materials and per diem for 30 days for 60 volunteer sectoristas)	5
- Vehicles and spare parts (Four 4-Wheel drive vehicles, 10 motorcycles and 80 bicycles)	13
- Technical assistance (Expatriate technical assistance, transport and per diem)	10
Subtotal	44
Operating Costs	
- Staff salaries (Three professionals and seven sub-professionals)	15
- Per diem	4
- Vehicle maintenance and fuel	7
- Credit fund (revolving fund for short-term loans)	21
- Survey and evaluation (By National Institute of Nutrition, under an agreement to be signed with the Project Unit)	9
Subtotal	56
N = US $ 651,500	100

Source: The World Bank: Report No. 2736-E.

The monitoring and evaluation of the nutrition component was undertaken by the project itself headed by a senior agricultural economist. A consultant from outside the project was sought to design the system for data collection to detect emerging problems. Reports were solicited from each project component on a trimester basis for review by IBRD. These reports discussed project status in terms of achievements and shortcomings.

The Project Unit recognized the need for a basic study of the area's nutrition status. Project personnel felt that the formulation of a solid statistical data base was an urgent need. The evaluation concentrated on the results of collective farming, changes nutrional habits, and the nutritional self-sufficiency of the various communities. These first studies had a direct bearing on the ongoing work of nutritional components.

Current Project Status

A) Village Based Paraprofessionals (VBP's)

A fundamental element in the development of the nutrition component has been the use of VBPs. VBPs were selected in each community by an asemblea of villagers, a traditional town meeting. The ideal criteria for selection of VBPs were the following: a) that the VBP would be influential in the community, b) that he would be literate, c) that he would have a working knowledge of Spanish, and, d) that he would be willing to volunteer his time. VBPs can serve as the critical link between project headquarters and the communities.

Once selected the VBPs were sent to a 5-10 day training course. Community development VBPs were trained to recognize village level problems and how to use local resources to overcome these problems; agrarian VBPs were trained in cultivation and vegetable gardening; and, the livestock VBPs learned how to establish small farms to raise chickens, rabbits and guinea pigs, etc. During the training session, the VBPs were observed and aided by nutrition extension officers.

VBPs were to spend one day a week working directly on assigned sectoral areas and, then, to meet together to share observations at least once every two weeks. However, not all VBPs have followed the suggestions they received in training and many get discouraged. For example, one VBP explained "I think that I am not going to continue; I have served for 3 years. One has to take care of himself, considering that there is the high cost of living, and in a day one can lose everything...."

Table 4

Activities Programmed and Executed in 1981

and Programmed for 1982

Activities	1981 Programmed	1981 Executed	1982 Programmed	1982 Total
C. Communities to be attended	20	20	10	30
1. Training				
- Courses for promoters	3	5	6	6
- Training for promoters:				
. Social	20	20	20	20
. Agrarian	20	20	20	20
. Livestock	20	20	20	20
- Actualization - Reindorcement of the promoters training:				
. Social	-	-	40	40
. Agrarian	-	-	40	40
. Livestock	-	-	40	40
- Seminar for promoters (all of them)	-	-	1	1
2. Organization of:				
- Mother's Clubs	20	20	10	30
- Demonstrative centers	20	18	10	28
3. Nutritional Education				
- Families to be attended	1,440	321		?
4. Difusion and motivation				
- Production of booklets	26	3	?	?
5. Agrarian activities				
- Farming of potatoes: Ha.	10	16	10	26
- Farming of quinua: Ha.	20	13	10	23
- Farming of beans (haba): Ha.	-	-	2	2
- Pilot (or communal) vegetable gardens	20	21	9	30
- Family vegetable garden	200	378	120	498

Activities	1981 Programmed	1981 Executed	1982 Programmed	Total
- Distribution of horticultural equipment	20	3	?	?
6. Livestock activities				
- Raising of cuyes (cobayos):				
. Communal farms	3	3	4	7
. Family farms	-	-	8	8
- Raising of rabbits: family farms	-	-	2	2

Source: PROSIRP Documents.

B) Mothers Club

Organized with the aid of the community development VBP, Mothers Clubs have become a significant factor for involving the women of the community in nutrition programs as well as handicrafts, sewing, animal husbandry, and home economics.

They have weekly sessions to learn how to prepare simple dishes based on traditional foods and those obtained from the vegetable gardens. Each participant constributes a portion of food for the preparation of a common lunch or for demonstration preparations. Some of the recipes, however, are impossible to prepare at home. A woman from the Mother's Club in Sutuca observed: "Uy, the quinua cocktail that we are preparing is good, but how are we going to do it at home..."

The success of the Mother's Club has been largely due to work done in previous projects. This project has broadened their scope and provided some communities with workshops containing sewing machines and looms.

Nutrition education has provided knowledge to mothers and children of the value, use and storage of traditional food. This is done primarily through the Mother's Clubs. In the first year of the project development has been limited due to scarcity of kitchen utensils and lack of a home economist. Inability to distribute nutrition literature widely, due to lack of funding and personnel, has also reduced project effectiveness.

C) Common Farming

1) Agricultural Production Centers

The pilot agricultural production centers have been established in schools and other nearby locations. In some cases, the land used is the property of the school, and in others, it has been donated by the participants. In order to ensure that the plots were economically viable, some peasant farmers had to give up some of their land. Nevertheless, the successful demonstration effect of these parcels has been evident in requests to enlarge the area under cultivation and to incorporate more and more farmers interested in achieveing similar results.

The project lends each demonstration center seed, fertilizer, fungicides and insecticides. Part of the center's yield is used to pay back the loan; of the remainder, one portion is used for seed, another for purchase of implements, and the remainder is distributed among the farmers. The productivity of these centers and the vegetable gardens is shown in Table 5.

2) Vegetable Gardens

Twenty pilot vegetable gardens ranging from 20 m^2 to 300 m^2 in area - generally 200-300 m^2, were started on school property. Under the direction of the agricultural VEF, community members farm the land with seeds provided by the Project on a grant basis. A large part of the harvest goes to the school itself and the Mothers Clubs. What remains is consumed by laborers and a small quantity is actually sold. Among the vegetables produced are beets, collards, spinach, carrots,

Table 5

Results of the 1981/82 Campaign

in the Communities Visited
(potatoe and quinua)

Community	Cultivated Area (Ha)	Seed Used (Kilos)	Harvest (Kilos)	Estimate Production Ha./Kilos	Seed (fo: keeping (Kilos)
			Farming of Potatoes		
1. Quello Quello	1.2	1,400	10,000	10,285	1,500
2. Sutuca Urinsaya	0.9	1,100	10,000	7,800	1,100
3. Candile	0.5	600	6,700	13,400	900
4. Almozanche	0.1	120	800	8,000	150
			Farming of quinua		
3. Candile	0.5	6	942	1,884	8
4. Almozanche	0.5	3	450	1,800	10

Source: Information in the four communities and PROSIRP documents.

onions, lettuce and cabbage. Yields fluctuate due to frosts and lack of water for irrigation.

Family vegetable gardens are considerably smaller and receive additional inputs directly from UNICEF. According to a VBP in Quello Quello:

"They (the peasants) recieved seed but they did not use them all; they did things in a bad way, not as they were taught. They did it as they thought; they did not obtain a good harvest, only some did...the rest did nothing. The seeds were thrown among the pasture and only some of them. They placed carrots in very small plots in order to plant them again after they had grown a little as they were taught. Because of that, next year we are not going to give the seed, we are going to have only one big plot, the same as for the school."

Nevertheless, the existence of the smaller plots has introduced new vegetables into villagers' diets. Previous to the project, many farmers were only growing onions and/or cabbage. Many farmers hope that the small gardens will generate a cash income, making them more interested in obtaining higher yields.

3) Animal Husbandry

To increase protein intake in diets, guinea pig production has been introduced in 3 communities and will be introduced in eight more this year. There have been several setbacks in the development of the nutrition component.

1) Lack of communal land resulting in dispersed lots.
2) Lack of hand pumps for efficient irrigation in most communities. Water has to be transported to the fields from up to 4 km away.
3) Lack of equipment at Mothers Clubs.

4) The delay in approval and disbursement of budget items for the nutrition component.

5) Lack of transportation for technicians due to delay in the acquisition of project vehicles.

6) Lack of coordination between project components. Each division is proceeding as a separate entity.

But in Candile a peasant says: "Everything is alright..., the people of UNICEF serve us well..."

Task I

Based on information now available to you in this case, what do you see as the major issues for further project identification and analysis to design a nutritional component for the Puno Integrated Rural Development Project?

Be sure to treat the following points in your answer:

a. component objectives
b. monitoring and evaluation design, including possible base-line survey and any follow-up on nutritional status
c. selection criteria for target communities
d. organization and staff requirements

Team Task II

Given what you now know about the Puno Integrated Rural Development Project, please formulate solutions to the following questions:

1. How would you evaluate the project identification process undertaken in the actual project?

2. Given the project appraisal information, what would your team have done differently to improve the nutritional component of this project and why?

QUESTIONNAIRE

In-Service Workshop on Food Production/Consumption Linkages

Participant's Name _____ Country _____

Part A--Country Data

1. What is the nature of the country's nutrition problems, if any?

   12 Undernourishment

   12 Inadequacy of specific nutrients

   2 No serious nutrition problems Yemen, Guyana

2. If there is a malnutrition problem, how extensive is it?

   6 Virtually countrywide 40; 25; 40; 25; 75; 20

   6 In certain specific geographic areas, representing about ___% of total land area

   3 In certain specific population groups, representing about ___% of total population 25; 5; 10; 60-80; 70; 5

   1 Primarily an urban problem

   5 Primarily a rural problem

   10 Serious in both urban and rural areas

3. What is the basis for the foregoing conclusions?

   6 A national nutrition survey

   3 Extrapolations from sample surveys

   1 Conclusions drawn from food balance sheets

   5 A combination of survey extrapolations and conclusions from food balance sheets

   ___ Other: PVO Reports Personal observations
   Int. Org. reports — 2 Ministry reports

4. Are nutrition related data reliable?

   2 Very reliable 4 Fairly reliable 7 Fairly unreliable

5. What type of data are the most (least) reliable?

   Most reliable: SEE page 1a

   Least reliable: _____

QUESTIONNAIRE TABULATION

PART A - COUNTRY DATA

Number of questionnaires tabulated - 18

Number of countries covered - 16

Cameroon
El Salvador
Guatemala
Guyana
Haiti
Honduras
Indonesia
Kampuchea
Nepal
Peru
Philippines (2)
Sri Lanka (2)
Tanzania
Tunisia
Yemen (North)
Zaire

QUESTIONNAIRE TABULATION

5. (a) Most reliable data

Small-scale surveys - 5
Individual and organization reports - 2
National survey
Tulane University studies
Missionaries
Nutritional surveys
Food balance sheets
On-site observations
Import data
Marketings agency price data
Total caloric intake
Outside financed research reports
Authrometric and clinical data

5. (b) Least reliable data

Government reports - 2
Large scale surveys - 2
Height/weight data Operation Timbang - 2
Food balance sheets
Paid surveys
Production data
Food stocks
Food demand
Sales of food to government agency
Food availability data from Ministry of Agriculture
Specific protein intake
Food coop sales records
Host government research
Sample surveys
Donor studies (reports)

6. Which of the following are significant causes of undernourishment in the country? (1= critically important; 2 = significant secondary factor)

1	2	
6	3	insufficient overall food supply
6	5	inadequate access to food
11	6	insufficient purchasing power
3	6	inappropriate demand patterns (due to taste, tradition, perceptions)
7	6	inequitable distribution of food within the country
3	5	inequitable allocation of food to individuals within families
1	5	poor utilization of food
1		other: inability to import needed foods
1		recurrent drought

7. Is there a program of nutrition surveillance in the country? 10 Yes 8 No
If so, how would you rate its effectiveness (1 to 5 basis, with 1 = exceptionally effective; 5 = virtually worthless)? 1-2 3 4 5
If rated 3 or worse, what are the principal problems? Data collection meth 4
Used for political purposes Lack of trained manpower 3
Lack of HC support Budget problem - 2
Corruption Lack of reliable data

8. Does the country have a nutrition planning or surveillance unit? 13 Yes. 3 No 2
If yes, where is it located in the government? MOH - 10; MOH - 3; Planning - 2
Does it have any influence on formulators of national policy/plans? 7 Yes 6 No
Does it have contact with those designing agricultural programs? 5 Yes 8 No

9. What governmental unit has the greatest influence in the formulation of agricultural policy or other policies which determine the effectiveness of agricultural programs?
MOA: General - 11; Planning Unit - 2; Land Reform Inst. - 1
Military; MinFinance; Planning Office - 4; Pres. Office - 1
Does this unit consider the nutritional impacts of agricultural policies? Bur. of Logis
1 Consistently 9 Occasionally 7 Almost never

10. How well are agricultural policies implemented? 1 Well 11 So-so 6 Poorly
What are the principal obstacles to effective implementation?
See p. 2 ic

11. Are nutritional elements of agricultural policy implemented as effectively as other elements of agricultural policy?
___ More effectively
10 Less effectively
7 About the same
1 Not Applicable

12. What are the principal constraints to improving the nutrition component of agricultural policy/programs? (1 = most important; 2 = problem, but less critical)

1	2	
6	3	Lack of usable data
4	5	Inadequate methodological tools
7	5	Insufficient number of trained nutritionists/food economists
17	7	Lack of institutional base for nutritionists/food economists
13	5	Nutrition unit lacks influence licy makers and program planners

1 2

4 3 Agricultural planning unit lacks influence on policy makers and program planners

3 3 Nutrition planning unit (1) or agricultural planning unit (3) focuses too much on theoretical activities and/or long term studies with little immediate feedback of use to economic planners/policy makers

1 1 Other: Policy makers unaware of problem
Lack of inter-mini coordination; politically-driv. strategy development/resource control too centralized; prog.

13. Has AID or other donor assistance been requested in recent years for
14 agricultural planning
11 nutrition/food policy planning

ADB-1 PVOs, IV
IBRD-3; FAO-3

If so, was or is it being provided? 15 Yes 1 No By whom? AID-12; IDB-2
What has been the impact? Generally none/little. Improved data collecti
Increased trained manpower; Improved analytical capabilities
What have been the principal problems encountered? Govt. policies; corrupt
Civil unrest; Military presence; Corruption
Trained personnel-4; HG budget constr-2; HG focus on S/T problems-2; HG coordinate-2; Data quality; Poor impl.

14. Is AID or another donor carrying out projects or project components designed to have a direct favorable impact on nutrition? 15 Yes 2 No

Contrai
Limited to

If so, please check as appropriate by items in each column of the table on the following page (objectives, activities or directions, project elements), indicating those items which are receiving the greatest attention in projects or project components being carried out in your country.

15. Which of the following types of interventions or activities appear most relevant or most important in designing programs/projects to address nutrition problems in your country? (VR = very relevant; R = relevant; I = irrelevant)
Which are the easiest to design and implement? (VE = very easy; E = easy; D = difficult; VD = very difficult)

Relevance	Design	Implement	Intervention/Activity
			Anticipating changes in food consumption which accompany changes in cropping patterns
			Anticipating nutritional impacts of agricultural labor requirements
			Strengthening intrahousehold resource allocation patterns which improve nutrition by generating on and off-farm employment
			Determining food consumption pattern of at-risk groups and identifying their technological and capital constraints
			Providing preventive health care to nutritionally vulnerable groups
			Monitoring the growth of preschool children

Continued on page 5

Food consumption/nutrition objectives, general activities or directions, and specific project elements and activities

Food consumption/ nutrition objective	General activity or direction	Specific project elements & activities
11 A. Increase consumption of traditional high energy foods by certain groups to increase productivity and general welfare	8 1. Increase subsistence output	9 1a. Provide techn. assistance for subsistence output of traditional foods
		3 1b. Allocate small plots & resources to landless
		6 1c. Provide seeds, simple cultivators, etc,
	3 2. Increase com'l production of traditional foods	5 2a. Incr. prodn & sklg. of such crops & small animals by sm. farmers plus home use
	6 3. Increase purchasing power of target population	4 3a. Generate off-farm employment
		4 3b. Cottage industries - training, resources.
		1 3c. For sm. fishermen - boat bldg., credit for motorizing and storage facilities
	1 4. Food distribution	1 4. Nutrition education
5 B. Increase consumption of fruits & vegs. supplying problem nutrients so as to reduce deficiency diseases	5 1. Increase subsistence output	3 1a. See 1a, b, c above
		3 1b. Provide nutr. educ. re importance of such foods plus tech. assistance to M & Women
	1 2. Increase purchasing power	1 2a. See 3a, b, c above
3 C. Increase intakes of nutrients like iodine	3 1. Seek commonly used food for fortification vehicle e.g., salt, MSG	2 1a. Support development of small proc. plants and small marketers
11 D. Reduce food insecurity, both general & seasonal	8 1. Increase storage facilities	7 1a. Improve trad'l units on farms & villages and experiment with new types for area
	4 2. Increase prodn. of low risk crops to supplement high yielding but risky crops	4 2a. Research trad'l farm cropping practices and suppl. crops used to reduce risk of widespread disaster
	6 3. Encourage planting of crops in areas with diff. harvests	3a. See 2a
	6 4. Improve marketing infrastructure in poorest areas	6 4a. Include poorest areas in roads, coop. credit institutions,
		3 4b. Assist new small businesses to buy & sell.

Relevance	Design	Implement	Intervention/Activity
___	___	___	Promoting breastfeeding
___	___	___	Providing community water supplies and promoting the use of latrines
___	___	___	Including nutrition education in school curricula
___	___	___	Orienting community outreach workers (agricultural extension agents, social workers, medical personnel, community volunteers) about nutrition concerns and training them in nutritional "first aid" and referral
___	___	___	Providing advanced training in nutrition to development planners, economists, agriculturists, educators, physicians, nurses, etc.

16. Have any evaluations of AID-supported agricultural or rural development projects in your country specifically reviewed the impact of the project on food consumption of an at-risk group or in general? 4 Yes 13 No 1 Don't know

If not, why not? Not considered problem/not relevant/not priority - Not cost beneficial; Lack of staff.

If so, how useful was the analysis? 2 Very useful
1 Slightly useful
1 Marginally useful
___ Not useful

Question No.	Supplemental Comments on Part A
___	
___	
___	
___	
___	
___	
___	
___	
___	
___	
___	
___	
___	
___	

If additional space needed, use reverse.

QUESTIONNAIRE TABULATION

PART B--GENERAL VIEWS

1. Based on your cumulative experience, what do you feel are the greatest constraints to introducing nutrition concerns into agriculture planning in LDC's?

13 - Lack of awareness/knowledge about nutrition
3 - Low priority vis-a-vis other ag problems
2 - Coordination between ministries
Policy makers do not have access to nutrition planning techniques
No constraints
Credibility of government programs
No answer
Budget
Eating habits
Communication lags

2. What are the greatest constraints in designing projects to carry out nutrition policies, either as separate projects or as components ag/RD projects?

4 - Failure to understand linkage between ag projects and nutrition
3 - No good data source
2 - No constraints
2 - Coordination of various ministries
2 - Trained personnel
No answer
Emphasis on production
Hard to analyze projects
Traditional values are hard to change
Government does not feel need
Project funcability
No clear nutrition policy
Short project life
Lack of knowledge by USAID ADO's

3. What are the most important constraints in implementing nutrition projects or nutrition components of ag/RD projects?

6 - Trained manpower
5 - Low priority

Protein production

6. What have been the least successful (greatest failures) you have encountered? (Same info)

6 - No answer
3 - No or little experience
Preschool feeding schemes not reaching target group
Kenya livestock
Those attempting to change eating habits
Seed productions project, Guyana
Caricom corn/soya 1976-79
Projects with bad pricing policy
Subsidized food program, Philippines
Guyana Food Sufficiency Program
Nutrition project in Nicaragua

7. What are the most important institution building needs in LDC countries to improve nutrition planning (NP) and implementation of nutrition projects/activities (IMP)?

NP

10 - Trained personnel
3 - No answer
3 - Understanding problem
3 - Data base
Linking ag to nutrition
Modify primary and secondary curriculum
Research
Extension
Policy analyses
A stable government

IMP

9 - Training
3 - Budget
2 - Linking ag to nutrition
2 - Competence of managers
No answer
Understanding problem
Extension
Credit
Proper utilization of labor
Land tenure

4 - Budget
2 - No answer
2 - Projects are long term/hard to analyze
2 - Lack of institutions to carry out program from start to finish
2 - Lack of knowledge on how to do it
No perceived need
No constraints
Poor implementation
Inter-ministerial management
No DATA

4. What are the greatest constraints to evaluating nutrition projects or nutrition components of ag/RD projects?

6 - No knowledge of evaluation methodologies
4 - Lack of data
4 - Trained evaluators
2 - No answer
2 - Too time consuming
2 - No institutional framework
Budget
Survey
Low priority
Relying on data from people whose only concern is their paycheck

5. What have been the 2 or 3 most successful nutrition-related project interventions you have encountered? (Give type of intervention, approximate dates, country, foreign donor if any)?

- No answer
- No or litter experience
- Secondary crops production
North Shaba maze production project, Zaire
Wapti millet production, Mali
Food for work
Thailand dairy project 1963-65
Fisheries project, Columbia
Mild production project in Tunisia
CARE School feeding program
PL 480 Title II
Triposha Program, Sri Lanka
Ag production/productivity project in Jamaica 1976-67
Poultry production, Bangladesh (AID) 1975-79
1980 C. R. S. up country survey, Tanzania

Remuneration of producer

8. What are the principal constraints to using local and U. S. private sectors to further nutrition objectives in LDC's?

9 - No incentive to do so
4 - No answer
2 - No host government commitment
Political
Cultural
Preference by host government for parastatals
Parallel markets
Lack of knowledge of how produce reaches consumer
AID allowing them to function

9. In what ways might local and U. S. private sectors contribute to the achievement of nutrition objectives in LDC's?

6 - Providing T. A.
6 - Marketing systems
5 - Food processing
5 - Food production
4 - Training course
3 - No answer
3 - Fortify local foods
Research
Storage
Financial resources
Fair advertising
Discourage high cost/low value food production
Set up office of nutrition

...y easy; E = easy; D = diffi-

Relevance VR 9	R 6	I 3	Ease of Design VE 1	E 6	D 9	VD 3	Ease of Implement VE	E 10	D 9	VD	Intervention/Activity
2	9	4	3								Anticipating changes in food consumption which accompany changes in cropping patterns
2	4	11	1		5	6	5	2	7	3	Anticipating nutritional impacts of agricultural labor requirements
	[illegible]	[illegible]			3	7	6		7	9	Strengthening intrahousehold resource allo[illegible]tion patterns which improve nutrition by generating on and off farm employment
13	6		[illegible]								
			2	6	8	[illegible]		7	7	5	Determining food consumption pattern of a[illegible] groups and identifying their technological and capital con[illegible]
10	8		2	8	8						
10	7	1	6	[illegible]	3			2	11	5	Providing preventive health care to nutrit[illegible] vulnerable groups
10	5	2	5	10	1	1	4	9	2	3	Monitoring the growth of preschool chilb[illegible]
11	7		4	8	5	1	3	9	2	3	Promoting breastfeeding
10	8		4	9	4	1		6	8	4	Providing community water supplies an[illegible] the use of latrines
12	6		2	11	3	2	2	4	10	2	Including nutrition education in school[illegible]
							1	7	7	3	Orienting community outreach work[illegible] agents, social workers, medical per[illegible] extension teers) about nutrition concerns and t[illegible] volun- "first aid" and referral
10	6	2	2	7	7	2	1	6	7	4	Providing advanced training in nutri[illegible] planners, economists, agriculturists, educat[illegible], etc.

MATERIALS FOR
INSTRUCTOR

"LESSONS LEARNED"

from

EVALUATION REPORT, OPERATION HAUTE VALLEE PROJECT, MALI

prepared by:

James L. Roush

for

Development Associates, Inc.

December 1981

PROJECT IMPLEMENTATION PROBLEMS AND RECOMMENDATIONS

From:

Project Implementation Courses
Dakar, Senegal
May 9-21, 1982

and

Abidjan, Ivory Coast
May 24-June 4, 1982

Prepared Under:

Contract No. AID/OTR-C-1868

By

Development Associates
2924 Columbia Pike
Arlington, VA 22204

The Project Implementation Course was given twice in Africa during the period May 9 to June 4, 1982. Sites were the Meridien Hotel, Dakar, Senegal and the Forum Golf Hotel, Abidjan, Ivory Coast. In both sessions participants identified problems that hamper implementation originating with AID/W, Missions, Host Countries and Contractors/Grantees. They also developed recommendations for solutions to those problems. Results of both those deliberations are presented in this report.

DAKAR, SENEGAL

The 28 participants of this course represented 13 missions including Senegal, Jordon, Egypt, Cape Verde, Tunisia, Morocco, Niger, Gambia, Sudan, Zaire, Kenya, Sierra Leone and Mauritania. The problems and recommendations they identified are listed below.

AID/W Related Problems

Problem: Lack of perception of what is happening in the field.

Recommendations: Backstop officers should be encouraged to visit the field as often as possible. This experience would give them a better understanding of project activities and help them to anticipate Mission needs. They would also be better able to explain Mission needs to AID/W officials.

Problem: Extraneous demands on Mission time by:

- Travellers; and
- S&T, DR, NEATEC who attempt to dictate the form a project takes, by imposing additional data requirements, CPs, covenants, etc.

Recommendations: Visitors should be more responsive to availability of Host Country officials, counterparts and USAID staff and schedule visits accordingly.

AID/W should be more involved in the project design phase <u>in field</u> to facilitate AID/W review.

Problem: Imposition and lack of coordination of centrally funded projects on Mission and Host Countries.

Recommendations: Mission input into project design is often not solicited and commonly ignored. Participating Missions should assist in project design.

AID/W should be responsive to negative feedback on centrally funded projects.

Scheduling of visits to the field and appointments with Host Country officials should be Mission action (AID/W should not write or cable directly to Host Country officials).

Problem: Turn around time of documents in AID/W is too long and impedes expeditious implementation, e.g. time required to:

- review PIDs, PPs,
- respond to cables,
- grant waivers,
- negotiate contracts, and
- arrange for participant training.

Recommendations: Increase delegations of authority to field.

Increase contract office staff.

Problem: Screening of technical assistance experts, whether contractors or direct hire is inadequate.

Recommendations: AID/W must take more responsibility for selection of appropriate individuals/teams. Screening should consider:

- language skills,
- technical skills, and
- past experience with AID.

AID should enforce the use of contractor evaluation forms.

NOTE: Smaller Missions often have many of the above problems with REDSO.

Mission Related Problems

Problem: Lack of adequate support services and facilities, e.g.:

- Logistical
  - documentation distribution, typing
  - translating, photocopying
- Other
  - transportation, (inadequate fleet), office space.

Recommendations: More training is needed for office staff. AID should supply more and better equipment and maintenance, rent more office space, hire more technical translators and provide translators with resources, i.e., glossaries to facilitate translation.

Problem: Inadequate Mission personnel for work that is required. Poor distribution of Mission staff. Excessive paper work and other demands on time deplete available resources.

Recommendations: Hire more personnel, both U.S., FSN and third country national. Give more attention to staff distribution. Reorganize administrative procedures to reduce steps involved.

Problem: Mission staff have an insufficient understanding of AID and Host Country policies and procedures relating to development programs, as well as an inadequate understanding of Host Country cultures.

Recommendations: Missions should provide ongoing orientation and training to all staff to address above. Missions should have updated handbooks, reports, policy statements, and documents readily available to all staff.

Missions could make better use of FSN staff to facilitate understanding of Host Country policies and culture.

Problem: Lack of clearly defined authorities, duties and responsibilities of USAID, Host Country, contractors and other personnel involved in implementation.

Recommendations: Clarify the above by use of:

- organigrams,
- specific job descriptions, and
- clearly defined clearance procedures (chain of command).

Problem: Excessive length of design/approval/start-up process leads to unrealistic expectations and decline in enthusiasm.

Recommendations: AID/W should be more prompt in responding to approvals and providing technical assistance on timely basis.

There should be more use of sectoral projects which don't require further approval for sub-projects by AID/W.

Host Country Related Problems

Problem: Lack of trained personnel -- technical, managerial, and financial -- causes problem of overly centralized decision making, poor financial management and lack of qualified counterparts.

Recommendations: In-country middle management training.

More support for existing training institutions or development of new management/administration training entities.

Bonding of participants sent to training to ensure their return.

AID should develop long term training of trainers, to facilitate continuous training of Host Country staff.

Problem: Host Country has difficulty understanding and implementing AID regulations/procedures.

Recommendations: Require a mandatory language level of 3 for AID field personnel.

Provide short term in-country courses for Host Country personnel in AID regulations/management with follow-up training.

Resource materials and handbooks in the local language should be made available to Host Country (French, Spanish, Arabic, etc.).

Problem: Lack of donor coordination in the Host Country leads to duplication of effort, poor allocation of resources, poor coordination of project resources and possible Host Country manipulation of donors.

Recommendations: AID Mission Directors should be required to seek the most appropriate means (in-country) for improving donor coordination of resources at all levels -- project, national and regional.

AID/W should coordinate with other donors as well -- treating larger issues and policy questions, e.g., indemnities in Sahel.

Problem: There is a lack of Host Country capability to absorb new projects and/or recurrent costs of existing projects.

Recommendations: AID should be more realistic in its assessment of a country capability to carry out projects. This should be done in conjunction with other donors. All economic analyses should take the absorbtive capacity of the country into consideration. DON'T BE AFRAID TO SAY NO!

Contractors/Grantees/PVO Related Problems

Problem: AID lacks a mechanism for advance screening of contract personnel to determine language capabilities, overseas experience, professional expertise and familiarity with AID regulations and Host Country customs. Qualifications on paper are often exaggerated or misleading.

Recommendations: Strengthen feedback mechanism by ensuring widespread use of contractor evaluation forms. Improve input and utilization of the contractor performance reporting system for use in contractor selection.

Make contractor PER part of standard clauses and require that contractor evaluation be emphasized in Washington/Mission/Host Country orientation.

Problem:	Bait and switch (intentional and unintentional) of promised personnel after the lengthy process of awarding a contract leaves the Project Officer little choice but to proceed with substituted less qualified personnel.
Recommendation:	Streamline/shorten the contract selection process to allow for provision of alternative expedited actions without jeopardizing project implementation.
Problem:	Lack of clearly defined relationship between PVOs and the USAID.
Recommendation:	Re-evaluation of AID policy in the utilization of PVOs, i.e., consider limiting AID funding to general support of PVOs.

ABIDJAN, IVORY COAST

The 25 participants of this course represented eight missions and REDSO/WA. Mission represented included Cameroon, Gambia, Liberia, Mali, Mauritania, Sierra Leone, Tanzania and Upper Volta. The identified following problems and provided recommendations for their solution.

AID/W Related Problems

Problem: Changes in AID/W priorities as in:

- population;
- private enterprise;
- cost/benefit ratios;
- Sahel financial management; and
- use of PVOs, Title XII institutions, and 8(a) firms.

Recommendations: Changes [fads] in priorities hinder continuity of ongoing projects, i.e., credit, WID, health. Therefore, ongoing projects should be allowed to mature with maximal support from Washington.

PVOs can be as difficult to monitor as bilateral projects and may not facilitate Project Officers' job of doing more with less. Therefore, reconsider policy favoring PVOs.

Title XII institutions can be effective if provided with exact scopes of work, otherwise they tend to carry out their own research priorities.

Minority (8a) firms should be used judiciously and not imposed on Mission.

Problem: Changes in AID/W personnel resulting in:

- unfamiliarity with field constraints imposed by Host Country logistical problems, cultural behavior, scarce management, severe climates (both physical and political);
- lack of commitment to backstopping field; and
- excessive demands for information not vital to programs.

Recommendations: More Foreign Service Officers with overseas experience should be placed as backstop officers in both projects and program.

Restrict demands for information (including TDY groups) to relevant project and program matters, e.g., land use planning, agricultural production statistics, etc.

Problem: Inadequate training of direct hires in AID system.

Recommendation: Provide more training of direct hire staff.

Problem: There appears to be confusion in AID/W over who is responsible for policy and who for project implementation.

Recommendation: Clearly define lines of authority and communicate with field.

Problem: FSN staff is insufficiently utilized and compensated. Universal problems include:

(1) low salaries ~~include,~~
(2) lack of incentive structure;
(3) lack of responsibility; and
(4) lack of training opportunity.

Recommendations: Review statutory requirements and AID/W policy of FSN reward system.

Problem: AID/W caution evidenced by requirements for multiple clearances delays responses to cables and feedback on programs.

Recommendation: Reduce multiple clearances on cables and policy directives. Include names of drafter, authorizer, and individuals responsible for clearances.

Problem: AID/W is slow in responding, most notably in:

- allotment of funds and other program decisions;
- authorization of project amendments;
- waivers;
- contracting for technical assistance;
- commodity procurement; and
- placement of participant trainees.

Recommendations: Constantly update field on changes of back-stop officers including temporary assignments in order to facilitate follow-up.

Improve supervision of cable log to ensure prompt responsiveness.

Provide advance notification of shipment of commodities and/or status reports of procurement.

Institute periodic updates or status reports on process of contracting for technical assistance and placement of participant trainees.

AID/W should assure that all missions concerned receive cables [info/action] that are relevant to them.

Need to speed up allotment process.

Authorization of project amendments needs to be quicker -- new delegations of authority will help.

Missions should comment on responsiveness or lack thereof of AID/W TDYers.

Missions should install routine action follw-up on cables to AID/W with right to reinforce by telephone.

Mission Related Problems

A. Staff Development

Problem: There is a general need for training throughout the agency, especially for:

- inexperienced direct-hire staff put into management roles. Training should be on AID procedures;
- FSN staff. After receiving training they should be given increased responsibilities to utilize it;
- filing;
- senior AID staff who tend to be interested in routine management problems -- only interested in BIG PICTURE; and
- FSN and USDH staff who need more language training.

Recommendations: Mission management should screen Mission staff mix in terms of experience. Training should be provided prior to posting at Mission (Example -- Orientation training with real design and implementation problems, PP, PID, PIOs.).

Mission PER Officer should analyze FSNs staffing patterns and identify potential career growth, provide appropriate training, and promote according to merit.

Request AID/W TDY of Central files experts. Training at post by Senior staff secretaries for the Mission.

Mission Directors should have prior training in Mission Management procedures including various options available to them in managing a mission.

FSN and US direct-hire staff need more language training. Eliminate language waivers for USDH.

For FSNs, organize in-country English training.

B. Management

Problem: FSN motivation negatively affected by the practice of hiring unqualified U.S. direct hire dependents when FSN staff is available.

Recommendations: See recommendation on training above. Update salary surveys with emphasis on true competition -- private sector and other donors. FSNs should participate in surveys. The system to favor the hiring of U.S. dependents should not be abused to create new positions.

Problem: Inadequate communication flow; timing and clearance procedures (vouchers, PIOs, etc.).

Recommendation: Missions should be encouraged to develop Mission manuals. May use Senegal Mission manual as a starting point.

Problem: Project Officer does not have enough recognition by management.

Recommendation: Follow Africa DR procedures for Project Officer role in project committee.

Problem: Over-emphasis in project design, not enough on project implementation.

Recommendation: Reward management Project Officers for good project implementation instead of for rates of obligation. Punish management for project proliferation.

Problem: Bilateral agreement is not adequately enforced to provide diplomatic privileges.

Recommendation: U.S. Missions should be more forceful in securing normal diplomatic privileges for the staff and logistical assistance sequenced for operations.

Host Country/PD 69 Problems

Problem: Lack of management/financial skills and abilities required for prudent project management.

Recommendation: AID should finance outside accounting firm to provide accounting assistance and/or training. One person in Mission should have assistance/training as primary responsibility. Also controllers need to be integrated into mainstream of Mission/need cultural sensitivity and language training -- pro-Host Country orientation.

Problem: Bait and switch: Contractors propose personnel that are not provided on actual team.

Recommendation: Missions should have veto on nominations of final team members.

Include clause in RFP to avoid "Bait and Switch."

Implementation

Problem: Inadequate home office support of contractor/grantee teams, e.g.:

- not meeting cash flow needs of team members;
- poor or lack of predeparture orientation;
- poor communication after team arrives in-country;
- slow and poor delivery of project team or support commodities; and
- weak or overloaded home office personnel.

Recommendations: Request in RFP and evaluate proposals on specific administrative and financial abilities and capability, and previous experiences in project implementation.

Provide for participation of USAID/PO and Host Country Project Manager to clarify (in evaluation process):

- AID regulations;
- Scope of project;
- AID/Host Country/Contractor relationship and responsibilities; and
- General conditions in Host Country as they relate to project, to potential contracts (Cultural/Physical/Political, etc.)

Problem: Contractors often fail to meet project reporting requirements.

Recommendation: Contracts should stipulate that failure to meet reporting requirements may result in delay of voucher processing.

Problem: PVOs do not adequately coordinate their planning and activities with the Mission.

Recommendation: Be more selective in selecting PVOs to support.

Problem: Failure to meet agreed-upon contributions/staffing.

Recommendation: AID should listen to what the Host Country says it wants. Get Host Country to generate projects and ideas it would be committed to. Also, AID needs to be more realistic about contributions. If country can't contribute don't ask it to. If it can and doesn't, cut off $. Use trust funds more where possible.

Problem: High turnover of Host Country personnel.

Recommendation: Use training as incentive for length of work on project. Also to extent possible, get Host Country to commit key personnel for the life of the project.

Problem: Conflicting or unrealistic project goals.

Recommendation: Again AID should listen to what the Host Country wants. Also simplify projects -- don't have grab bag projects like OMVS, Mali Livestock Sector. Clarify goals and think long-term.

Problem: Lack of understanding of AID procedures or conflicting local procedures.

Recommendations: Again AID should provide training for Host Country officials. AID should have one person responsible for training/assistance, e.g., procurement.

Mission staffs should know or find out environment and constraints within which they are working, i.e. they should:

- initiate dialogue with Host Country counterparts;
- learn procedures; and
- build team effort.

Contractor/Grantee/PVO Related Problems

Planning and Design

Problem: In some cases, contractors' conception of purpose and implementation procedures differs from that of original design.

Recommendations: Clear and concise scopes of work should be developed to avoid ambiguity/confusion.

Use or simulate the collaborative assistance mode of design and implementation, i.e., try to have as much overlap as possible of personnel and institutions.

SUMMARY OF IMPLEMENTATION PROBLEMS AND RECOMMENDATIONS

from the

Project Implementation Course
1981-82

Prepared Under Contract No. AID/OTR-C-1868

by: Development Associates, Inc.
2924 Columbia Pike
Arlington, Virginia 22204

July, 1982

As of July, 1982, the Project Implementation Course has been given 10 times, including the pilot test in Panama in January, 1981. During each of these sessions, participants have identified their most pressing problems in implementation and have developed recommendations for their solution. After each course, a report of the results of the project identification task has been sent to the Administrator and to Bureau representatives.

An interesting finding from this effort has been that many of the same problems have been identified in each course; that is, similar problems exist worldwide. This report summarizes the participant feedback from those first 10 sessions, by presenting problems that arose repeatedly across geographic areas. To facilitate presentation and comparison, problems are categorized as the participants addressed them into four sources: AID/W, Mission, Host Country and Contractor/Grantee.

AID/W

In each of the sessions, the number of issues raised was greatest for the AID/W category. In spite of this fact there was a great deal of concurrence across sessions on the problems in this area. Several problem areas crossed geographic boundaries. Probably the most pervasive of these was the inequality of the reward structure for project design vs. implementation. In spite of recent recognition of this imbalance, Project Officers continue to cite this situation as a cause for problems in implementation. They feel that increased recognition of good project implementation and management in the PER system would signify that AID was truly interested in successful implementation.

A second area repeatedly identified as problematic was that of cumbersome, confusing and lengthy contracting and procurement procedures. Project Officers report that these processes are not only difficult to understand and explain to the Host Country, they also impede timely implementation of projects. Also, concerning contracting priorities, course participants repeatedly questioned the imposition of priority contracting modes, e.g., Host Country, 8(a), Small Business, OPGs, etc. They report that oftentimes the requirement that they use these modes, increases their workload and impedes their ability to do more with less.

Another area of concern regarding contracting, is the perceived lack of coordination between AID/W Contracts Officers and Mission staff. Participants recommend that to ensure that missions get the product they are paying for, AID/W Contracts Officers should cable substantive changes in Scopes of Work to the Mission and send final bid documents to Mission for review before issuance. They have also requested that Mission contracting authority be increased, and have welcomed recent moves in that direction.

Another concern is the general lack of effective communication and coordination between AID/W and the Missions. This situation is evidenced by backstops who have an insufficient understanding of countries and projects; by AID/W imposition of centrally funded projects on unwilling or uninterested Missions; by lengthy approval, clearance, waivers processes; and, by AID/W imposition of unrealistic constraints (CPs, etc.) on projects.

Project Officers suggest that these conditions could be ameliorated if AID/W were more familiar with the local situation. Backstop officers should be thoroughly familiar with field situations and specific projects. Course participants

suggest that ideally backstop officers should serve in the field during the period Mission officers are taking R & Rs and/or home leaves. Additionally Washington should accept Mission positions (whether affirmative or negative) on the development of centrally funded projects, and ensure Mission input in PIDs and PPs for these projects. Officers feel AID/W backstop officers should also facilitate Mission design and implementation of their own projects by restraining themselves from adding unrealistic CPs or components and by expediting approvals and waivers.

A tangentially related problem to the lack of communication is AID/Ws lack of sensitivity to the problems of perpetual information requests and drop in visitors to the Missions. Course participants felt that they were hampered from performing their project duties by having to spend inordinate amounts of time responding to questions and guiding Mission visitors. Recommendations centered on having AID/W act more thoughtfully in screening both information requests, which are often redundant, and visitors to the Mission in order to minimize their numbers.

A final, all pervasive concern, was the impact of the policy of doing more with less. Project Officers report that present operating procedures, lack of managerial tools (word processors, etc.) and continuous concern for development of new projects, makes implementation with the present level of staff practically impossible. Besides reviewing the present policy, implementation with present staff levels could be accomplished by funding fewer but larger projects, upgrading support functions, simplifying procedures, and increasing training opportunities for USDH and FSN staff. (Training opportunities should include management, implementation, language and cultural sensitivity training.)

MISSION

Regardless of where the course was given the same core problems with the Missions were identified. These problems fell into two categories: internal and external concerns. Internally, Project Officers repeatedly cited lack of managerial capability at the Mission. This situation results in unclear roles and functions of technical, staff and support offices. The lack of clear delineation of responsibilities causes the officers to work counter to one another causing tension, difficulties and lack of continuity in Mission policies. The clearance processes tend to be overly complex and time consuming because too many people are needlessly involved.

Participants recommended that Mission management receive training in management as well as implementation. As a result of this training, Mission roles and responsibilities should be clearly and effectively defined, and clearance processes should be streamlined by fixing time limits for clearance and limiting the number of individuals involved. It should be made clear that clearance should be for substance not for style.

Regarding external relations, Missions almost universally report that there is inadequate communication with the Host Country. As a result of this, there is a lack of knowledge on both sides of the rules and regulations of the other. Additionally, Host Countries are not adequately involved in the design and planning of projects which often results in a lack of enthusiasm and interest in implementation.

Participants recommended that close, frequent and collaborative contact with

counterparts should be encouraged. Provisions should be made for Host Country and Mission technical officers to thoroughly brief each other on their respective rules and regulations.
Missions also reportedly lack adequate knowledge of what is being done by other donors in the Host Country. As a solution, Project Officers recommend that coordination with other donors be accomplished at both the Mission and AID/W level.

HOST COUNTRY

One major concern in implementation regarding Host Countries is the lack and high turnover of qualified personnel to carry out the projects. Additionally, Project Officers report that there is a lack of cultural and bureaucratic incentives for performance of the available Host Countries staffs.

Among the suggestions to ameliorate this situation were the recommendations that host governments should be encouraged to increase their benefit structure, training opportunities should be tied to performance and participant trainees should be bonded to ensure return.

Another problem that hampers implementation is that the role of the implementing agency is unclear, the Host Country fails to meet agreed upon contributions, and/or delegations of authority are inadequate to manage the project. Recommendations for this problem were that implementing agencies should negotiate their roles in the development of the PP and in the PROAG. Additionally, projects should be designed with lower level decision points that tie the flow of resources to that level. Also AID needs to be more realistic about what Host Countries can provide.

CONTRACTOR/GRANTEE

The main problem perceived with contractors and grantees was the issue of (intentional and unintentional) bait and switch, the process whereby contractors and grantees propose specific staff but substitute others in actual implementation. To avoid this problem, course participants recommend that letters of intent be included in proposals, that Missions have veto power over nominations and that contracting procedures be streamlined in order that Project Officers have the option to cancel the contract and start the process again without inordinate delay. Additionally, the contractor evaluation system should be strengthened to facilitate identification of contractors who continuously change proposed staff. This system would be generally helpful in weeding out unqualified/unresponsive contractors.

Many contractors have a different understanding of project purposes and implementation procedures, according to course participants. In response, participants suggested that clear and concise Scopes of Work would clear up these misconceptions. Additionally, it was recommended that the collaborative assistance mode of using contractors to design and implement projects would reduce this problem.

A final area of concern repeatedly identified was that home office support of contractor/grantee teams was often inadequate. To counter this problem, Project Officers recommended that proposal evaluation should also include a closer assessment of home office capabilities. The requirements of the project for home office support should be clearly defined in RFP and clarified in discussions with the prospective contractors/grantees.

VII. LESSONS LEARNED

This section presents findings of the evaluation, or draws conclusions from the findings, which have relevance beyond the immediate project. Suggestions or recommendations may be addressed to the GRM, or an agency thereof, to AID/Washington or to the USAID in Mali. The proposals may relate to the implementation of similar projects or to particular implementation methods or systems, regardless of the type of project.

A. Improving Collaboration and Communication

1. In the Design Process

In both this evaluation and in the Roush report previously cited, the importance of greater host country participation in the project design process was stressed. This has been much easier for AID to accept in principle than to put into practice. Therefore, it seems appropriate to explore collaboration in project design in greater detail.

Improved collaboration in project design could be strengthened if USAIDs were more fully staffed and could take greater control of the design of projects. However, this does not appear likely in the near future; rather, there will continue to be a dependence upon external design teams. Greater participation by host country personnel in design teams would also be salutory. Again, however, there is reason to doubt that too much headway will be made. For example, there is usually a scarcity of qualified personnel, and since the design process is rather long and the result not always sure, priority is usually given by host country agencies to using such personnel on current activities.

Nevertheless, there are some things that should be feasible which could strengthen collaboration or compensate for less than desired host country inputs to the design process.

a. Design Team Composition

On the AID side, the composition of the design team could be modified make up for the inadequate host country representation and focus more on implementation mechanisms. For example, in addition to the usual technical specialities, teams should also include someone with broad experience in project evaluation and someone with good training and experience in the management of international development activities, particularly with implementation experience. A financial expert should be included on the team if: (a) the project will have a credit component; (b) the host country will administer a significant portion of AID project funds; or (c) the success of the project will depend to a considerable extent on the efficiency of the host country financial system. Similarly, a logistics expert may be needed if the project will require the purchase, storage and/or distribution of significant quantities of commodities. One person may be able to fulfill more than one of the above functions. It may also be necessary to divide the design team into groups, with the logistics/finance/management group following the technical group to review the implementation feasibility of the technical program. If the feasibility should be questioned, a follow-up team visit might be necessary. This would still be cheap in relation to the overruns on projects which encounter serious implementation delays as a result of inadequate pre-project implementation planning.

On the host government side, higher priority needs to be given to project design and evaluation. Host governments need to realize that there will always be a high turnover in the expatriate personnel who come to participate in development activities in their country. Therefore, it will be host country personnel who are in the best position to profit from evaluations and to insure that lessons learned are incorporated into future project design. It probably will not be feasible to have design and evaluation units in all ministries for some time. However, it should be feasible to have at least one unit in the government, perhaps in the Ministry of Plan.

In Mali in particular, the Ministry of Plan has a responsibility for evaluating development projects. In addition, the Institute of Rural

Economy (IER) in the Ministry of Agriculture has an evaluation unit that is used for many, if not most, evaluations of rural development projects. It would seem desirable, therefore, that an individual from either or both of these units participate in the design team for new rural development projects as well as anyone that could be spared from the organization that would have responsibility for implementing the proposed project. Even if personnel constraints precluded putting someone on the design team, the government should insist on a review of the draft project proposal by those units as well as the implementing agency prior to giving preliminary government approval of the proposed project.

AID, in conjunction with other international donors and lendors as appropriate, should encourage host countries to establish design and evaluation units where none exist and should support such units as needed. For example, AID could provide support for the creation of services similar to AID's Development Information Service and the training of personnel in the design and evaluation concepts developed by AID and now used by many other donors. In addition, AID should insist that USAIDs seek out and incorporate in design teams host country personnel experienced in evaluation -- from either the private or public sectors.

b. A More Realistic Implementation Plan

It is usually fairly easy to obtain agreement between host country officials and USAID project design personnel on the general objectives of a project. Frequently, however, there is not a meeting of minds on how those objectives are to be accomplished--in part, because host country personnel generally make little input into the detailed implementation plan. While efforts should be made to have greater host country input in the early stages of design, it is quite likely that the most important input, that of the host country project director, will not be available because he may not even have been selected at the time of the project design team's visit. This is especially likely where there is a considerable time lag between the visit of the design team and the signing of a project agreement. Because of the likelihood of inadequate host country input into the implementation plan included in the Project Paper, AID should consider modifying its project design and approval process.

(1) Meaning of Project Approval

AID should make clear that its project approval is binding on the general objectives of the project, but it is leaving considerable latitude to the USAID and host country in terms of how the objectives are achieved--subject to the presentation of sufficient information to insure that the project can be carried out in the time frame proposed. To compensate for requiring less implementation detail at the time of project approval, AID should insist on improved USAID monitoring of project implementation--see A.2 and C. below.

(2) Revised Implementation Plan Before Project Signature

The implementation process should provide for the joint preparation at the time of, but prior to, the signing of the Project Agreement of a more detailed life-of-project implementation plan, with detailed work plans for the first year and procedures for reviewing and updating the plan. At that time, the host government should be (. must be) willing to give priority to working out implementation details. There are also rules of the game that must be established, and this should be done prior to the signature of agreements. Furthermore, agreement on the rules of the game does not guarantee that the rules can be followed even if there is a willingness to do so. Therefore, the detailed financial and other operational procedures, at least for the first project with an agency or organization, should be worked out, and tested for feasibility before the Project Agreement is signed -- not presented in the first Project Implementation Letter as is now the practice.

The foregoing implies that AID/Washington will cease and desist in its most consistent actions--actions that probably are the greatest contributors to poorly implemented projects: pressuring USAIDs for rapid development of new projects, speedy obligation of funds and early initiation of disbursements. It is well recognized that an extremely high pipeline can provide the Congress with an excuse f

reducing foreign assistance appropriations. It is suggested, however, that one of the most important contributors to AID's high pipeline is the obligation of funds before enough of the "hows" of implementing projects have been worked out collaboratively, and the foregoing pressures are the principal cause for such premature action. Therefore, it is important that AID accept the utility of allowing missions more flexibility in the timing of the signing of Project Agreements and explain to Congress the rationale for the change in the process.

c. Cultural and Social Factors

More attention needs to be given by AID planners to the interests and motivations of the project implementers and the factors in the cultural and social environment that may discourage initiative and encourage practices in resource management that are unacceptable to AID. For example, in some of the environments in which AID works, society expects members of an extended family to give their highest loyalty to support of that family and government salary scales are extremely low. These conditions often foster practices which are acceptable in the local society but which would be either frowned upon or considered illegal in the U.S.

AID's rhetoric also calls for the intended recipients of AID projects to participate in the design and implementation of proposed projects, but this seems to be the exception rather than the rule. Inadequate attention generally is given in Project Papers to the interests and motivations of the personnel of the implementing agency to determine whether they are likely to involve intended recipients in the project and, if not, whether such involvement is really feasible. If it is feasible and desirable, project designers should look for measures that could be incorporated in the project design to promote such involvement in a meaningful way.

To deal with the foregoing types of issues, AID might look at the approval process of individual projects and also undertake some research related to the general problem of dealing adequately with cultural and social factors. With regard to individual projects, there is need for

an analysis in Project Papers of the social/cultural/political problems directly impacting on the feasibility of project implementation. The Social Soundness analysis section of Project Papers usually deals only with the possibility of insuring that the intended beneficiaries of the project will indeed benefit from the project, and the Implementation section deals mostly with the quantity and quality of local personnel available and the structure and track record of the implementing agency. The weakness of these sections is probably attributable to a considerable extent to the need for an unclassified presentation. It is suggested, therefore, that AID provide for a classified presentation of cultural/social/political factors and any other issues that could impact seriously on the implementation of the project. This presentation should focus on local administrative practices and the institutional and personal relationships between the implementing agency and the intended recipients of project benefits. As a part of the foregoing, or as a supplement thereto, an analysis should be included of the implementing organization in relation to the institution building model developed for AID by Milton Esman, et. al. (see a summary presentation of the model in Annex E).

In terms of the broader problem, a comprehensive study of the principal types of social/cultural/political problems encountered in the implementation of international development projects is overdue.[1] It should be possible to identify the most persistent problems, evaluate the various means attempted to overcome or circumvent them and develop some guidelines for dealing with at least some of the problems. As a complement to the foregoing study, an effort should be made to identify any countries which have overcome the most serious social or cultural impediments to effective project implementation and determine the factors which appear to have contributed most to the changed istuation. This might lead to new program or training activities or to the convening of seminars to discuss the findings. Collaboration in the foregoing with other donors/lenders would be desirable.

[1] One attempt to classify and describe common problems of this type is contained in Dennis A. Rondinelli's article in Project Planning and Implementation in Developing Countries: A Bibliography on Development Project Management.

2. In Project Implementation, Monitoring and Re-Planning

Section IV provides recommendations for improving in-progress project planning, project monitoring and other actions for improving project implementation. Detailed suggestions are also included in the previously cited Roush report (Sections IV and V). It is suggested that it would be in the interest of the GRM to implement a number of those recommendations in other GRM development projects. In addition, it is suggested that AID incorporate the recommendations, as appropriate, in its Handbook chapters and training programs on project implementation. Furthermore, the Handbook chapter dealing with Project Agreements should require that Project Agreements include:

- those portions of the Project Paper that both parties agree are important to follow in project implementation;
- a requirement for joint reviews of project implementation and joint approval of annual work plans and budgets; and
- a provision that Project Implementation Letters will be the official project documentation and will be used specifically to formalize approval of annual work plans and changes in the overall implementation plan or annual work plans.

B. Making Project Management More Effective--the People Factor

A number of recommendations for improving project direction and management were made in Section IV above and in Section V of the previously cited Roush assessment of USAID-funded technical assistance activities in Mali. The latter section, especially, includes recommendations which have relevance for a number of USAID-financed activities and probably for non-AID financed projects in Mali as well. In addition, some of the recommendations are believed to have relevance for AID projects and programs in other countries, especially in French-speaking West Africa. It is recommended, therefore, that both the GRM and AID/Washington review the two sections for general applicability. The suggestions and recommendations in this section are designed to complement or elaborate upon the recommendations in the two Project Management sections cited above. Particular attention will be given to determining personnel needs, up-grading personnel skills and seeking ways to offset personnel shortages/inadequacies.

1. Analyzing Personnel Needs

Generally, the most crucial need for assuring good project management is for a sufficient number of appropriately experienced or trained personnel. Determining just how many of what types of people with how much training and experience is not a simple task. Project Papers do not generally deal adequately with the subject. The requirements for technical personnel may be dealt with reasonably well, but the need for support personnel (e.g., administrative, logistical, financial, planners, trainers, etc.) is usually ignored or underestimated. It is suggested that GRM and AID study the impact of personnel inadequacies (numbers and quality). Assuming the validity of the thesis that personnel inadequacies has contributed significantly to poor project management, AID and/or host countries could improve the chances of successful projects by including on project design teams a management-oriented person with experience in personnel planning and personnel development.

2. Overcoming Personnel Shortages/Inadequacies

Host country budgetary problems often necessitate the acceptance of less than optimal project staffing. Furthermore, the level of experience and

training often leaves much to be desired. Thus, a principal project component frequently is the up-grading of the skills of project personnel. There follow some thoughts on how to make such training most effective in the project context, plus some ideas on alternative approaches for compensating for personnel inadequacies.

a. Orientation and Training

It is very important that the project director have a full understanding of project objectives and of the personnel implications of the project implementation plan. Frequently, this can only be fully appreciated after exposure to a similar type project in another developing country or in the U.S. Sometimes someone from a budget bureau or an overall government personnel agency must also have full understanding of, and be in agreement with, project plans before it is possible to implement the project effectively. Often, therefore, one of the first project actions should be an orientation tour for the project director, and possibly other host country personnel.

Financial management is an area where it seems particularly important to provide orientation to host country project directors and USAID project officers. It is doubtful that much value will come from the proposed AID training in the Sahel in financial management if the training is geared just to accountants and to assuring proper control over the use of AID funds. To assure its effectiveness, such training must be preceded or accompanied by an orientation for project directors which helps them see how improved financial systems and reports can improve their effectiveness. This orientation will need to be followed up with help in financial management systems beyond just controlling the flow and use of funds.

Often project plans call for long-term training in the U.S. for senior project personnel, usually in technical areas. Mid-level training is seldom proposed to any considerable extent. Thus, senior personnel already in short supply are sent off for training, weakening overall project management capabilities because personnel going for training will generally be replaced by a less capable person or by a peer who will try

to administer both persons' functions. Furthermore, personnel sent for training often do not remain with the project long after their return from training--if the selection was good--but move on to a more import job.

It is suggested, therefore, that long term training abroad be done on a sector basis under a special training project rather than incorporated in an action project. Project training then would focus on short term courses or orientation visits abroad plus in-country training. Such in-country training should focus on management training for project managers and middle-level personnel as well as skills training at all levels. Project personnel could still be selected for long term training abroad, but they should be replaced by a qualified officer, preferably one that had already been for training.

USAID personnel also need additional orientation and training in management. The new course in Project Implementation that is now being given periodically in the regions is very helpful and long overdue. However, there is also a need for exposing more senior personnel to a number of management concepts so that they will at least recognize the need for improving management systems and have some idea of how to go about doing it. Thus, the Development Studies Program should include a management concepts component. Candidates for Director and Deputy Director who do not have a strong background in management concepts should be required to attend the Federal Executive Institute or a short management course prior to being assigned to their new position. AID/Washington officials also need greater exposure to management concepts -- in part to do a better job, in part to assure sympathetic responses to USAID requests for improving internal USAID management as well as assisting host country agencies which are implementing AID-funded projects.

b. Improving Productivity

Often project designs provide for increased agricultural productivity through the introduction of new plant varieties, improved cultivation practices or new technologies and/or more advanced equipment. All too often, however, these innovations are not proposed for the system of

administration of the implementing organization or for the delivery systems for the proposed new technologies. New equipment and new systems introduced into such fields as organizational administration, financial management, logistics planning and management, etc., can increase considerably the chances of implementing a complex project successfully. It would require additional training, usually largely in-country, but the result should be improved morale and increased efficiency in the offices involved and enhanced overall effectiveness of the project. In general, increased attention should be given to the non-technical needs of development projects.

c. Contracting

Most AID projects provide for AID to contract or finance contracts for technical assistance and for engineering and construction services. It is generally assumed that all other services will be provided by the host country implementing organization using its own personnel. Since projects usually provide for an increasing level of services to be provided to intended beneficiaries or intermediaries, the implication is that the host country organization will need to increase its staffing. This approach tends to foster a continuing expansion of governmental bureaucracies, which usually contributes to a declining level of efficiency. Furthermore, this approach usually means that it takes longer to implement development projects because of the necessity of developing and carrying out training programs, promoting new institutional structures, etc.

It is proposed that a much greater effort be made to structure development projects to make greater use of indigenous private sectors for providing the services that frequently, if not usually, are provided by government organizations. Where it is necessary to use a foreign firm, the firm's contract should require the firm to maximize the use of subcontracts with local firms so that a local capability could be built up. Concurrent with trying to utilize more contracting with the private sector to implement development activities, it will be necessary to provide training to appropriate host country personnel in contracting and contract management.

Some activities are mentioned in Section II.C. of this report which could be shifted from OHV to the private sector. It should be noted a' that some countries are experimenting with having agricultural extensi services extended by the private sector. It can be argued that greater use of contracting will cost host governments more, even if it saves on numbers of government personnel. This might not be true, however, if there is a sufficiently large improvement in efficiency. Furthermore, it may be easier to shift some of the financing burden from the government to the recipients of the services when the distribution of the services is in the hands of the private sector.

d. Use of Technical Assistance

It was suggested in Sections III. H. and IV.A.3. that better use could have been made of the technical assistance contractor in meeting the objectives of the project. The previously cited Roush study found problems in contract management in a number of other USAID-financed projects. It is suggested that an appropriate agency of the GRM (perhaps the Min stry of Plan) undertake or arrange for a review of a number of foreign assistance projects involving technical assistance to determine what elements seem to be the most important in a successful technical assistance project in Mali -- e.g., type of contractual arrangement, relationship of contractor's team with host country organization and personnel, minimum language requirements, length of stay of technical assistance experts, amount of orientation and training given to foreign and Malian personnel about each other and about the objectives and planned implementation mode of the project, etc. Based on the results of the study, the GRM could issue general guidance to its agencies on the contracting for, and management of foreign-financed technical assistance.

GRM agencies are urged to review Section V.B. (Contract Management) of the Roush report, including particularly sub-section 5. on Host Country Contracting. It seems quite likely that the GRM review suggested in the previous paragraph would conclude that host country contracting is unnecessarily burdening GRM project directors with administrative problems limiting the time available to them to devote to policy matters, plann and implementation supervision. Even if host country contracts should

be deemed desirable, implementation of a number of the recommendations included in Sections III.D. and V.B. of the Roush report should improve communications and contract management and should result in better results from the contracted technical assistance.

AID should insist that USAIDs review host country contracting capability before recommending host country contracts. Furthermore, USAIDs should be reminded that use of host country contracting does not reduce the USAID's responsibility for assuring that proper contracting procedures are followed and that project implementation is both efficient and effective; i.e., that AID funds are properly used.

C. Being Realistic About "Doing More With Less"

In Mali, and apparently elsewhere in the Sahel, AID has been trying to do m with less for a number of years, and the results are coming home to roost. There is now a mad scramble to initiate financial training programs as a means of ameliorating one of the most glaring and consistent problems raised in project evaluations and other assessments. There is a real danger that senior AID management will conclude that some financial management training for selected host country nationals and more Project Implementation courses in the field will largely solve the problems raised. While both of these training courses are badly needed, it is high time that AID administrators, Ambassadors, Directors of Budget and the Congress stop kidding themselves that efficient and effective aid programs can be run without people -- qualified people. Saving on staffing needs is possible, however, with some changes in personnel policies and changes in the way the Agency does its business. The first part of this section will deal with personnel policies and practices and the second part with some more fundamental issues (but still within the general framework of current AID programs and program administration).

1. Aid Personnel Policies and Practices and USAID Staffing

It has usually baffled field people just how AID/W decides on the size of a USAID, and how it decides when and how much to change the level of staffing. It appears that far too much attention is paid to the dollar amounts of programs than to the content of the program or the actual workload at post. Dollar values of programs and projects frequently have little relevance to workload. Furthermore, a new mission or a mission that is expanding its portfolio significantly needs an early influx of people during the project preparation and initiation stage, not after all of the funds have been obligated. Thus, adequate staffing levels generally tend to lag behind when a program is expanding, as was the case in Mali. This in turn causes those at post to be badly over-worked, resulting in a poorer quality of performance and frequently poor morale. This in turn creates problems in recruiting personnel for the post.

The number of projects in a mission is more meaningful in determining staffing needs than the value of a country program or of individual projects, but

it also has its drawbacks. First, which projects are you going to count? The usual tendency seems to be to look only at USAID-funded dollar projects and to ignore regional and AID/W-funded projects located in the country, local currency projects (from counterpart funds or P.L. 480 proceeds), Title II programs, etc. Secondly, many projects such as Haute Vallee, have a number of components, a number of which would be a separate project in another mission. Thirdly, one needs to include not only on-going projects, but those in the development stage -- frequently, the latter are the more time-consuming.

Another factor that impacts heavily on staffing needs is the local environment in which the USAID personnel must operate. Where logistical support is poor, climatic conditions are rough, qualified local nationals are difficult to find and hire, and host country project officers are poorly trained and/or have little management or technical experience, the USAID staffing should be relatively stronger -- in numbers and in experience. In addition, if the USAID program is largely located in the interior of the country, and it is relatively inaccessible, staffing requirements are likely to be greater.

Actual availability for work also needs to be factored into the calculation of staffing needs. For example, many hardship posts authorize R&R. There are also annual leave, sick leave (which may be greater in hardship posts), home leave, and training assignments. Allowance never seems to be made for training subordinates or interns (IDIs). Rather, interns are counted as staff (under MODE rules), which is unfair to the USAID, the intern and the AID foreign service.

Finally, the level of experience and training of those assigned to a mission affects the numbers required. In the case of Mali, most of the project managers were interns or had just finished their internship and their supervisors generally were relatively inexperienced in AID and without management and supervisory experience or training. Fewer, more qualified personnel could have done a better job.

As indicated above, it is especially important to have extra personnel on board during the buildup of a program or during the project development and project initiation stages. Thus, AID/Washington should assure that it can

provide USAIDs with quick and easy access to short term help for this purpose where field staffing is inadequate. Project budgets could have a line item for project start up costs which USAIDs could be authorized to obligate prior to the signature of the project agreement. AID/Washington could assure that one or more Indefinite Quantity Contractors would have the needed support capability to help launch the project efficiently. Particular areas of need are likely to be guidance, and possibly training, in financial management systems, procurement and logistics planning, management information systems (including networking), project management theory and practice.

Efficient and effective project implementation depends not only upon AID experience, but especially on experience in-country. Thus, it is very important to keep good performers for a longer period at posts. AID should be more diligent in insisting upon a minimum three-year assignment or back to back two-year tours at each post for most personnel. In addition, the policy of a two-tour maximum at post should be discarded. Instead of a mission having to justify why it wants to keep someone for a third tour, the reverse should be the case for middle and upper level personnel -- the U[illegible] and the individual should have to justify transferring out before six years at post. This should save on operating costs as well as improve efficiency and program effectiveness.

2. Some Ideas for Alleviating Staffing Problems

Some ideas flow from the foregoing discussion; i.e., reduce the number of regional and centrally-funded projects or contract for their administration; expand and improve the training of AID personnel and their counterparts responsible for project implementation; do a more realistic job of estimating staffing requirements. Other ideas include:

a. Fund projects in full. The annual funding of projects increases workloads because of additional paperwork and because funds frequently are not available when needed. Thus, efficient planning is not possible. This issue should be taken to the Office of Management and Budget and Congress and authorization sought to carry this out as a one-time shot.

or over a three year period. The funds needed should be shown separately and not be used for any other purpose.

b. Develop local organizations to provide project implementation support. This could be handled as a separate project or financed from individual projects. The organization would give management training, but also provide consulting services to its graduates to facilitate their putting into place what they had learned. The organization could support USAID as well as host country project implementing agencies. In time, it might well be self-supporting through work for other donors, government agencies, local private sector, etc.

c. Perform reviews of USAID internal management. Two types of review teams are needed, although the same individuals could perform both functions. In one case, AID/Washington could request a review of the internal management of a USAID, either because it felt that improvement was needed or as part of a regular, periodic inspection system. Secondly, it should be possible (and encouraged) for a USAID Director to ask for assistance in dealing with internal management problems or concerns without any report being produced to be circulated in Washington. Psychologically, such a review system will work effectively with positive results only if its mandate is to "help" mission management with its problems, not assess its performance in the audit sense.

d. Make greater use of host country personnel in staffing the USAID. This implies giving local nationals more responsibility and better access to training opportunities in accordance with AID Handbook Circular - HB31 transmitted by Administrator's Memorandum of September 17, 1981.

e. Re-organize USAID to increase the focus on project implementation and improved management. Often USAIDs end up with more U.S. personnel assigned to overall management, control, programming and general mission support than to the implementation of the mission's program. In addition, the traditional pyramid form of organization is not necessarily the most efficient. Technical personnel often waste much of their time on administrative matters in which they have neither an interest nor a bent. Until project officers are considerably up-graded, they will need the

support of other personnel in financial management, networking, planning, etc. Mission organization should conform to the needs of a specific program with given personnel, not to some pre-conceived management theory. AID/Washington should not arbitrarily rule out the possibility of combining the Management or Executive Offices with the Controller's Office or of letting a local national occupy those positions.

f. Involve the U.S. private sector (profit and non-profit) or other U.S. government agencies more in program planning and administration. AID already provides a large grant to an umbrella private voluntary organization (PVO) which in turn distributes grants to member PVOs. Consideration should be given to using this concept for a country program, particularly in countries where major U.S. support to the development effort is not planned. A larger PVO might plan a program with the host government, perhaps in conjunction with other PVOs, and get full funding from AID. USAID staffing should be no more than one person and it might be possible for monitoring to be handled from a regional office, supplemented by periodic evaluations.

Consideration could also be given to AID participation in the financing of development activities that might be partially funded and fully managed by a U.S. business firm.

If a small program were concentrated in one technical field; e.g., agriculture, it would be feasible to let a USDA team fully plan and manage a country program (one or more projects).

D. Structuring Future Evaluations

As indicated in Section I.E, the preparation of this report was delayed. While some of the problems that contributed to this delay could not have been foreseen, the impact of these problems would have been considerably less if the evaluation had been structured differently. A number of suggestions have been made to the USAID Evaluation Officer which it is hoped will help make future evaluations both more efficient and effective. Some of the suggestions and some comments are set forth below in the hope that they might be helpful to others planning evaluations.

1. Size and Composition of Evaluation Team

A 13-person team is very unwieldy, especially when two or three nationalities are included and the team members are drawn from a number of organizations (five in this case). The task is further complicated if not all members can work in both French and English and rapid translation of documents is not available.

Suggestions

a) Hold expatriate team size to five, preferably three. If highly technical inputs are needed, have the experts do their studies beforehand and leave written reports for the team.

b) Draw the expatriate team from one organization if at all possible. Then, there is one organization that has clear responsibility to provide a report on time.

c) Provide funding to the leader of the evaluation team for contracting with a local organization or government agency for host country inputs to the evaluation, or have a firm agreement with the appropriate agency so that the evaluation team leader will know exactly what local personnel will be available.

d) Designate one individual as team leader and ensure that all other members of the team accept the designation.

2. Scope of Work for the Evaluation

An overly detailed scope of work can lead to excessive work in relation to the results achieved. An Evaluator may feel that it is necessary to cover every item mentioned in the scope, even though some items have marginal significance in terms of the overall findings of the evaluation. Furthermore, requiring individual working papers from each evaluator or group of evaluators magnifies the workload considerably, particularly if an attempt is made to let all team members comment on the paper and the logistical support for typing, translation and reproduction is weak. Given the variation in background, experience and training of potential evaluators, specifying the exact composition of the evaluation team by job title can lead to the fielding of a larger team than really required.

Suggestions

a) Scopes of work should set forth clearly the scope of the project, including the activities to be reviewed, the principal purpose of the evaluation and the resources that will be made available to the evaluation team. Then, those proposing teams should be able to determine needs and put forth their recommendations for the size and composition of the team needed.

b) Generally, working papers should not be required of team members. The team leader may wish individuals to produce draft sections of the evaluation report, but this would entail minimal logistical problems. Furthermore, the team should have the option of formulating their findings and recommendations and making oral presentations to the interested parties before putting anything in writing for circulation.

3. Advance Preparation

Advance preparation for an evaluation has many facets. One facet is advance logistical preparations to maximum the efficient use of the time of the evaluation team. Another facet is the arranging of field surveys or short studies by technical experts so that all the basic data needed for the evaluation will be available. Also important is arranging the scheduling so

that people with whom the evaluation team will need to talk will be available. Another aspect of scheduling is to ensure that the necessary USAID and host country personnel will be around at the end of the evaluation to interact with the evaluation team in the latter's initial presentation of their findings and recommendations and then be ready to take quick action on the final report -- or quick decisions not to act.

Suggestions

a) That all of the foregoing aspects of advance preparation be considered in the scheduling of evaluations.

b) That the leader of the evaluation team be given full information about the foregoing factors at the time a proposal is being prepared, even if some factors are not positive. The team leader may be able to suggest some slight modifications in approach to make up for the less than optimal conditions.

4. Joint Evaluations

Joint AID-host country evaluations are generally desirable, even if somewhat more time-consuming and difficult to manage. According to the Project Grant Agreement, the evaluation of the Operation Haute Vallee project was to be a joint evaluation, i.e., a joint USAID-GRM evaluation. However, the Malians had not participated in the preparation of the scope of work for the evaluation or in the formulation of the more detailed procedure for carrying out the evaluation. There was no agreement with the host country organization participating in the evaluation regarding the responsibilities of the organization or its participants on the evaluation team.

Suggestions

a) The role of the joint evaluation organization should either be spelled out in advance and made known to the potential providers of the expatriate evaluation team, or the latter should be advised that the evaluation team leader will have to work out an arrangement after arrival in

country. In the latter circumstance, an idea should be given of any funding likely to be required.

b) Host country participants can be particularly useful in field work where use of the local language often is essential for obtaining frank answers. It would seem appropriate, therefore, to plan for their participation in this way. However, at least one member of the host country group should be available to interact with other team members regarding findings and recommendations across the board.

c) The schedule for the evaluation should allow time for local and expatriate evaluators to discuss thoroughly all aspects of the evaluation and to prepare jointly a detailed work plan, tentative outline of evaluation report, etc. Such team-building exercises will pay off even though they initially appear to be very time-consuming (hence, wasteful).

Problem: There is a lack of continuity of personnel on projects because of changing contractors or contractor staff evidenced by:

- inadequate overlapping of contractors when there is a change;
- inadequate prepartion of replacement personnel prior to arrival at post; and
- inadequate/poor contract time frames (12-24 month contracts).

Recommendation: Utilize long term (four to five years), life of project contracts, where possible, to maximize continuity of staff.

PREPARED BY: Kathy Alison
September, 1982

PALAWAN, THE PHILIPPINES video script

visuals	audio
PHILIPPINE FARMERS	MUSIC UP & OUT During this workshop on food production/consumption linkages, you will be working on the design of a nutrition component for an Integrated Rural Development Project. The project is set in the Philippines, and more specifically, the island of Palawan. The following background information on the Philippines and Palawan may be useful as you begin your analysis.
MAP OF PHILIPPINES	The Philippines islands are located in the south Pacific, near Indochina, Indonesia, Malasia, and Taiwan. The Philippine archipelage contains 7,107 islands, but only about 500 of these islands are larger than a square kilometer. Some of the largest islands and most important islands are Luzon, Mindanao, Palawan and Panay. We will be focusing on the island of Palawan for this case study.
CITY SCENES	The capital city of the Philippines---Manila, is a booming metropolitan area of 6 million people and is located on the largest island---Luzon. The population of the entire Philippines islands in 1970 was 47,910,000. By now that number is much larger.

STREET SCENES

The colonial legacy of the Philippins includes rule by Spain, Japan and the U.S. On July 4, 1946, the islands were granted independence, creating a nation-state out of diverse religious, cultural and ethnic groups wh historically had few ties of national unity, other than geographic proximity.

PEOPLE TALKING

There are still 77 native languages in the archipelago, 9 of which are used widely to conduct business.
The colonial heritage continues to affect the Philippines, through linguistic usages such as speaking English and the adoption of many Spanish words.
Cultural traditions, educational systems, political structures and social customs also still reflect the colonial heritage.
The country is ruled both politically and economically by-the president, Ferdinand E. Marcos and his family.
Politically, Marcos has been able to establish a sense of Philippine nationhood, despite Moslem dissatisfaction and rebel activities on the island of Mindanao, as well' as problems created by the dissident New People's Army.

STREET SCENES

The country faces economic problems including high infaltion. There are also extreme economic differences between the elite and the poor, the urban and rural populations, and between those living on Luzon and those living on other islands.

--------more--------

PALAWAN script

FIELD SCENES	Now let's take a closer look at the island of Palawan. Palawan is the third largest island and the most distant from Luzon.
FAMILY WALKING ON BEACH	It has been used as a relocation point for outcasts from Luzon and other nearby islands. The island is the site of a leper colony, a prison farm, a resettlement site for reformed anti-government rebels, and more recently, the site of a camp for Indo-Chinese refugees.
CHILDREN	Palawan is a poor island, largely inhabited by indigenous ethnic groups and migrants from other Philippine islands.
	Some of the major problems facing the island are
MAN ON OXEN	malaria; and communications between island segments. The communications problem is caused by lack of good roads, as well as major physical barriers including a
MOUNTAIN RANGE	large mountain range running from north to south, and the Iwahig prisom farm seperating the northern part of
PRISON FARM	the island from the southern portion. The prison is located just south of the capital city of Puerto Princesa, the island's most densely populated area.
VILLAGE	Many of the scattered coastal villages maintain communications with Puerto Princesa only through marine
BUTRIGGER BOAT	transport--meaning long rides in outrigger boats.
GROUP OF CHILDREN	The population density of the island is far below the norm for the Philippines as a whole. The population of Palawan is estimated at just over 400,000 at present.

AGRICULTURE SCENES

The two major food production activites on the island are fishing and agricultural production. Rice, corn, beans, and sweet potatoes are the most prevelant crops. Rice, both in paddy and dryland forms, is the major crop.

PRISON WORK

The prison farm possesses some of the island's finest rice producing land, but its production is totally utilized within the prison system, largely by prisons on other islands.

FISHERMEN W/ CATCH

MINE

SHORELINE

Other economic activities on Palawan include wholesale and retail marketing of fish and marine products, mining of mercury and manganese, lumbering, plus handicrafts production and growing tourism.

HOUSES

There are numerous government regional offices located in the ~~capital~~ Puerto city so government salaries add a substantial amount to the cash economy.

HOTEL

In the mid-1970's, petroleum was discovered off the westernshore of Palawan in the South China Sea. Palawan thereafter began to experience a short, speculative boom in the lodging and tourism industries, However, at present, most travel and communications is between the oil site and Manila, rather than through Palawan.

more

PALAWAN script

PEOPLE IN FIELD

SURVEY TAKERS

GIRL W/ CHILD

FARMER SEEDING

Now let's look at the nutritional make-up of the islands. Malnutrition in the Philippines has been described as widespread, but not generally debilitating.

Survey data has shown that the two major nutritional problems in the Philippines are: insufficient caloric intake and insufficient oil in the diet.

The Philippines government responded to these findings through the food and nutriton plan for 1980.

The plan was prepared in recognition of these problems which are particularly acute in rural areas. The plan calls for increased and diversified food production to improve diets of all Filipinos and to insure a minimum diet the undernourished.

FIELD

SHIP UNLOADING

WOMEN FEEDING CHILDREN

The strategies suggested in the plan include stimulating the growth of the food economy; increasing export earnings while encouraging domestic substitutes for higher priced food imports; maintaining food prices at equitable levels; and targeting government investments on the most critically malnourished groups.

In the case study, you will be looking at the nutritional focus of the Palawan Integrated Area Development project which has given the Philippines government an opportunity to experiment with innovative tactics to achieve these goals.

MUSIC UP & OUT

PUNO PERU video script

visuals	audio
MEN IN FIELDS	Music, up and out During this workshop on Food Production/ Consumption Linkages, you will be working on the design of a nutrition component for an Intergrated Rural Development Project. The
MARKET SCENE	project is set in Peru, and more specifically, the department or state of Puno. The following information on Peru and Puno may be hlepful as you begin your analysis.
AERIAL VIEW	Peru is located on the West Coast of South America, bordered by Ecuador, Columbia, Brazil, Bolivia, Chile, and the Pacific Ocean. The department of Puno is in the southern part of the country, on the border with Bolivia.
ANDES MOUNTAINS IRRIGATED VALLEYS TROPICAL LOWLANDS	Peru is known for the high Andes mountains, whicl divide the desert coast and irrigated valleys fr the tropical lowlands of the Amazon basin. The department of Puno contains both lowlands and highlands.
LAKE TITICACA ALTIPLANO	Most of the population of Puno live on the borders of Lake Titicaca and in what is known as the altiplano or high plane, a relatively arid region.
VILLAGERS NEAR HUT	Politically, the remote region of Puno has experienced social unrest and economic and ecological problems over the years.
MILITARY GROUP	In 1968, a military junta took over the Government of Peru and began a number of populist reforms aimed at quieting some of this unrest.
BAGS OF POTATOES	Some of these programs included agrarian reform, worker protection legislation, and regulation and exprop iation of agribusiness and industry.

-------more---------

FIELD WORKERS

TALL BUILDING

More than a decade later, a new constitution was written, elections were held and political power was returned to elected civilian leaders.

FIELD W/ SHEEP & CATTLE

WOMEN IN FIELD

PLOTS ON LAKE

BUSES

FIELD OF SHEEP

LAND W/ HORSE

A closer look at the food and agricultural policies that were begun by the military government shows that the programs had both intended and unintended impacts on the country. A number of these policies were an attempt to influence food production and food supply. Such reforms as land redistribution, producer price controls, retail food price controls, and transportation fare setting were attempted. One effect of the land redistribution reform wa to decapitalize the agricultural sector. Large landowners realized their land was to be expropriated, so they sold off whatever machine and livestock they could, leaving little more than the land.

The department of Puno was one state that had some large estates expropriated and converted into government-managed agricultural cooperativ and enterprises during the 1969 reforms.

MARKETING TRUCK

The military government also set the prices tha farmers received for their crops at a low level This was an attempt to keep consumers contented but did not help the farmers.

At about the same time, the government took ove marketing of certain staple crops such as rice and sugar. These policies discouraged investme in the agricultural sector and many farmers stopped producing these controlled products.

MARKET

On the consumer side, the government designated certain foods as essential for life and fixed their prices. The most important of these commodoties were rice, wheat products, sugar, milk, and vegetable oil.

---------more---------

BEEF IN LOT

Beef was rationed in Lima, where it was only sold during the last half of each month. This policy was designed to promote the growth of the beef cattle berds that had been decimated by the slaughtering of cattle prior to land redistribut

STREET SCENE

Eventually, in 1976, because of pressures from international lenders and the International Monetary fund, the Government of Peru instituted an austerity program which included raising consumer prices and dramatically devaluating the currency that had formerly been fixed at a politically popular level. The devaluationn was meant to stop the active black market that had developed for foreign currencies.

DEMONSTRATORS

Because of these new monitary policies, widespre demonstrations occurred in coastal and highland cities in 1976.

Despite the demonstrations, the military slowly instituted the changes aimed at impoving economic conditions. Official food prices and exchange rates slowly crept upwards to levels that were more in line with real levels.

In 1979, when the military returned the governme to elected civilian officials, Peru was in the most critical economic situation in over 30 year

MAN IN FIELD

Over the last 10 years, the nutritional status o Peru's population deteriorated. Nevertheless, severe nutritional problems were not widespread. Malnutrition is most prevalent in the highlands and Puno is the most depressed area of the highlands

WOMEN IN STREET

The new civilian government acknowledged that nutrition was a problems, even though basic food subsidies were being eliminated

--------more--------

In official documents, the government expressed concern for nutriton, stating a priority for meet the needs of the rural poor, the most malnourishe These documents also expressed a desire to increase demand for locally produced foods throug programs aimed at increasing yeilds and reducing food imports.

PUNO LANDSCAPE

The department of Puno is a predominantly rural area and has extremely limited natural rescurces. A high percentage of the land is non-productive because of shallow top soil, rocky outcroppings, glacial areas and altitudes too high to produce food crops.

LANDSCAPE

These problems are compounded by a general lack o water along with climatic conditions such as unpredictable frosts, hail and erra tic, sometime heavy rainfall which make agricultural activities very risky.

Because of Peru's proximity to the equator, hours of daylight are not greatly variable from season to season.

MAN WITH PRODUCE

The major crops produced in the Puno area are potatoes, barley, broad beans, indigenous tubers such as oca and olluco, and a native grain which forms the bulk of the traditional diet.

Because of government subsidies, wheat products, rice and refined sugar have become increasingly common in the diet of highlanders.

CULTIVATED FIELDS

Studies done in the 1950's show that the traditional diet was supplemented by wild greens, mostly weeds, which came up in cultivated fields along with planted crops. The people of the highplane also consume some meat and milk, although rarely. They keep animals including cattle, sheep, llamas, alpace, swine and guinea pigs.

ALPACA

--------more--------- 36

POTATO FIELD

HUT & STONE FENCES

TUBORS

ANIMALS W/SMALL FIELD IN BACKGROUND

There are significant variations among the department of Puno's agricultural and dietary practices because of differences in climate and micro-ecology. For instance, there are zones along Lake Titicaca where certain crops such as maize may be growm which normally only grow at lower altitudes. There are other zones where few crops other than bitter potatoes, oca and olluco will grow, and the residents devote themselves primarily to herding activitie Most small farmers attempt to diversify their plantings to make use of various kinds of tiny fields, in a typical risk-aversion strategy.

MAN IN NATIVE GARB

PEOPLE W/ HOE

The population of Puno consists primarily of indigenous people living in rural areas, sharing common culture, languages and traditional technology. There is a high indes of illiteracy in the population.

PLOTS

SMALL LANDOWNERS

Land reform left the large estates intact, althc supposedly operating in the interests of the peasant residents. This fact increases envy and hostility from other communities of small landowners, who make up the bulk of the populati

TRAINING CENTERS

In the late 1960's, the U.S. had several develop ment projects in Puno, including training center and technical assistance. Now the U.S. is involved only in food aid to the region.
In the last several years, a number of other bilateral donars including Germany, Holland and Canada, as well as multilaterals such as the World Bank, U.N. and FAO have been providing development aid to Peru for Puno.

--------more---------

That brings us to a brief overview of the background of the case study you will be working on.

2 MEN IN FIELD

In the late 1970's, the department of Puno and specifically the Juliaca-Lampa region was chosen as a pilot project area because of the critical situation there.

PLANE/AIRPORT

FAO sent a team into Puno to do a study and the outcome was a report entitled "Project for Food Srategy."

VILLAGE SCENE

The World Bank was then approached by the Peruvian government for funding of an Integrated Rural Developmnet Project in the Juliaca-Lampa microregion. There was a food consumption sub-project.

The World Bank identified a project appraisal team including a nutrition planner that spent several weeks designing the project.

The case suty material you will be working with will include data that was available to the project appraisal team. You will be focusing specifically on the nutrition componenet of this project.

ITD slide

MUSIC UP AND OUT

----------END----------