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FOOD, NUTRITION AND AGRICULTURE

Guidelines for Curriculum Content for Agricultural Training in Southeast Asia

Prepared by

Nutrition Programmes Service
Food Policy and Nutrition Division
Food and Agricultural Organization of the United Nations
with input and assistance from representative
Agriculturists, Nutritionists and Extension Educators
in Southeast Asia

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University of the Philippines
at Los Baños,
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of the United Nations, and the
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Development participating
April 1981

FOREWORD

It is clear from the requests we receive for information and assistance in curriculum planning that there is an increasing interest in including courses on human nutrition in agricultural training institutions.

These curriculum guidelines for the introduction of nutrition content into pre-service and in-service agricultural education are designed to help the teacher develop a course in nutrition for use in agricultural programmes and to present the subject in a manner relevant to agricultural students and practitioners employed at the village, district or community level. Participation in such a course should motivate the student to recognize his responsibility in improving the nutritional status of people in the geographic area in which he works and equip him with the technical knowledge and skills he needs in order to take account of nutritional considerations in designing and implementing agricultural and rural development projects. He should also be able to select and implement appropriate nutrition interventions to help ensure that people are better fed.

A preliminary version of the guidelines was first issued in April 1978 and comments and suggestions were invited. In August 1980, a second draft of the guidelines was prepared incorporating many of the ideas received. This present version of the curriculum guidelines is the product of a regional workshop for Southeast Asia conducted by the University of the Philippines at Los Baños. This edition, adopted for use in Southeast Asia, was a cooperatively sponsored project with technical expertise provided by FAO and AID.

A large number of people have contributed to the development of each stage of the guidelines and we are grateful to all of them. For your information their names appear in the appendix, pages 138-141. This has been a true cooperative undertaking. We hope these guidelines, into which so many professionals have had input, will assist you as you develop and implement a course dealing with human nutrition in your agricultural training programme.

Z. I. Zabry, Director
Food Policy and Nutrition Division
Food and Agricultural Organization
April 1981

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INTRODUCTION

1. THE EXPANDING ROLE OF AGRICULTURE

Since so much of the economy in Southeast Asia is agriculture-based, the way agriculture develops in this part of the world is very likely the key to national and regional progress in the area also. In the past, the greatest thrust of agriculture in developing countries has been that of economic development through promotion of cash-cropping systems. However, in the future there are aspects of agricultural progress that need to be emphasized in additional to economic development.

In spite of the fact that agricultural production in Southeast Asian countries is increasing, malnutrition is also increasing, especially among the groups of the population who traditionally have been the most vulnerable: pre-school children; pregnant and lactating women; the sick and convalescent, the handicapped and the elderly; and most particularly these groups among the rural landless poor. If past events are an indication of the future, increasing food production by itself will not solve the problem. Hunger and malnutrition are intricately bound up with the lack of social development as well as inadequate economic development. Thus solving the problem of malnutrition is a complex one and will require the best efforts of many groups.

This problem all too often has been viewed as a health problem only and thus considered the sole responsibility of ministries of health. When other ministries have been included they have usually been the agencies dealing with elementary education, home economics or home technology. In addition to these groups, all other agencies and organizations involved in food production, distribution, marketing, preparation, storage, consumption and acceptance need to become involved. Solving the problem related to food and malnutrition will require an improvement in the whole complex of economic, social and cultural conditions impinging on communities, especially on rural communities.

Agriculturalists have a major and vested role to play in the alleviation of malnutrition since the lack of adequate food to eat not only impairs the health of farm families but subsequently adversely affects agricultural production for the community and the nation. Therefore agriculturalists have the responsibility to (a) continue to accelerate economic development by increasing agricultural production to the optimum and, in addition, (b) contribute to parallel social development by assuring that the benefits of increased food production improve the quality of life through better nutrition for farm families.

2. THE TARGET GROUP

2.1 The guidelines are intended for use in curriculum and course content development for the introduction of subject-matter content in human nutrition into the pre-service education of students preparing for employment as agriculturists at district, village or community levels as teachers of agriculture in secondary schools or as part of the extension service as general agricultural agents or attached to a specialized project, such as rural community development.

2.1.1 For the pre-service-education target groups, the guidelines may be adapted for use in two- or three-year programmes of study leading to a certificate or diploma in agriculture.

2.1.2 They may also be adapted for use in four-year programmes of study leading to the baccalaureate degree in agriculture, agricultural education, agricultural extension or agricultural technology.

2.2 The guidelines may be adapted for use in the in-service educational programmes for agriculturists, rural development workers, and administrators of agricultural and rural development programmes.

2.2.1 They may be adapted to in-service education of secondary-school agricultural teachers, agricultural extension agents and rural development workers employed at district, village and community levels.

2.2.2 They may also be adapted for short courses or workshops used for the in-service education of agricultural and rural-development administrators and faculty members.

3. GOALS OF THE PROGRAMME

3.1 In introducing nutrition content into the agricultural curriculum the purpose is to help future agriculturists as they work in close contact with communities to provide more effectively for the nutritional well-being of farm families, with special emphasis on landless farmers. This programme should help agricultural students:

3.1.1 Become aware of the food and nutrition problems facing rural communities.

3.1.2 Understand and appreciate the role of agriculture in solving these problems.

3.1.3 Function more effectively in the total process of rural development by learning how to work with other rural development personnel toward improvement of the quality of life for rural people. As a member of the rural-development team, the special contribution of the agriculturist will be to assist farmers with food production, availability and distribution to provide food adequate in quantity and quality to meet community nutritional needs as well as to increase economic benefits to farmers.

3.2 The purpose of introducing agriculture-related nutrition content into the in-service education programmes of agricultural teachers, extension agents and other rural development workers employed at the local, district or community level is to increase their effectiveness in working with farmers toward improvement of the nutritional status of community members through broadening the social and economic benefits available to them.

3.3 Since they will be instrumental in institutionalizing this programme of nutrition content into both formal and informal programmes of study, agricultural and rural development administrators and faculty members also need to have an understanding of the programme and the objectives of the nutrition content introduced, including the teaching methods, community-based field experiences, etc. Thus one of the goals of the programme is to introduce an overview of the course content and its implications for rural social development to agricultural and rural development administrators and faculty through short courses and workshops planned to provide an understanding of, appreciation for, and commitment to implementation of the programme.

4. COURSE CONTENT AND OBJECTIVES OF THE GUIDELINES

4.1 AGRICULTURE, FOOD, NUTRITION, AND HEALTH; the student should learn to:

4.1.1 Understand the relationships between agriculture, food and nutrition and the importance of this relationship in improving the food and nutrition situation of the individual, the community, and the nation.

4.1.1.1 In addition to working with farm families to improve their economic status, to also develop a commitment toward improved social development for them.

4.1.1.2 Understand and gain appreciation for how agriculture, through its impact on nutritional status, may contribute to the health and well-being of people.

4.1.2 Understand the concepts of nutrition as they apply to human nutrition.

4.1.2.1 Understand the various terminologies used in human nutrition.

4.1.2.2 Appreciate and understand the general framework of the discipline of human nutrition.

4.1.3 Discuss factors that influence food availability and be able to apply this knowledge toward improving and maintaining nutritional status of farm families at the community level.

4.2 FOOD VALUES, NUTRITIONAL REQUIREMENTS AND NUTRITIONAL ASSESSMENT; the student shoud learn to:

4.2.1 Understand the nutritional values of foods and the important functions of nutrients.

4.2.1.1 Compare the nutritive value of locally available foods.

4.2.1.2 Appreciate the most essential functions of the several constituent nutrients.

4.2.2 Discuss food requirements of individuals and of different groups of people within the community.

4.2.3 Assess the most prevalent nutritional deficiencies within a community.

4.2.3.1 Recognize important signs of malnutrition indigenous to the geographic area.

4.2.3.2 Understand the methods commonly used in the geographic area for assessing nutritional status.

4.2.3.3 Predict, as appropriate, types and severity of malnutrition likely to occur in relation to quantity and quality of food production.

4.3 FOOD AND AGRICULTURAL SYSTEMS: IMPACT OF NUTRITION; the student should learn to:

4.3.1 Understand local food processing and storage systems and their relative value to total food availability and diet quality.

4.3.1.1 Understand traditional methods for processing and storing foods locally and be able to suggest improvements where appropriate.

4.3.1.2 Evaluate effects of the processing and storage methods used on the nutritive value of local foods and justify and recommend improvements when advisable.

4.3.2 Analyze food production systems and understand how they affect food supply and the resulting nutritional needs of population groups.

4.3.2.1 Discuss factors that influence food production.

4.3.2.2 Understand and be able to use simple methods for monitoring food production.

4.3.2.3 Relate food supply to population food requirements and be able to recommend changes when needed and appropriate.

4.3.3 Relate existing local food production systems to community food needs and be able to suggest appropriate diversification of food crops and animal production to meet nutritional needs of the population.

4.3.3.1 Relate diet quality of vulnerable population groups within the community to amount and variety of food produced and to the methods of food processing, storage and distribution used.

4.3.3.2 Recommend ways to diversify food systems in relation to food production, processing, storage and distribution in order to meet the nutritional needs of population groups within the community.

4.4 FOOD AND NUTRITION PROGRAMMES AT COMMUNITY AND NATIONAL LEVELS; the student should learn to:

4.4.1 Appreciate the relationship of nutrition programmes to nutritional well-being, make a positive contribution to nutrition programmes at the community level, and understand and be able to interpret national nutrition policies directed toward improvement of nutritional status.

4.4.1.1 Understand the importance of nutrition programmes in improving nutritional status.

4.4.1.2 Integrate nutrition education into his own agricultural programme to meet community needs.

4.4.1.3 Given an inadequate food and nutrition situation in a family or community, help develop an appropriate nutrition programme to improve nutritional status.

4.4.1.4 Understand and interpret to community groups national nutrition policies aimed at improving nutritional status.

4.5 PROGRAMME PLANNING, IMPLEMENTATION AND EVALUATION; the student should be able to:

4.5.1 Plan, manage and evaluate agricultural programmes designed to improve both nutritional and economic status of farm families; in addition, to work with other community agencies toward effective rural development at the community level in both social and economic development.

4.5.1.1 Collect, analyze and interpret base-line information necessary to identify food supply problems which contribute to malnutrition within the community.

4.5.1.2 Set realistic objectives for an agricultural programme designed to alleviate the defined food supply problems at the community level.

4.5.1.3 Plan a community agricultural programme directed toward achievement of the stated goals and objectives.

4.5.1.4 Select indicators for use in monitoring and evaluating the programme, establish a systematic plan for reviewing results, and, as needed, make appropriate changes in the plan of action.

4.5.1.5 Given nutritional deficiencies and causal agricultural factors within a community, work as a member of the community rural development leadership team to develop a suitable programme to:

4.5.1.5.1 Accelerate economic development within the community by increasing agricultural production for income and for home consumption; and

4.5.1.5.2 Contribute to needed social development within the community, with special emphasis on improving the nutritional status of its most vulnerable groups.

5. USING THE GUIDELINES

5.1 Review of Modifications:

These guidelines for curriculum content for Food, Nutrition and Agriculture for use in agricultural training programmes have been reviewed by an interdisciplinary regional committee in Southeast Asia composed of members from Indonesia, Malaysia, the Philippines and Thailand. However, before introducing the nutrition content suggested into agricultural training programmes in a specific Southeast Asian country, the guidelines should be reviewed again and, where necessary, adapted to meet the special needs of the country or the section of the country in which the programme is to be introduced.

Since the guidelines are intended for use at several educational levels, careful review and adaptation must be made by appropriate staff members in order to introduce and interpret the course content in keeping with the educational and professional background of the target audience.

As was the case for those individuals who reviewed the guidelines for Southeast Asia, a multi-disciplinary panel of staff members is recommended for the assignment to further review and adapt the guidelines to better meet local and national needs within a Southeast Asian country. Assistance from those fellow-countrymen who served on the Southeast Asia review team (See Appendix VI, page 138) would be helpful. A preliminary workshop to orient administrators and those staff members who will be involved in teaching Food, Nutrition and Agriculture or who will later be working with district, village or community level agriculturists should also be held.

5.2 Cooperation of Other Agencies:

The relevance of course content to the local needs for trained personnel with an understanding of the relationship of agriculture to food and nutrition could be more effectively ensured by consultation with agricultural and rural development administrators and other prospective employers prior to teaching the course. Their support and encouragement of employees to participate in the course to enhance their knowledge and skills in the food and nutrition component of agricultural training would be helpful.

5.3 Choosing Faculty:

An agriculturally oriented human nutritionist would obviously be of great advantage in the development, refinement and presentation of the course content. An alternative would be the use of a nutritionally oriented agriculturist. If neither an agriculturally oriented human nutritionist nor a nutritionally oriented agriculturist is employed or can be "borrowed," other alternative choices for teaching the course might be a rural development specialist or an extension educator. Consideration needs to be given to providing faculty members who indicate interest in the undertaking with opportunities to develop expertise in this interdisciplinary endeavor.

5.4 Styles of Presentation:

The course content should present a local and practical approach oriented to a community situation. Emphasis should be on problem solving rather than only on problem identification and should encourage maximum student participation. In order to set the stage for total student involvement, a group size no larger than 15-20 students is desirable. Where larger numbers of students must be accommodated, a plan should be devised so that smaller groups may participate in discussions and practical activities.

5.4.1 The traditional curriculum for a three-year diploma course in agriculture usually covers the following broad subject-matter areas:

- 5.4.1.1 Practical training on farms, plantations, research and experimental stations and on college farms.
- 5.4.1.2 Introduction to agriculture covering broad agricultural principles in
  - 5.4.1.2.1 National agricultural production.
  - 5.4.1.2.2 Agricultural patterns and farming systems.
  - 5.4.1.2.3 Utilization and conservation of natural resources.
  - 5.4.1.2.4 Availability of resources.
  - 5.4.1.2.5 Food production versus cash cropping.
- 5.4.1.3 Applied sciences in such areas as
  - 5.4.1.3.1 Plant science and agricultural botany including basic plant physiology.
  - 5.4.1.3.2 Animal sciences including vertebrate structure and physiology.
  - 5.4.1.3.3 Soil science including soil genesis, conservation, soil improvement, water management and soil erosion.
  - 5.4.1.3.4 Agricultural chemistry including basic biochemistry as an introduction to plant and animal physiology and nutrition.
  - 5.4.1.3.5 Elements of pathology as an introduction to crop protection and animal health.

5.4.1.3.6 Introduction to economic theory.
5.4.1.3.7 Mathematics and mechanics as a basis for agricultural engineering.

5.4.1.4 Crop production covering the principles of
5.4.1.4.1 Agronomy major crops and pastures.
5.4.1.4.2 Production methods and techniques of cultivation, irrigation, and harvesting.
5.4.1.4.3 Agricultural machinery.
5.4.1.4.4 Crop protection.
5.4.1.4.5 Crop processing and storage.
5.4.1.4.6 Crop improvement, plant breeding and seed supplies.

5.4.1.5 Animal production in such areas as
5.4.1.5.1 Animal husbandry and utilization.
5.4.1.5.2 Animal nutrition.
5.4.1.5.3 Animal health.
5.4.1.5.4 Animal products and processing including eggs, fish, meat and milk.

5.4.1.6 Agricultural economics and management with emphasis on
5.4.1.6.1 Agricultural policies.
5.4.1.6.2 Prices of inputs, outputs and farm incomes.
5.4.1.6.3 Farm planning, land, labor, capital and other resources.
5.4.1.6.4 Agricultural credit.
5.4.1.6.5 Cooperatives.
5.4.1.6.6 Agricultural marketing.
5.4.1.6.7 Farm records and accounting.

5.4.1.7 Rural sociology.
5.4.1.8 Extension methods and communication techniques.
5.4.1.9 Statistics.

5.4.2 The guidelines for the addition of nutrition content into the agricultural curriculum are divided into five categories and altogether consist of eleven topics (see Table of Contents, page ii). They may be adapted to at least four presentation styles.

5.4.2.1 The topics may be taught in a series as a clearly defined course with reinforcement and enrichment by other fields of agricultural study such as agricultural economics and management, agronomy, animal science, extension methodology, horticulture, rural sociology, etc. Specialists in areas such as agricultural economics and management and rural sociology should be encouraged to incorporate nutritional aspects into their research programmes. Reinforcement of the food and nutrition content and its relationship to agriculture by several areas of agricultural study is highly desirable. Likewise,

background materials in the following agricultural subject-matter areas prior to the study of Food, Nutrition, and Agriculture are also beneficial.

5.4.2.1.1 Animal physiology with emphasis on nutrient requirements and digestion of food by ruminants and non-ruminants.

5.4.2.1.2 Crop protection including pre- and post-harvest control of insects, rodents, moulds and viruses.

5.4.2.1.3 Agricultural economics and management dealing with cost of animal and crop production with different inputs as well as the influence of market price on supply and demand.

5.4.2.1.4 Rural sociology covering organization, roles and responsibilities within the family; in addition, the socio-cultural effects of increasing income levels.

5.4.2.1.5 Agricultural extension methodology and development communications with emphasis on communications methods and change induction.

5.4.2.2 The topics may also be taught in a series as a clearly defined course without reinforcement of other disciplines if that assistance cannot be obtained. However, a concerted effort should be made to get all related departments to cooperate in this important undertaking.

5.4.2.3 The topics included in the guidelines may be introduced as self-contained topics into other agricultural courses already included in the curriculum, such as:

5.4.2.3.1 AGRICULTURE, FOOD, NUTRITION AND HEALTH may be introduced into Introduction to Agriculture, Introduction of Animal Science, Introduction to Soil Science, Agricultural Economics and Management, Extension Methodology, and Rural Sociology.

5.4.2.3.2 FOOD VALUES, NUTRITIONAL REQUIREMENTS AND NUTRITIONAL ASSESSMENT may be introduced into Agronomy, Animal Science, Soil Science, Agricultural Economics and Management, Extension Methodology, Horticulture, and Rural Sociology courses.

5.4.2.3.3 FOOD AND AGRICULTURAL SYSTEMS: IMPACT ON NUTRITION may be introduced into courses in Agricultural Economics and Management, Agronomy, Animal Sciences and Extension Methodology courses.

5.4.2.3.4 FOOD AND NUTRITION PROGRAMS AND PROGRAM PLANNING, IMPLEMENTATION, AND EVALUATION are appropriate topics to consider in Agricultural Economics and Management and Extension Methodology courses.

5.4.2.4 By agreement with the agricultural faculty, the topics may be integrated into the existing agricultural curriculum at appropriate places to emphasize the close relationship between human nutritional well-being and agriculture. The guidelines would thus be adapted for introduction into several of the subject-matter areas of agricultural education when related agricultural topics are presented.

5.5 Time and Credit:

The guidelines were developed for presentation as a one-semester (2 semester hours credit) course or a one-quarter (3 quarter hours credit) course; however, due to the way they have been organized the topics are adaptable to a shorter or a more expansive course of study. For adequate coverage of content, including theory and practical experience, at least 40-60 hours of contact time are needed: 10-15 one-hour lecture periods and 30-45 hours devoted to practical experiences and problem solving. The practical experience, problem solving laboratories have, for the most part, been planned around three-hour blocks of time. The teacher will likely find, however, that more time will often be needed for such activities as (a) discussing the experiences of the previous week's activities, (b) planning for those of the following week, (c) the inclusion of more than one of the suggested problem solving activities, (d) the inclusion of additional activities not included in the guidelines, or (e) simply because the students need a little extra time.

When utilized for in-service training programmes, approximately three weeks of full-time concentration are required, 6 hours a day. An alternative method of presentation is the scheduling of one- or two-day classes (at least 6 hours each day) throughout the year for a total of 12-15 days devoted to theory and practical experiences.

SUMMARY OF THE CONTENT FOR TOPIC ONE: AGRICULTURE, FOOD AND NUTRITION

TOPIC ONE	OBJECTIVES	MAJOR CONCEPTS INVOLVED	SUMMARY OF CONTENT	PRACTICAL LEARNING EXPERIENCES	TEST OF UNDERSTANDING
Agriculture food and nutrition	The student should learn to: 1.1 Understand the meaning of nutrition and the various terminologies commonly used in human nutrition. 1.2 Understand the relationship between agriculture, food and nutrition. 1.3 Recognize the importance of the food/nutrition/agriculture relationship in improving the nutritional status of the population, especially at the community level in rural areas.	Meaning and concept of nutrition as applied to people. How agricultural practices in food production and distribution can influence both economic and social well-being of farm families. How involvement in agricultural production of the segments of the population presently malnourished is a basic step in improving their nutrition.	Terminologies - Food, Staple food, Food intake, Food preservation, Food sanitation; - Diet, Dietary habit, Balanced diet; - Nutrient; - Recommended Dietary Allowance; - Nutrition, Human nutrition, Nutritional status; - Undernutrition, Overnutrition, Malnutrition. Relationship between agriculture and nutrition - Agriculture as a profession for the largest number of people in Southeast Asia; - Food production as the most important role of agriculture, especially as it relates to landless farmers; - Linkages between agricultural practices, food production, food distribution and nutritional status. - Food crop failure and malnutrition; - Vicious cycle of low food production, poverty and malnutrition in subsistance agricultural families. Role of agriculture in improving nutritional status - Introduction of improved farming methods means increased food production; - Increased food production means more food available; - Increased food production in amount and variety means better nutrition; - Targeting food production to meet nutritional needs means better health and well-being for farm families.	At the beginning of this topic the student should be given a simply worded questionnaire to discover his concept and knowledge of nutrition.	The student should be able to: 1. Define: - Food - Staple food - Diet - Nutrients - Nutrition - Undernutrition 2. Draw and explain the cycle showing the relationship between agricultural practices, food production and nutrition. 3. Explain the important role played by agricultural workers in improving the nutritional status of the people of their area.

Topic One

AGRICULTURE, FOOD AND NUTRITION

PERFORMANCE OBJECTIVES | **Notes for Teachers**

The student should learn to:

1.1 Understand the meaning of nutrition and the various terminologies used in human nutrition.

1.2 Understand the relationship between agriculture, food and nutrition.

1.3 Recognize the importance of the food/nutrition/agriculture relationship in improving the nutritional status of people, especially at the community level in rural areas.

1.4 Understand and gain appreciation for how agriculture, through its impact on nutritional status, may contribute to the health and well-being of farm families.

CONTENT OUTLINE

The human body is a living machine which like all other living beings needs food to sustain life. When introducing the subject of nutrition, understanding the terminology used is an important step.

1. TERMINOLOGY COMMONLY USED IN HUMAN NUTRITION:

Food:	Foods are substances we eat daily to fulfill needs for maintenance, growth, work and tissue repair of the human body.	Ask the students to give examples of local foods.
Staple food:	A food is known as a staple food when it is eaten regularly, especially by the poorer population sectors of a country or community,	Ask students to name the staple food eaten in their community and their country. Find out if there are different staple foods eaten in some areas; if not, tell the

		Notes for Teachers
	and in large enough quantities to furnish a substantial proportion of the total energy supply.	students about some different staple foods eaten in other countries.
Food intake:	All the food and drink an individual consumes (takes into the body) in a given length of time, usually a 24-hour period, is called that person's food intake.	
Food preservation:	Most foods can be safely saved for future out-of-season use through preservation by one or more methods. Some foods may be kept simply by storing in a clean dry place; others may require salting, drying, smoking, curing, fermenting or heating and canning, bottling, or pickling, etc. Use of sanitary food preservation methods will increase foods available for consumption, both at home and for sale.	
Food sanitation:	Food sanitation refers to the processes of handling, preparing, serving, storing and disposing of foods to prevent them from becoming contaminated by substances and conditions harmful to human health.	
Diet:	A diet consists of the total solid and liquid foods consumed by an individual or a population group.	Ask students to give examples of what their diet consisted of yesterday.

		Notes for Teachers
Dietary habit:	The way we generally choose our daily food becomes our dietary habit.	Ask students to give examples of what they usually eat, if that is different from what they ate yesterday.
Balanced diet:	When the diet meets all the nutritional requirements of the body, it is called a balanced diet.	Ask students to give examples of what they consider to be a balanced diet for them.
Nutrient:	Food contains certain substances called nutrients which are used in the normal metabolism of the body. Nutrients are responsible for the function of food in the body. The six main types of nutrients are carbohydrates, proteins, fats, minerals, vitamins, and water. Many foods contain some of all of them; a few, like sugar for example, contain only one. To call a substance food, it must contain at least one nutrient.	
Recommended Dietary Allowance:	The Recommended Dietary Allowance (RDA) refers to the amount of energy (calories) and nutrients which will maintain a good state of nutrition in healthy people of all ages. The allowance includes a margin of safety to cover individual differences. Recommended Dietary Allowances are included as Appendix IV, page 135.	Explain the differences between RDA and the physiological need for food and nutrients.
Nutrition:	Nutrition is the study of food in relation to health and the processes by which living organisms use food	

		Notes for Teachers
	for the maintenance of life, growth, normal functioning of body organs and tissues and the production of energy.	
Human nutrition:	Human nutrition is the study of food in relation to the health of individuals and groups of people and the processes by which they use the food they eat to maintain life and growth, provide for the normal functioning of body organs and tissues and produce the energy their body needs.	
Nutritional status:	The condition of the body resulting from intake, absorption, and use of food is called nutritional status. A diet which meets nutritional body needs generally leads to a satisfactory nutritional status.	
Under-nutrition:	If a diet fails to meet nutritional demands of the body over a considerable period of time, the result is undernutrition.	Show the students pictures of undernourished children and adults. If they know people who appear to be undernourished, ask them why they think these individuals are undernourished.
Over-nutrition:	The condition resulting from more food being eaten over a considerable period of time than is necessary to meet body demands produces a state of overnutrition.	

Notes for Teachers

Malnutrition: The condition resulting from either prolonged undernutrition or overnutrition is termed malnutrition. In developing countries the main type of malnutrition is undernutrition.

Provide examples and discuss with students some of the principal signs or indicators of malnutrition in Southeast Asia.

2. RELATIONSHIP BETWEEN AGRICULTURE, FOOD AND NUTRITION:

Agriculture mainly affects nutrition through production of food and cash crops, livestock, etc., depending on the agricultural ecology. When enough food is produced both in amount and variety and when enough of it is available in the community to meet the nutritional needs of all people who live there, little malnutrition occurs. Poor agricultural practices lead to low production of crops and livestock and therefore also to less income for the farmers, especially the landless farmers in developing countries. The resulting poverty due to low crop production and the smaller amounts of available food for home consumption will generally lead to malnutrition which, in turn, will reduce the working capacity of the farmers and their families. This will again lead to further reduction of food production and increased poverty. Thus not only is a vicious cycle introduced but also a spiraling cycle that continues to worsen as it grows. The cycle can be presented as:

Discuss this vicious cycle with the students from their own experiences. Consider the links between (1) agricultural practices and food production on the one hand and between (2) work capacity (related to nutritional status) and agricultural production, on the other.

(Insert Fig. 1.1 It is a vicious and spiraling cycle)

Notes for Teachers

Discuss the role of agriculture in helping improve agricultural practices.

Mention the roles of agricultural and health services in helping improve farm, home, and community environment.

3. ROLE OF AGRICULTURE IN IMPROVING THE NUTRITIONAL STATUS OF THE COMMUNITY:

Agricultural workers are an important group in breaking this vicious cycle of low food production, poverty, and malnutrition. They can help break this cycle by helping farmers:

- Improve their agricultural practices.
- Increase the amount of food grown.
- Increase the variety of food grown.
- Improve the way they store and process food.
- Improve the distribution of food at the community level so that enough food is available to all families living there.

Once agriculturists understand the nutritional needs of the community, they will be able to target agricultural production and distribution by influencing cropping patterns, sale and shipment of foods, etc. to better meet the nutritional needs of the population, beginning with the needs of farm families living in the community.

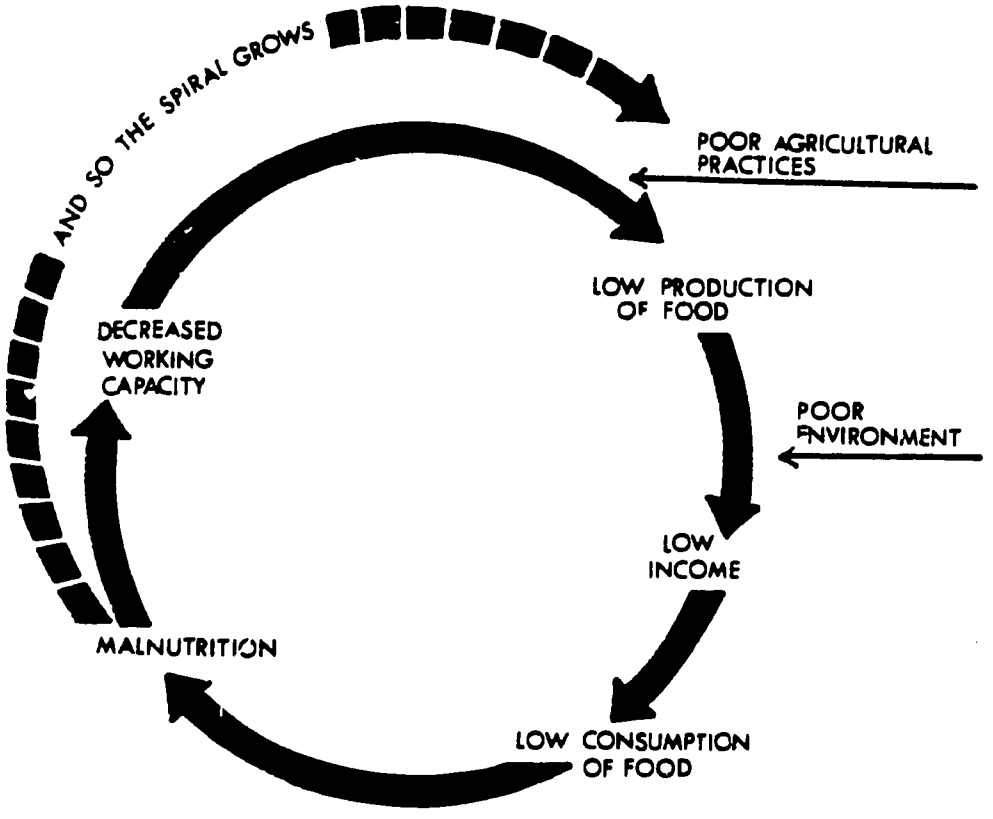


Figure 1.1 It is a vicious and spiraling cycle.

TOPIC TWO: IMPACT OF FOOD AVAILABILITY ON NUTRITION

TOPIC TWO	OBJECTIVES	MAJOR CONCEPTS INVOLVED	SUMMARY OF CONTENT	PRACTICAL LEARNING EXPERIENCES	TEST OF UNDERSTANDING
Impact of food availability on nutrition.	The student should learn to: 1.1 Discuss the factors affecting food availability. 1.2 Recognize the important role of agriculture in improving and maintaining the nutritional status of farm families through more effective food production and supply methods used at the community level.	Local food consumption patterns. The factors affecting amount and variety of foods available, food choices, and utilization of food. The importance of self-sufficiency in food production at community and national levels in order to effectively support nutritional well-being of the population.	Factors influencing food consumption: 1. Food availability: - Agricultural methods; - Soil fertility - Climate and irrigation; - Amount of land; - Cropping patterns; - Cooperative practices, - Land tenure systems; - Food storage, processing and drying methods; - Locality; - Incentives; - Social roles; - Income levels. 2. Socio-cultural patterns: - Meal patterns; - Family structure; - Family size; - Food customs and beliefs. 3. Personal factors: - Knowledge of nutrition; - Personal preferences; - State of health	1. Group discussions on food habits in different locations. 2. A simple survey to investigate local food habits and attitudes.	The student should be able to: 1. Explain the two most important factors that determine availability of food in his community and country. 2. Diagram the factors affecting food availability, food utilization, and nutritional status and show the relationships between the three. 3. Develop a questionnaire for conducting a "Food Frequency" intake survey.

Topic Two

IMPACT OF FOOD AVAILABILITY ON NUTRITION

PERFORMANCE OBJECTIVES

The student should learn to:

1.1 Discuss factors influencing food availability.

1.2 Recognize the important role of agriculture in improving and maintaining the nutritional status of farm families through more effective food production and supply methods used at the community level.

Notes for Teachers

CONTENT OUTLINE

The amount and variety of foods eaten in a geographic area depend on several factors. Some of the most important ones are:

Food Availability,
Socio-cultural patterns, and
Personal factors.

Ask students from different parts of the country what foods they eat. What factors determine the types of food they eat?

In considering the impact of any of these factors on nutritional status, the first factor must always be the availability of enough food to eat.

1. AVAILABILITY: Availability of food also depends on a number of factors. Some of them are:

   Agricultural methods

   Mechanization, the use of high-yielding varieties, fertilizers, irrigation, multiple cropping, and intensive animal husbandry all increase productivity.

   Land quality and amount

   Soil fertility, climate and the amount of land available will influence varieties of food grown as well as yields obtained, especially when non-intensive farming methods are used.

Notes for Teachers

Cropping patterns

The amounts of different foods produced and the seasonal production patterns strongly affect nutritional status at the subsistence level.

Discuss the implications of the country's land tenure system on agricultural development.

Often there is a "hungry" season for various reasons, such as when heavy and sustained labor is needed at planting and harvesting time. When people do not have enough food to eat the strength they have to perform hard labor is limited. However in many areas, the cooperative practices of sharing labor among farmers to lighten work loads may prove effective and economical; an example of this is farmers helping each other at harvest time.

Depending on the type of land tenure and stability of leaseholds, permanent crops may be established on the basis of an equitable sharing of the harvest.

Storage methods

Poor drying and storage methods may result in food losses as high as 30%. Improvements in the methods used for drying and storing foods would greatly increase food availability.

Food losses incurring in the various commonly used methods for drying and storing food should be described.

Locality

Accessability is important in ensuring reliable supplies of seeds, fertilizers and marketing outlets. The presence of foot-and-mouth disease or other types of cattle diseases will severely limit cattle production. People who live near lakes or coasts have access to fish.

Incentives to produce

Motivation to increase food production is often hindered by inadequate marketing facilities. If credit programs are not available or loan requests are not

Ask students if farmers in their home areas are able to market their food crops and livestock easily and at

	Notes for Teachers
handled punctually, farmers may be unable to adopt improved methods because of lack of funds. A government assured or stabilized production/marketing system and community agricultural cooperatives will serve to encourage farmers to increase farm production of food crops and livestock as needed.	fair prices. Are the farmers they know able to get the credit they need at the time it is needed in order to adopt improved farming methods?
Social roles	
In many parts of Southeast Asia, women produce the food used for home consumption. They also store, dry and process it in various ways. Extension programmes for women should emphasize how to improve the quality and amount of food produced in order that some of it can be stored for future use.	Ask students to give examples of what they know about Extension programmes for women which help them learn how to improve food production for home use.
Income levels	
In general, as the level of income rises the amount and variety of the diet tends to improve. However, diet quality may not always improve when a cash crop is introduced. The cash crop may replace production of food for home use, and the income earned from a cash crop (or from other income-generating plans) may not be used to buy food or foods of good nutritional quality. Food crops grown at the same time as cash crops will more likely assure food for the family.	Emphasize the fact that poverty, though certainly important, is not the only factor affecting malnutrition: that many of the other factors included in this topic are also important.
2. SOCIO-CULTURAL PATTERNS: The cultural practices of a family, a community, a state, or a country have strong and long-lasting influences on what and how people eat. Some of the cultural patterns that should be understood are:	
Meal patterns	
In some rural areas of Southeast Asia, only one meal a day is customarily eaten. If only one main meal is eaten each day, food intake, especially for children,	Show a thin gruel or porridge made from 350 gm of rice. This provides a 2-year old with his daily

	Notes for Teachers
will very likely be inadequate. Pregnant and lactating women may also have difficulty in meeting food requirements when fewer than three meals a day are consumed.	energy requirement. Could he eat all of this at one time?
Food distribution within the family	
Traditionally, fathers may have priority for certain kinds of foods within the family. Taboos may limit the variety of foods available to different sex and age groups.	Ask the students if they know of food taboos in their community for: - Infants and very young children. - Pregnant and lactating women. - People who are sick.
Family size	
The food available for a large family might be enough for a family half that size but inadequate for a large one. All community programmes, especially those in agriculture, need to emphasize the importance of family planning and population control so that farmers will be able to grow enough food to feed the family adequately and also supply family needs for income through the cash crops grown.	Help students to understand the difficulty of continuing to meet family food needs if the community population continues for the next 10-20 years to grow at present rates of population increase.
Acceptability	
Many food preferences are established by what people accept due to custom or tradition. Many people may only eat corn if rice is unavailable, or vice versa. Corn (maize), an acceptable staple crop in some parts of Southeast Asia, is not used for human consumption in some other countries of the world even though it may be grown there.	Ask students to share information about local food customs; also about different customs they have heard about from other places.
Most religious groups of people have certain dietary restrictions although they usually vary from one religion to another. These restrictions make certain foods unacceptable to members of a specific religious group.	

Notes for Teachers

3. PERSONAL FACTORS: In addition to the many factors affecting food availability and socio-cultural patterns, there are also personal factors and preferences which influence the amount and kinds of food people eat. Some of them are:

Knowledge of nutrition

Misconceptions of food values and food requirements are common in every country of the world. The food needs of children in particular are often misunderstood. "Soup" or "gravy" and chicken feet are often considered to be adequate foods for young children. Since their stomachs are small and their rate of growth is rapid, young children need easily digested and less bulky food of excellent nutritional quality served at least three times a day or more often.

All of us would benefit from a greater knowledge of the principles of nutrition and how to apply this information for people of different age levels and physiological conditions.

Personal preference

Texture, color, and flavor influence food choice. Form and preparation of food for young children need to be given consideration. Table food prepared for adults may need modification before serving to the very young.

Use edible food dyes color a selection of food items, including the staple food of that region. How do students react?

Media influences (radio, television, pamphlets, advertisements, etc.) on personal food preferences are strong ones and should be recognized and understood.

State of health

Infections and fevers often cause loss of appetite or create difficulty in swallowing food. The sick, the convalescent and the elderly all have special food needs due to a poor state of health.

Notes for Teachers

Pregnant and lactating women have higher food needs due to body condition. Parasites, such as roundworms and hookworms, also reduce food utilization in the body.

4. SUMMARY: FOOD AVAILABILITY, FOOD UTILIZATION AND NUTRITIONAL STATUS

Fig. 2.1 is a summary of the key factors affecting food availability, food utilization, and hence nutritional status.

(Insert Fig. 2.1 Factors affecting nutritional status)

The degree of influence any factors have on food eaten will likely vary from community to community and from country to country, but in all areas those most likely to influence food intake are

Amount and variety of food produced,
Income levels, and
Nutrition knowledge.

Self-sufficiency in food production is a goal of most all of the countries of Southeast Asia and is a vital part of their development plans. Otherwise, money which could be used for educational, industrial, housing and other types of development must be used instead to import food. When the amount of food grown is not sufficient to feed the people of a country, the risks of nutritional inadequacy are high and malnutrition increases. This condition leads to poor health and low productivity not only at local levels but at national levels also.

Discuss foods needed in the country which are in short supply. Have bulletins and other publications available and ask students to use them to secure total amounts and costs of imports for those food commodities for which agricultural production and home production are below population needs. Identify those imported foods which are essential to health and those that could be eliminated without detriment to nutritional status of the people.

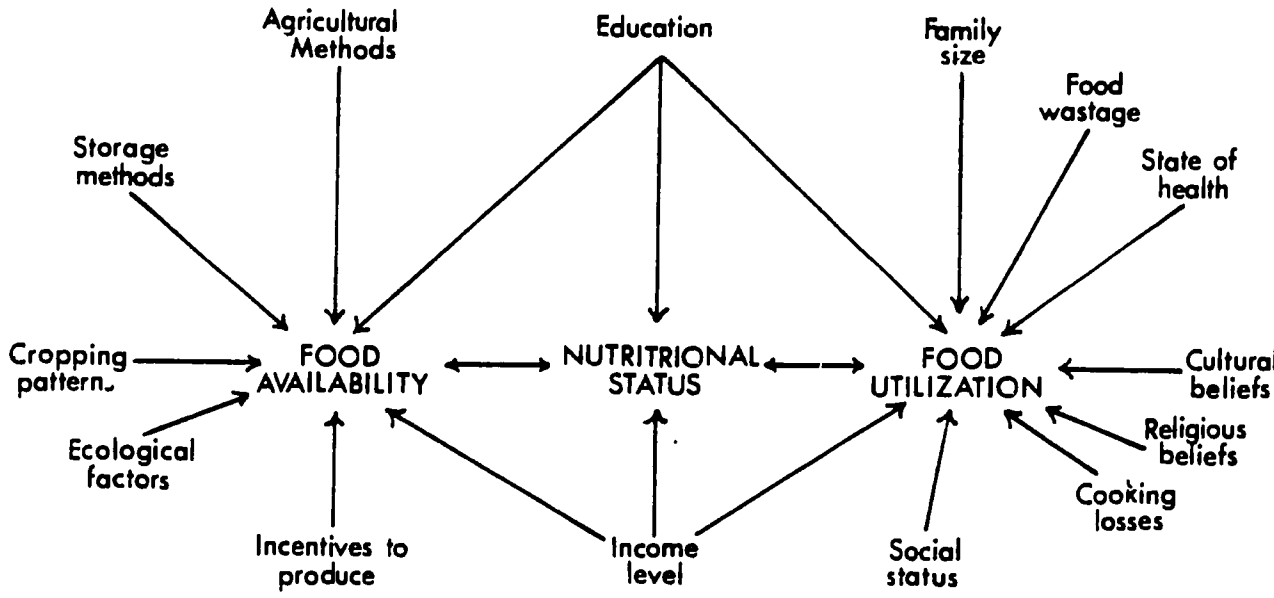


Figure 2.1 Factors affecting nutritional status.

Production of food is the first step towards providing an adequate diet for a population. Therefore, the agriculturist has a very important part to play in the development and implementation of food and nutrition programmes.

Notes for Teachers

Discuss costs of importation versus home production of foods. If students do not have the background to determine importation costs, etc. invite an agricultural economist to discuss this topic with the students.

SUGGESTED PRACTICAL ACTIVITIES

1. GROUP DISCUSSION: TO LINK REGIONAL FOOD SUPPLY AND AGRICULTURAL PRACTICES:

   Divide students into groups, students from the same part of the country working together.

   Students should discuss and compile a brief report on the situation in their home areas concerning:

   - Types of foods produced and eaten,
   - Seasonal variations in food supplies,
   - Agricultural methods, including processing and storage,
   - Food habits and beliefs.

   Allow each group about ten minutes to present their report.

   Summarize reports in a brief general discussion, using the following points as a guide:

   - What foods are eaten all over the country?
   - Is the staple food the same in all parts?
   - Are any foods eaten only in one area?
   - Are farming methods similar in different areas?
   - Is animal husbandry restricted to definite areas?
   - Do beliefs about foods vary?
   - Are methods of cooking or processing food similar in different areas?
   - How is food divided with the family?

2. FIELD EXERCISE: TO INVESTIGATE LOCAL FOOD HABITS: (a simple exercise in information collection)

   Students, working in pairs, will carry out a brief survey on food habits in the local area. If time allows, a questionnaire should be designed as a class exercise. A simple example follows on page 30. Students will need some help and practice in planning how they will introduce themselves to the people they interview and conduct the interviews. Collaboration with the Extension Department on this exercise would help strengthen students' survey techniques, both written and oral.

   The survey could be door-to-door, people in the local market, people at the local clinic or elsewhere.

   Students should present their findings as a brief report.

Summarize findings to show:

- The average number of meals eaten per day in the area.
- The average family size.
- The foods eaten most often.
- The approximate amount of staple needed/family/month.
- Common beliefs about food.

Are there any differences between people who say the have had some nutrition education and those who say they have had none?

Are there any differences between people who belong to different occupational groups/different socio-economic levels?

SAMPLE QUESTIONNAIRE

(Students should provide their own introductions)

1. What are your family's favorite foods?	
2. What did you have to eat all day yesterday?	
3. Are there any foods which you think are particularly good for you?	
4. Are there any foods which you think are particularly good for young children (6 months-6 years of age)?	
5. Are there any foods which you think are harmful?	
6. Are there any foods which you think are harmful to young boys and young girls (10-12 years of age)?	
7. How many meals did you have yesterday?	
8. How many meals do you usually have each day?	
9. Where does your food usually come from?	
10. If "brought", list those foods which are difficult to obtain?	
11. How much_____(insert main staple) do you find you use each month for your family?	
12. How many people are there in your family?	
13. How many people in your family eat at your house regularly?	
14. Have you ever had any lessons or heard talks about nutrition?	YES_____ NO _____
15. If "yes" where did you have these lessons/ talks?	___Clinic ___School ___Women's Club ___Radio/television ___Other; please specify: _____

SUMMARY OF THE CONTENT OF TOPIC THREE: FOOD AND NUTRIENTS

TOPIC THREE	OBJECTIVES	MAJOR CONCEPTS INVOLVED	SUMMARY OF CONTENT	PRACTICAL LEARNING EXPERIENCES	TEST OF UNDERSTANDING
Food and nutrients	3.1 Compare the nutritional values of locally available foods. 3.2 Appreciate the most essential functions of the several constituent nutrients.	The composition of locally available foods and their nutritional value to the diet. The functions of the different nutrients and their relationships.	Local consumption and nutritional composition of: - Cereals/products; - Starchy roots, tubers and cooking bananas; - Grain legumes/ oilseeds; - Vegetables; - Animal products; - Fruits; - Fats and oils. An outline of the functions of - Carbohydrates; - Fats; - Proteins; - Certain minerals; - Vitamins; - Water.	Preparation of a list of the foods usually eaten in the community or the country; organization of these foods by food types and listing of the most essential nutrients of the foods by types. Estimation of food consumption by the dietary recall method. Calculation of the calories and protein provided by the foods eaten for a day's time and comparison with the Recommended Dietary Allowances.	The student should be able to: 1. Enumerate three functions of food. 2. Write the names of three nutrients which provide energy to our body. 3. Name the three most important food sources of vitamin A, iron and vitamin C which are available in the community. 4. Enumerate the two most important nutrients present in i) rice, ii) corn (maize), iii) cassava, iv) soyabeans, v) green leafy vegetables vi) fish.

Topic Three

FOOD AND NUTRIENTS

PERFORMANCE OBJECTIVES

The student should learn to:

3.1 Compare the nutritional value of locally available foods.

3.2 Appreciate the most essential functions of the several constituent nutrients.

Food provides the nutrients required for growth, body maintenance, activity, reproduction and lactation. Most foods contain a mixture of nutrients, but the proportions of different nutrients in foods vary widely.

(Insert Fig. 3.1. Food consumption as % of total food intake)

Notes for Teachers

Agricultural students know more about food than about nutrients. Therefore, the teacher should help the students (1) prepare a list of various foods usually eaten in their country, (2) group them as shown in this lesson, and (3) discuss the nutrients of the various foods and types of foodstuffs.

CONTENT OUTLINE

1. NUTRIENT COMPOSITION OF DIFFERENT TYPES OF FOODS:

   A. Cereals form the major part of the diet (60-80%) in most Southeast Asian countries. They are:

      Good sources of energy as carbohydrates;
      Useful sources of protein (approximately 6-12% of a cereal is protein); they are also useful sources of minerals and "B" vitamins, although the amounts depend on the milling and refinement processes.

      They contain no vitamin C or vitamin D and yellow corn (maize) has a small amount of vitamin A value.

Examples of representative food consumption patterns for Southeast Asian countries are shown in Fig. 3.1. Note the heavy dependence of carbohydrate-rich foods (cereals) and the low intake of energy-rich fats and oils.

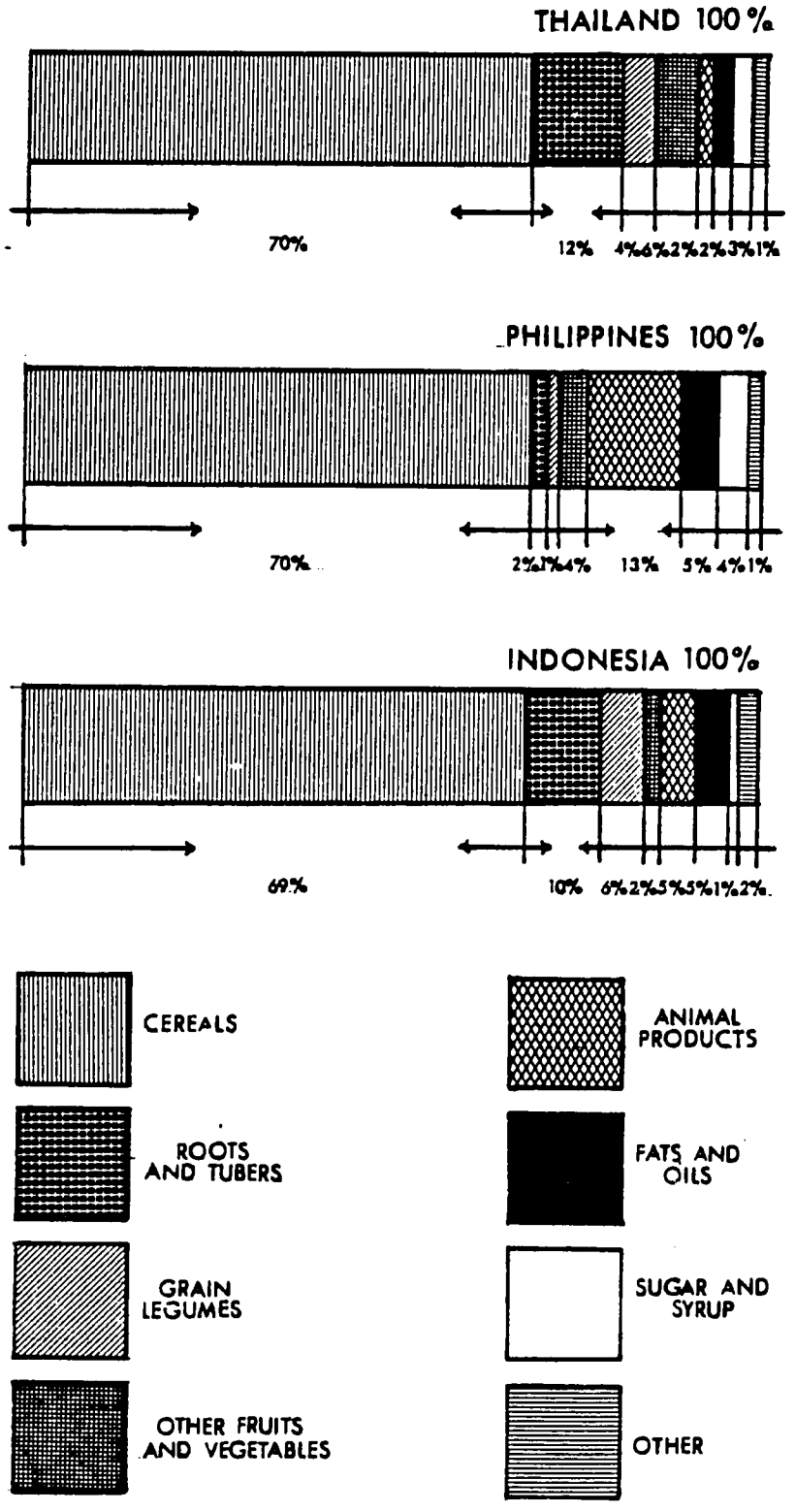


Figure 3.1 Food composition as percent of total food intake.

Notes for Teachers

B. Roots, tubers and bananas are the main food items (staple food) in some areas. They are:

Good sources of energy as carbohydrates;
Useful sources of calcium (except bananas) and of vitamin A value and vitamin C; and
Poor sources of protein and the "B" vitamins.

In Fig. 3.2, point out that roots and tubers contain much less protein than cereals.

C. Oilseeds and grain legumes may form about 5% of food intake. They are:

Good sources of energy, protein and minerals;
Useful sources of "B" vitamins, and
Poor sources of vitamin A.

100 gm of soya beans or mung beans furnish approximately the same amount of energy as 100 gm of corn or rice (dry weight).

D. Vegetables may form about 10% of the food intake. The darker the yellow/green color of the vegetables of a specific class, the higher is their content in certain nutrients such as vitamin A value or iron. They are:

Good sources of minerals and vitamins;
Useful sources of protein if dark green and leafy (about 5%, fresh); and
Poor sources of energy.

100 gm of sweet potato leaves contain approximately ten times as much vitamin A value as 100 gm of common cabbage leaves.

E. Animal foods may form 5-15% of the food intake. They are:

Good sources of protein and minerals; and
Useful sources of vitamins.

F. Fats and oils are:

Very rich in energy. One gm of pure fat provides more than twice as much energy as a gm of pure carbohydrate.
Good sources of vitamin A. Animal fat, except lard, usually contains vitamin A and carotene. Rancid fats and oil have less vitamin A value than fresh ones.

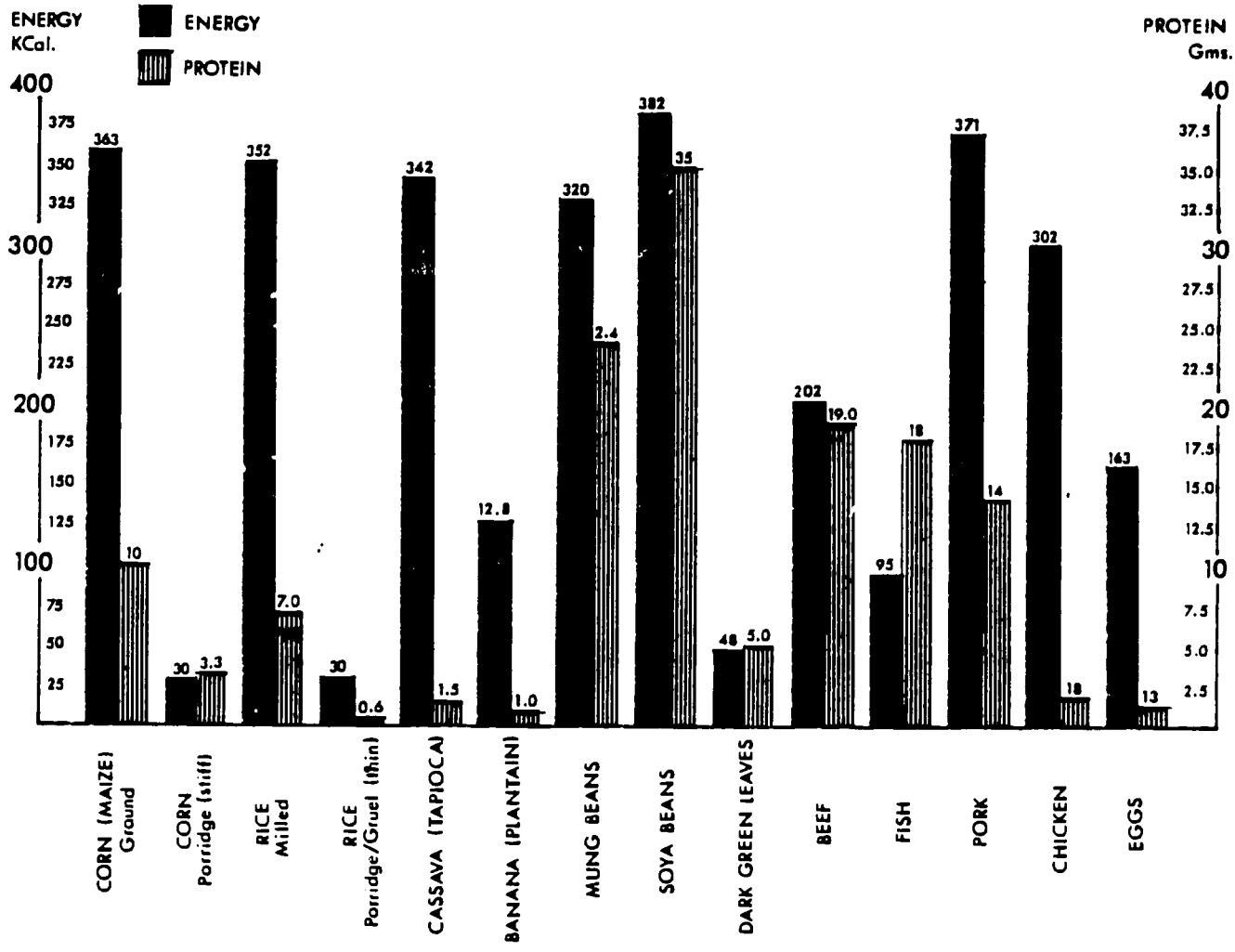


Figure 3.2 Comparison of energy and protein contents of selected foods expressed per 100 grams edible portion.

Notes for Teachers

G. Fruits usually form only a small part of the food intake. They are:

Good sources of vitamin A and C if their pulp is yellow or orange; citrus fruits are good sources of vitamin C but not of vitamin A;
Poor sources of protein and minerals and usually of energy.

2. TYPES OF NUTRIENTS:

Foods contain nutrients which are responsible for their functions. There are six types of nutrients present in food. These are:

Carbohydrates
Protein
Fat
Minerals
Vitamins
Water

3. FUNCTIONS OF NUTRIENTS:

The human body is made up of nutrients.

Fig. 3.3 shows the average composition of an adult man:

Water, 63%
Protein, 17%
Fat, 13%
Minerals, 6%
Carbohydrates, 1%

(Insert Fig. 3.3 Average body composition of an adult man)

The nutrients used by the body and stored in it are provided by food eaten (an exception would be iron pills distributed in programmes to combat anemia). A good diet must provide sufficient amounts of these nutrients in the proportions needed by the body. Depending on various factors, body needs will vary from person to person and from time to time.

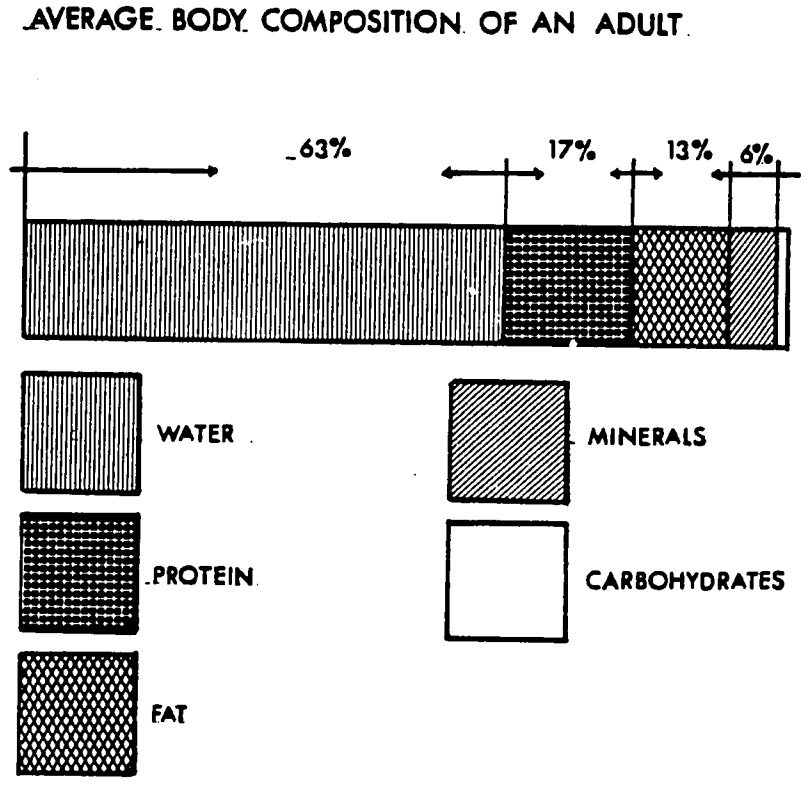


Figure 3.3 Average body composition of an adult.

The functions of the six types of nutrients are:

Carbohydrates: The main function of carbohydrate in the diet is to provide energy for physical activity (work) and for the maintenance of body temperature. Most people in Southeast Asia eat food which mostly consists of energy giving carbohydrates; for many of these people their staple food, rice, makes up from 60-80% of their food intake.

One gm of pure carbohydrate furnishes 4 KCal of energy. Usually carbohydrate-rich diets are bulky and tend to lack sufficient amounts of other essential nutrients. All cereals (corn, rice, sorghum, wheat, etc.), roots and tubers (cassava, potatoes, yam, etc.), some vegetables (beans and peas), some fruits (bananas, papaya) and sugar are good sources of carbohydrates.

Fats: Fats are highly concentrated sources of energy. One gm of fat gives 9 KCal of energy and provides more than twice as much energy per gm as carbohydrate or protein. Unfortunately in Southeast Asia the energy contribution of fats in the diet is small due to low intake of fat. When we eat more energy-giving nutrient foods (carbohydrate, fat and protein) than required by our body at that time, they are converted into fat and stored in the body as reserve energy. When energy intake is low or we are unable to eat enough energy-giving foods to meet body needs, the stored fat is used by the body to produce energy.

In addition, some fats contain fat soluble vitamins (A, D, E and K). Fat takes longer to digest than carbohydrate or protein, therefore stays in stomach longer and, as a result, delays the onset of hunger pangs. Fat in the diet provides flavor and increases palatability. There are two main sources of fat:

Animal fat:	lard, butter, suet, etc. and
Vegetable fat:	coconut oil, corn oil, palm oil, peanut oil, sesame seed oil, soybean oil, sunflower oil various hydrogenated oils, etc.

Nutritionally, many vegetable oils are better than animal fats.

Proteins: Proteins are the building blocks of the body. All tissues, skin, bone, muscles, blood and the various organs of the body contain protein. Proteins in food, when eaten, digested and absorbed into the blood stream are used to build tissue proteins and to maintain them. In addition, enzymes, antibodies and certain hormones are protein. There are two main sources of protein:

Animal:	meat, fish, egg, milk, etc. and
Vegetable:	beans and peas, cereals, legumes, etc.

The quality of animal proteins is better than that of vegetable proteins because animal proteins have a constitution similar to that of muscles of the human body. However, a mixed protein from selected vegetable

sources (mung beans with rice, soybeans with corn) improves the quality of the protein and is therefore almost as good as animal protein. In Southeast Asia most of the protein in the diet is provided by the staple food (usually rice) because it is eaten in such large amounts. When most of the protein of the diet is supplied from vegetables, mixtures of them should be eaten; this will increase protein quality. Even a small amount of fish, eggs or meat in the diet increases the quality of protein from rice.

Minerals: A variety of minerals is present in food. Minerals mainly assist in the control of body processes but, in addition, some of them have important specific functions.

Iron: Iron is especially needed to build blood for the body. Good sources of iron are liver, kidney, red meat, small fish, beans, peas, and green leafy vegetables. Iron from animal food is better absorbed than from other sources.

Calcium: Calcium is necessary for making bones and teeth and has other important roles as well, such as: proper functioning of muscles and the nervous system and proper clotting of blood. Rich sources of calcium are milk, cheese, nuts, beans, peas, small whole fish, shell-fish and dark green leafy vegetables. Absorption of calcium is increased by the presence of vitamin D.

Iodine: Iodine is necessary for the thyroid gland in the neck to function properly. The thyroid gland requires iodine in order to produce the thyroid hormone. This hormone is responsible for controlling the rates of many metabolic processes in the body. If the foods we eat do not contain enough iodine, the level of the iodine in the blood becomes lower than normal and the thyroid does not get enough iodine to make its hormone. In an effort to increase production of the thyroid hormone, the gland enlarges. As a result, a characteristic swelling appears at the front of the neck called goiter. Sea foods are natural sources of iodine.

Vitamins: There are two kinds of vitamins: (a) the fat soluble vitamins A, D, E and K - and (b) the water soluble vitamins: the B group and vitamin C. Those which are usually the most important to understand in relation to dietary habits in Southeast Asia are discussed here. More details are included in Appendix II, page 132.

A. Fat soluble vitamins:

Vitamin A: Vitamin A is essential for vision in dim light and healthy skin. Approximately 90% of the vitamin A in the human body is stored in the liver. This stored vitamin A can be used when enough vitamin A is not supplied by the diet daily to meet body needs. Vitamin A is only present in foods of animal origin. Rich sources of vitamin A are liver, kidney, butter and all liver oils. Many vegetable foods are

rich in provitamin A (carotene), a substance from which vitamin A can be made by our body. Some of these rich vegetable sources of vitamin A value are red palm oil, dark green leafy vegetables, all yellow colored fruits and vegetables such as yellow squash, mango and papaya.

Vitamin D: Vitamin D is essential for the absorption of calcium from food and for the formation of bone. The main source of vitamin D is sunlight. When sunlight falls on our skin, it reacts with a substance in our bodies to form vitamin D. Food sources of vitamin D all come from dairy products: whole milk, cream, butter, and cheese made from whole milk. Vitamin D deficiency is not common in Southeast Asia due to the abundant sunshine and habits of dress.

B. Water soluble vitamins:

The vitamin B Group: Members of this group are all water-soluble but they have different functions. Thiamin (B_1), riboflavin (B_2) and niacin, all three, in different ways assist in the utilization of carbohydrate and certain other nutrients. Folic acid and vitamin B_{12} are necessary for blood formation. Briefly, the main functions, food sources and conditions caused from prolonged dietary deficiencies of thiamin, riboflavin and niacin are:

Vitamin	Main Function	Rich Sources	Results of deficiency
Thiamin (B_1)	Energy release	Stone pounded cereals, legumes; pork; vegetables; fish	Beri-Beri
Riboflavin (B_2)	Energy release	Legumes; meat; fish; green leafy vegetables	Sores at corners of mouth
Niacin	Energy release	Meat, fish, legumes	Pellagra

Vitamin C: Vitamin C is necessary for the normal health of body tissues (e.g. gums) and for the proper healing of wounds. A deficiency in the diet causes scurvy. Rich sources of vitamin C are oranges, lemons, guava, melons, pineapple and green leafy vegetables.

Water: Water is involved in most body processes. It is needed by the body in greater amounts than any other nutrients and a deficiency results in death far more rapidly than other nutrient deficiencies. It assists in controlling body temperature and is used to remove waste products from the body through the kidneys.

SUGGESTED PRACTICAL ACTIVITIES

1. EVALUATION OF THE NUTRIENT VALUES OF COMMONLY USED FOODS:

Working in pairs, students should evaluate the foods listed in table 3.4, page 43, in relation to their possible use as sources of protein, fat, carbohydrate, iron, and vitamin A. At the beginning of the exercise the teacher will need to help the students decide on what is meant by "rich", "average", and "poor" sources of the nutrients (food composition handbooks should be available for students to use).

At the end of this exercise the class should discuss their results and the implications of these results for improving local food and agricultural patterns.

2. DIETARY RECALL; FOODS EATEN IN THE PREVIOUS 24 HOURS:

The teacher should make arrangements for a local health worker, dietitian, home economist or other person familiar with the techniques involved to demonstrate a dietary-recall interview and at least a partial calculation of the results obtained. Ask one of the students from the class to serve as the interviewee.

The teacher should either supply or ask the interviewer to bring the necessary equipment to interpret the results: cups, plates, a spring-balance dietary scale, food models, some commonly used foods, food composition tables, etc. With this approach, the students will be better able to understand how commonly accepted and used measures (e.g. cups, platefuls, handfuls, etc.) are transferred to dietary measures.

Whenever practical, students with the use of food composition tables should help with the calculation of nutrients in foods recorded from the dietary-recall interview (a worked example of such calculations is given on page 44). Possibly two or three students working together outside of class might volunteer to complete the calculations for the 24-hour dietary-recall period and report back to the class. If so, with the use of food composition tables the following calculations should be made:

(a) Calculate the total energy intake over 24 hours;

(b) Calculate the total protein intake over 24 hours;

(c) Calculate the energy and protein provided by the staple food as percentages of total intakes.

If these calculations are made, the two or three students working together should assess the adequacy of the dietary intake by comparison with Recommended Dietary Allowances. This should be completed before reporting back to the class.

If having students make these calculations is not practical, the invited interviewer should not only show the students how these calculations and assessments are made but also discuss with them the value of such calculations in assessing dietary adequacy of food consumption patterns.

3. FOOD FREQUENCY RECALL; FOODS EATEN OVER THE PREVIOUS WEEK:

This type of recall is used to obtain information on the frequency of particular foods eaten in the past week and provides an indication of the variety in the diet. (If the 24-hour dietary recall demonstration is not included as a practical exercise, the food-frequency-recall could be assigned; even if the 24-hour dietary recall demonstration is included, the food-frequency-recall method of assessing food consumption variety should be called to the attention of students.)

Students, working in pairs, should interview each other to determine usual eating patterns and variety as assessed from food-frequency-consumption for the past week. Prior to the interviewing session, the class members should discuss the type of recording system they will use. Possibly the teacher could get examples of such systems from the Extension Service or the Health Department. The teacher should remind the students to include on their recording system how often last week they ate specific foods from the following types of foods: cereals, roots and tubers, grain legumes, green leafy vegetables, yellow vegetables, other vegetables, animal foods (including not only meat but milk, cheese, eggs), fats and oils (including oil seeds), and fruits.

Table 3.4 Evaluation of commonly used foods as sources of nutrients

In table 3.4 please use the appropriate columns to identify the relative contribution of each food listed as a source of protein, fat, carbohydrate, iron, and vitamin A. Rate each food as follows:

Rich source: ✓ ✓

Average source: ✓

Poor source: o

Food	Rich (✓ ✓), Average (✓), Poor (o) Source of				
	Protein	Fat	Carbohydrate	Iron	Vitamin A
Rice					
Corn (maize)					
Cassava (tapioca)					
Sweet potato					
Yam					
Mung beans					
Dark green leaves					
Whole milk					
Beef					
Chicken					
Pork					
Dried fish					
Fresh fish					
Shellfish					
Banana					
Coconut					
Orange					
Papaya					

WORKED EXAMPLE

Suppose lunch consisted of rice, an average serving of meat and an average serving of either sweet potato tops or green mung beans.

(i) Amount of rice eaten was ½ plateful, which is equivalent to a weight of (say) 500*gm. From the food tables, 100 gm cooked rice (milled) contain 155 KCal, so 500 gm cooked rice contain $\frac{155}{100} \times 500 = 775$ KCal.

100 gm of cooked rice contain 2.5 gm protein, so
500 gm cooked rice contain $\frac{2.5}{100} \times 500 = 12.5$ gm protein

(ii) Amount of meat eaten was 30 gm

100 gm cooked meat (beef) contain 172 KCal
30 gm cooked meat contain $\frac{172}{100} \times 30 = 52$ KCal
100 gm cooked meat contain 23 gm protein
30 gm cooked meat contain $\frac{23}{100} \times 30 = 6.9$ gm protein

(iii-a) Amount of sweet potato tops eaten was 150 gm

100 gm sweet potato tops contain 48 KCal
150 gm sweet potato tops contain $\frac{48}{100} \times 150 = 72$ KCal
100 gm sweet potato tops contain 2 gm protein
150 gm sweet potato tops contain $\frac{2}{100} \times 150 = 3$ gm protein

(iii-b) Amount of green mungbeans eaten was 90 gm

100 gm green mung beans contain 150 KCal
90 gm green mung beans contain $\frac{150}{100} \times 90 = 135$ KCal
100 gm green mung beans contain 11 gm protein
90 gm green mung beans contain $\frac{11}{100} \times 90 = 9.9$ gm protein

Total Calories and Proteins provided by lunch

	a. with sweet potato tops		b. with mung beans	
	Calories	gm Protein	Calories	gm Protein
Rice	775	12.5	775	12.5
Meat (beef)	52	6.9	52	6.9
Sweet potato tops	72	3.0		
Green mung beans			135	9.9
	899	22.4	962	29.3

This procedure is followed for calculating the calories and nutrient value of all food items. This calculation does not include fat or other substances of nutritive value added to these foods.

*Hypothetical figure

SUMMARY OF THE CONTENT OF TOPIC FOUR: FOOD AND NUTRITIONAL REQUIREMENTS

TOPIC FOUR	OBJECTIVES	MAJOR CONCEPTS INVOLVED	SUMMARY OF CONTENT	PRACTICAL LEARNING EXPERIENCES	TEST OF UNDERSTANDING
Food and nutritional requirements	The student should learn to: 4.1 Discuss factors affecting food requirements of individuals and different groups of people within the community. 4.2 Advise on the planning of balanced diets.	The different factors which influence nutritional requirements of individuals and different groups of people within the community, especially - Infants and young children, - Women during pregnancy and lactation, - Sickness and convalescence. The principles involved in planning balanced diets.	Factors influencing food requirements: - Growth, - Pregnancy, - Lactation, - Physical activity, - Body size, - sickness/ convalescence. The nutritional vulnerability of: - Infants, - Young children, - Pregnant and lactating women, - The sick, convalescent, elderly. Planning balanced diets to meet individual and family needs.	Visit to a hospital or clinic to observe the problems of malnutrition in times of illness. Estimation of calorie needs for a community. Estimation of individual energy needs by use of an activity diary. Planning a balanced diet.	The student should be able to: 1. Describe six factors that affect nutritional requirements. 2. Explain why diets for the following groups of people should be given special attention in order to meet their needs. - Infants, - Children, 1-2 years old, - Pregnant women, - Lactating women, - Farmers during planting season, - Old people.

Topic Four

FOOD AND NUTRITIONAL REQUIREMENTS

PERFORMANCE OBJECTIVES

Notes for Teachers

The student should learn to:

4.1 Discuss factors affecting food requirements of individuals and different groups of people within the community.

4.2 Advise on the planning of balanced diets.

CONTENT OUTLINE

A nutritionally adequate diet is one in which all necessary nutrients are included in sufficient amounts to meet body needs. The amount of food and nutrients needed are influenced by:

1. FACTORS INFLUENCING BODY NEEDS FOR NUTRIENTS:

Stage of development

The rate of growth is greater during the first five years of life than at any other time. This rapid growth rate creates a high demand for energy and nutrients. Infants and young children are therefore more vulnerable to undernutrition than any other age group. Malnutrition during this period of life may affect long-term physical and possibly mental development.

A healthy baby usually doubles birthweight in the first six months of life.

Refer to Fig. 4.1 (energy needs/kg body weight/day). Energy needs per kg body weight are highest for infants and gradually decrease as age increases.

Nutrient requirements per kilogram of body-weight are higher during these years than at any time in later life.

Pregnancy

Pregnancy increases a woman's need for calories by about 15%. For most other nutrients, increased needs are even greater. If she is malnourished before and during pregnancy, she is likely to

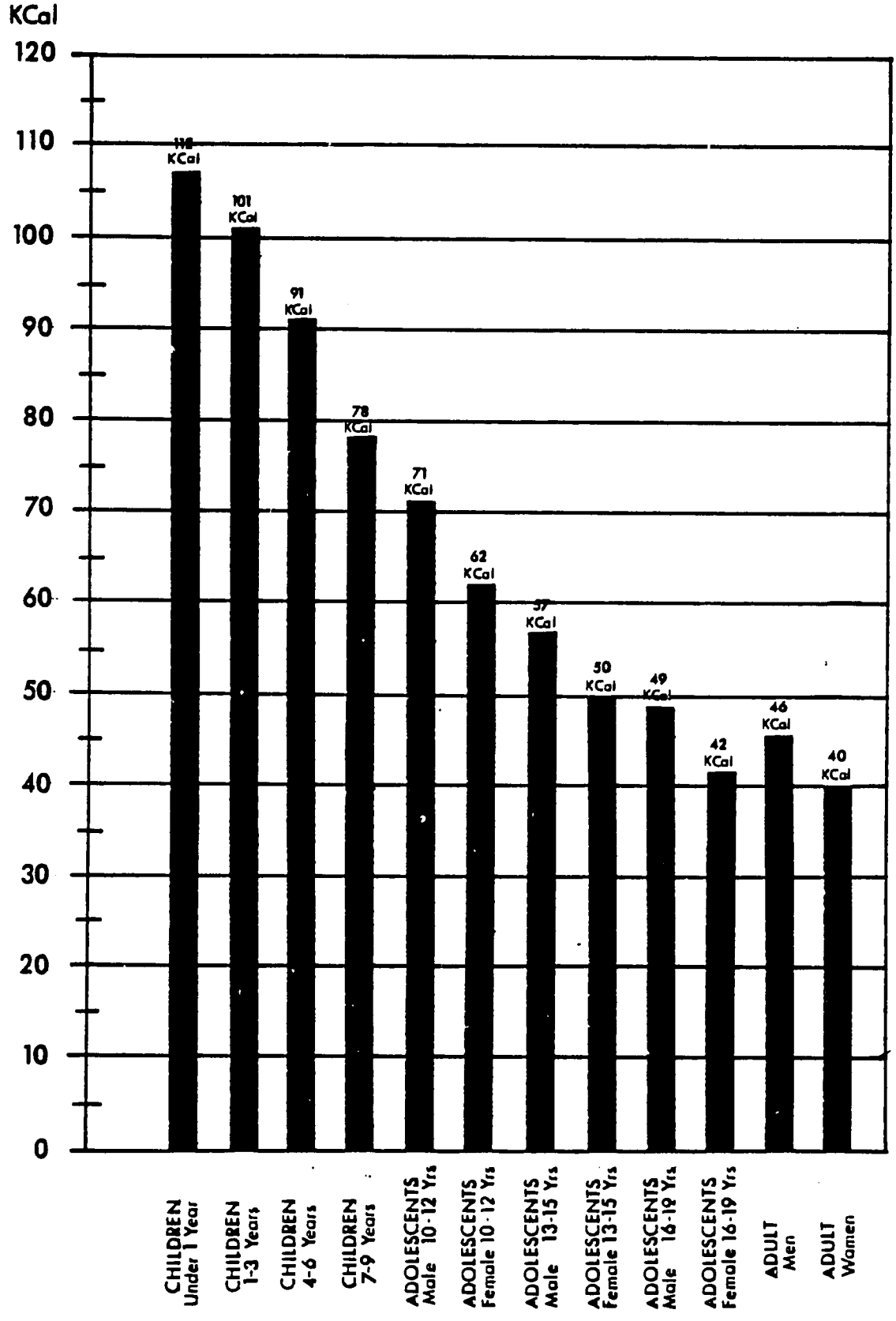


Figure 4.1 Comparison of energy requirements per Kg. of body weight per day.

Notes for Teachers

produce a baby of low birth weight and the risk of infant mortality is greater. If her diet is inadequate in pregnancy only, the baby may be of normal birth weight but she herself is likely to be in poor nutritional status. This condition of undernutrition may increase risks at childbirth and probably will affect the success of lactation.

Lactation

To produce sufficient breast milk without reducing her own body reserves, a mother needs to increase her calorie intake about 25% (an additional 10% above the 15% increase recommended during pregnancy). Extra fluid intake is also important for successful lactation.

If the belief is commonly held that a pregnant woman's milk is "sour" or "poisonous", discuss with students why this belief has arisen. Mention the importance of colostrum consumption by infants and discuss the reasons why, in some geographic areas, colostrum is not considered appropriate food for infants. What can be done to overcome this belief?

Physical activity

The more physically active a person is, the more energy he needs. In a rural subsistence community, there may be marked differences in energy expenditure at different times of the year. When land is being cleared and prepared for planting, energy expenditures are high. This may also be a time of low food availability (the "hungry" season).

Refer to Table No. 4.3 under "Practical Activities". This shows energy expenditures for different activities. Point out that most brain work uses very little energy; that physical labor is what increases energy requirement.

Body size

A large person uses more energy than a smaller one to carry out the same physical activities as it takes more energy to move a larger person's body around.

Sickness and convalescence

Infection increases the need for several nutrients and yet during a period of infection or other kinds of illness one's

The teacher will need to explain the difference in the two terms so often

	Notes for Teachers
appetite is often lost. If the person's previous dietary history has been poor (has not usually eaten enough food), serious malnutrition can occur. Repeated attacks of diarrhea, for example, in an already malnourished infant or very young child can lead to marasmus (a condition of severe calorie-protein malnutrition occurring mainly in infants). Measles in young children often precedes kwashiorkor, a condition of very serious calorie-protein malnutrition of young children which may develop during or soon after weaning.	associated with the severe malnutrition of infants and very young children: marasmus and kwashiorkor. The teacher should also discuss the special feeding needs of sickness and convalescence and how to encourage adequate and appropriate food consumption during these periods in spite of little or no appetite.
Diarrhea also results in water and accompanying nutrient loss from the body. Dehydration due to diarrhea occurs easily in an infant and can result in death if it is not treated properly and promptly.	Demonstrate the preparation of sugar-salt solution for use in the home treatment of diarrhea (2 teaspoons of sugar plus a pinch of salt to a cup of water). This is an excellent and practical treatment for diarrhea.
A good diet in convalescence is important in order for the body to replace any of the nutrient stores lost from it during illness.	If there is a hospital or health clinic near by, a visit to it would be helpful so the class could observe first-hand some of the problems of malnutrition which increase in times of sickness.

2. RELATIONSHIPS: NUTRIENTS, FOOD AVAILABILITY:

Factors which influence nutrient requirements, together with those influencing food availability and food use by the body, allow us to identify groups within a population which are more in danger of dietary inadequacy than others. For easy reference, a table of recommended dietary allowances is provided in the appendix, page 135.	Ask the students to tell which groups of people in a rural farming community are most likely to become malnourished. Why are these groups of people more vulnerable to malnutrition than other groups in the community?
Special emphasis should be focused on those nutritional requirements related to the nutritional deficiencies most often observed in Southeast Asia, such as from inadequate intake of energy	

Notes for Teachers

(especially from fats and oils), protein, iron, or vitamin A.

3. PLANNING BALANCED DIETS:

We need all six types of nutrients (see Topic Three)

Carbohydrates
Protein
Fat
Minerals
Vitamins and
Water

Refer to Figure 4.2 for energy and protein contents of selected common foods.

in large enough quantities to meet our body's needs. If care is used in planning what we eat daily we can meet body needs for required nutrients.

A mixed diet with a staple food, a "good source of protein", some fat or oils, and some fruits and vegetables will contain the basic ingredients of a balanced diet if adequate amounts are eaten according to one's appetite. Choices of foods eaten should be as varied as possible.

Ask the students to count the different kinds of foods they ate yesterday. If the diets were limited in variety, encourage them to try to include in their daily diet at least ten different kinds of foods.

In addition, for children, pregnant women and lactating mothers, a source of animal protein included in the diet is highly desirable. A diet made up largely of cereals or tubers will usually be too bulky for a young child to be able to eat enough to meet nutritional requirements. Figure 4.2 is a comparison of energy and protein contents of selected foods commonly eaten in Southeast Asia. From a glance at this chart one can easily see how difficult it would be for a young child to meet energy and protein requirements if the diet consisted chiefly of cereals, or roots and tubers.

Socio-economic status, state of health, physical activity, types of food available, food preparation and cooking practices, food likes and dislikes, and

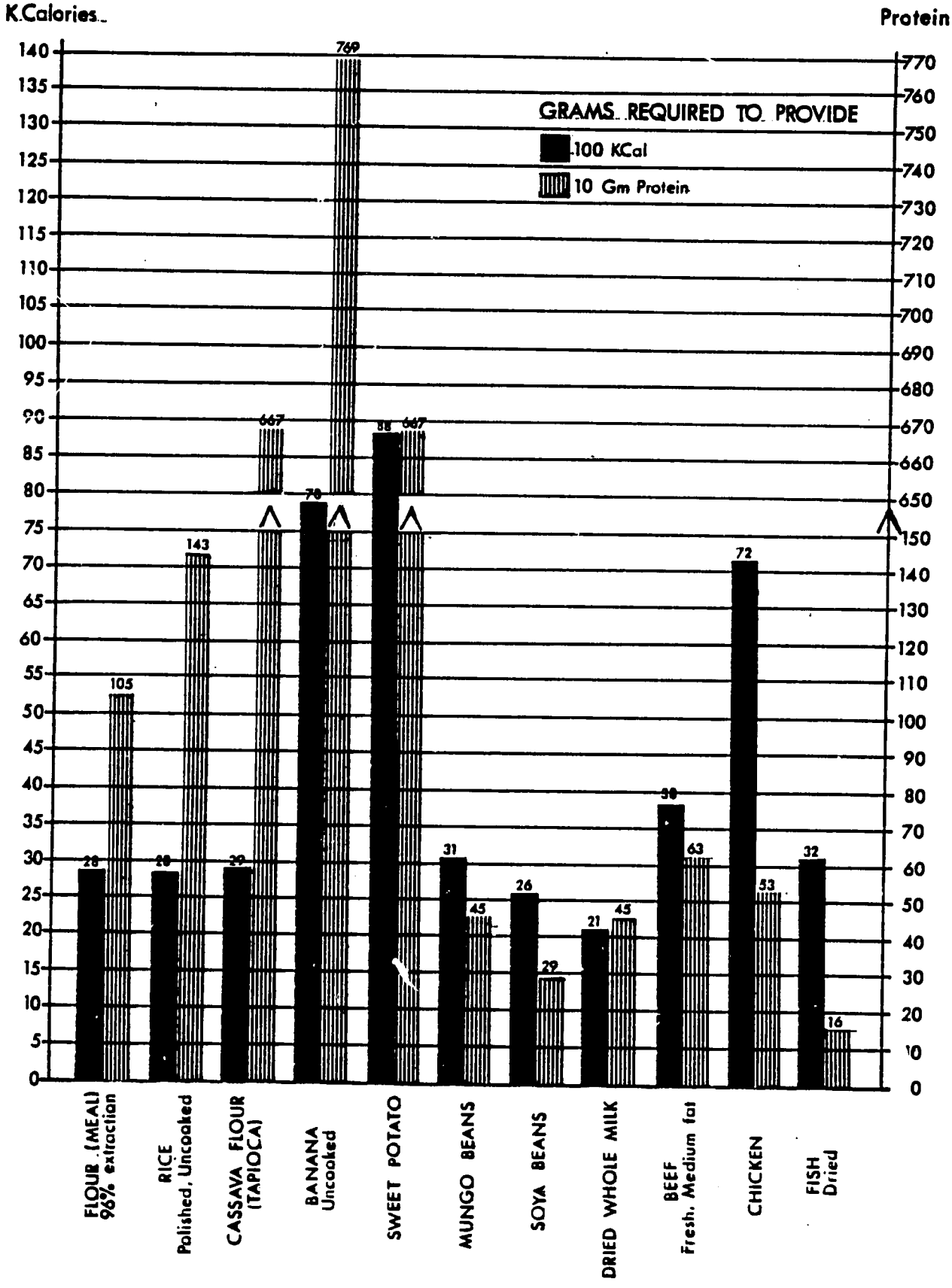


Figure 4.2 Comparison of energy and protein contents of selected common foods.

all the other factors which determine the food habits of individuals (refer to Topic Two) must be carefully considered in the planning of balanced diets.

4. FEEDING THE FAMILY:

Correct food distribution to each family member is very important for good family nutrition. Foods must be distributed to meet the nutritional needs of each person in the family. Children, pregnant women and lactating mothers must get plenty of growth-promoting food. Fathers and other working members of the family must get a large share of energy-giving food. Old people will need food that will help to repair the wear-and-tear of tissue. All family members, according to their individual needs, must get a good share of energy, growth and maintenance promoting foods.

SUGGESTED PRACTICAL ACTIVITIES

1. CALCULATION OF THE OVERALL ENERGY REQUIREMENT FOR A VILLAGE CONSISTING OF THE FOLLOWING POPULATION GROUPS: (assume moderate activity for all)

No. in each group	Age	Sex	Physiological Status
20	3	M	
10	2	F	
15	8	M	
17	10	F	
30	25	M	
20	30	F	Pregnant
10	60	M	
10	25	F	Lactating

2. ESTIMATION OF ENERGY EXPENDITURE BY MEANS OF AN ACTIVITY DIARY:

A. Students will record the time spent on different activities for a 24-hour period in order to calculate energy expenditure. Recording should start from the time of waking up one morning until the same time the next day; example, 7 a.m. on Tuesday until 7 a.m. on Wednesday.

Suggested key for activities	Example of part of possible diary	
T = Washing, dressing, etc.	Out of bed:	7:00 a.m.
W = Walking	T	15 min.
S = Sitting	W	5 min.
St= Standing	S	20 min.
B = Bed	W	5 min.
Students can develop their own keys for other activities	etc. through the day	

B. At the end of 24 hours, students should total the time spent on different activities. A possible breakdown might be:

Time spent	walking	1 hr 15 min
	sitting	10 hr 30 min
	washing	0 hr 45 min
	gardening	2 hr 0 min
	standing	1 hr 30 min
	playing soccer	1 hr 0 min
	in bed	7 hr 0 min
	Total	24 hr 0 min

For the amount of time spent in the activities recorded (as above) and using the average energy expenditures given in Table 4.3,

page 55, energy expenditures for the activities should be calculated* in a manner similar to the breakdown example given below:

Walking for 75 min (1 hr, 15 min) at 3.7 KCal/min	=	75 x 3.7 = 278 KCal
Sitting for 630 min (10 hr, 30 min) at 1.4 KCal/min	=	630 x 1.4 = 882 KCal
Washing for 45 min at 2.8 KCal/min.	=	45 x 2.8 = 126 KCal
Gardening for 12 (2 hr) at 6.0 KCal/min	=	120 x 6.0 = 720 KCal
Soccer for 60 min (1 hr) at 7.5 KCal/min	=	60 x 7.5 = 450 KCal
Bed for 7 hours at 63 KCal/hr	=	7 x 63 = 441 KCal
Total	=	2897 KCal

C. Compare energy expenditures* over 24 hours with the energy intakes estimated by the 24 hour dietary recall (see Topic Three).

D. Compare activity diaries of farmers in planting and in post harvest/preplanting seasons. (The teacher could provide typical diaries for the students to discuss).

E. What would the activity diary of a woman in a rural subsistence farming community look like? Include a record of household work as well as the assistance she gives to farming activities.

3. PLANNING A BALANCED DIET:

Group the students into small groups and give them one age group - or let them choose the age group with which they wish to work:

1 - 2 year old child
30 year old pregnant mother
25 year old man, moderately active, etc.

Ask each group to calculate nutrient allowances (using Dietary Recommended Allowances in the appendix, page 135) and plan a balanced diet for one day. Students must learn now the idea of "portion size" in the qualitative planning of a balanced diet.

*If mathematics skills are weak, students can keep an activity diary, record total times spent on different activities and classify these activities according to energy expenditures, i.e. light, moderate or heavy.

Table 4.3 Average energy expenditures for typical physical activities, measured in kilo-calories

Activity	Energy Expenditure	
	Adult Male	Adult Female
	KCal/min	
Sitting	1.4	1.2
Standing	1.8	1.4
Walking	3.7	3.0
Washing, dressing	2.8	2.3
Light activity; carpentry, paint-ng, etc.	4.2	2.8
Moderate activity; gardening, dancing, cycling, agriculture (non-mechanized)	6.0	4.0
Heavy activity; soccer, slashing grass, clearing brush, shovelling, etc.	7.5	6.0
Bed/hour	63.0 (hour)	53.0 (hour)

SUMMARY OF THE CONTENT OF TOPIC FIVE: EVALUATION OF NUTRITIONAL STATUS

TOPIC FIVE	OBJECTIVES	MAJOR CONCEPTS INVOLVED	SUMMARY OF CONTENT	PRACITCAL LEARNING EXPERIENCES	TEST OF UNDERSTANDING
Evaluation of nutritional status	The student should learn to: 5.1 Understand the methods commonly used in the geographic area to assess nutritional status. 5.2 Recognize the important signs and causes of malnutrition occurring locally. 5.3 Predict types and severity of malnutrition likely to occur in a community or geographic area in relation to amount and variety of foods produced.	The natural sequence and occurrence of malnutrition. The nutritionally vulnerable groups of a population. The identification and possible causes of malnutrition. The effects of malnutrition on physical, social and economic development. The role of agriculture in improving nutritional status of farm families, with emphasis on landless farmers and their families.	The natural history of malnutrition in Southeast Asia: - Low food intake, - Low nutrient levels in blood and urine, - Low level of health, - Small body size. The effects of malnutrition in adults: - Weakness, - Low productivity, - Lack of economic and social development. The effects of malnutrition in children: - Growth retardation, - Underweight. Simple anthropometric measurements for detecting malnutrition: - Weight - Height, - Mid-arm circumference Signs and causes of protein-energy malnutrition.	1. Obtain information on local food practices. 2. Measure the mid-arm circumference of children, 1-5 years old. 3. Learn the correct measurement of weights and heights and their use in grading malnutrition.	The student should be able to: 1. Name the nutritionally vulnerable groups of people in the community. 2. Diagram the normal sequence of the occurrence of malnutrition in Southeast Asia. 3. Give the main causes of protein-energy-malnutrition of the country. 4. Name four indicators used for detecting protein-energy malnutrition.

Topic Five

EVALUATION OF NUTRITIONAL STATUS

PERFORMANCE OBJECTIVES

The student should learn to:

5.1 Understand the method commonly used in the community or geographic area to assess nutritional status.

5.2 Recognize the important signs and causes of malnutrition which occur locally.

5.3 Predict types and severity of malnutrition likely to occur in a rural community or a geographic area in relation to amount and variety of food produced.

CONTENT OUTLINE

Food is broken down into nutrients in the body by the process of digestion. The nutrients are then absorbed into the blood which carries them to the various parts of the body. Some of them, in response to body needs, are used immediately. Nutrients may also be stored by the body for later use. In the body, nutrients are used to maintain the normal body structure and functions.

In determining the nutritional status of the individual, a group of people or a community, we study nutritional indicators at various levels of malnutrition. The developing countries of Southeast Asia are mainly concerned with assessing the degree and types of undernutrition.

1. STAGES AND DETECTION:

Stages	Method of detection
Low food intake	Food consumption
Low level of nutrients in blood/nutrients in urine	Blood and urine tests for nutrient levels
Level of health	Medical examination
Small body size, rate of growth	Anthropometric measurements

The first and last methods of detecting malnutrition (food consumption and anthropometric measurements) are the measurements the agriculturist will understand and use most frequently.

2. VULNERABILITY:

There are certain groups of people who are especially likely to develop malnutrition. The most nutritionally vulnerable groups are:

- Infants
- Pre-school and school-age children
- Pregnant and lactating women, and
- The sick and convalescent.

These groups among the families of poor farmers, especially those who are landless, are doubly vulnerable. They must be watched constantly or kept under continuous surveillance if malnutrition among them is reduced.

These groups are nutritionally vulnerable not only because of their special needs for foods, but also because of social customs such as:

- Food taboos which may limit the use of certain foods by young children,

- Adult men in the family who often have first choice of food; and

- The treatment of sickness by withholding food.

In some societies, particularly where the extended family system does not exist, the elderly poor are also at great risk. Even when the elderly live in an extended family if food supply is short, knowing they do not have many years to live the elderly members may eat very sparingly to save food for younger family members. Physical and mental deterioration together with low economic status expose the elderly to the risk of dietary inadequacy and subsequent malnutrition.

Notes for Teachers

Often the incidence and implications of malnutrition are under-estimated or not known as widely as they should be. In government health statistical reports, mortality numbers or rates directly attributed to malnutrition may be low. However, where high mortality figures are presented from diseases such as measles, respiratory infections, fevers or gastroenteritis, sub-clinical malnutrition likely is also widespread.

Quote relevant government health statistics: death from measles, gastro-enterities, malnutrition. A visit to the class by a health officer to discuss types of malnutrition and the groups of people in the community most apt to be or become malnourished would be helpful.

The first stage of dietary deficiency in a young or growing animal is usually a reduction in the rate of growth. This is also a sound indicator for dietary deficiency of infants and children.

Ask students how they would check to see if baby chicks and pullets are getting enough food to eat.

Notes for Teachers

3. COMMON INDICATORS OF MALNUTRITION IN CHILDREN:

The most common indicators used to detect onset and severity of dietary deficiency and malnutrition and for nutritional surveillance are:

Weight-for-age

For most children, this is the standard method used for following growth. Underweight not only indicates inadequate diet but also reflects recent illness, such as diarrhea or measles, which result in weight loss.

Ask a health officer or nurse or even an elementary school teacher to explain the use of clinic cards in recording children's weights regularly and the use of weight/age tables to indicate nutritional status.

The regular and frequent use of weight-for-age as an indicator of dietary deficiency will quickly indicate an acute dietary deficiency when there is a sudden change in growth rate.

Height-for-age

Height is affected less immediately by diet and therefore low height for age usually indicates chronic diet deficiency.

Weight-for-height

Low weight-for-height indicates a recent low food intake, the acute severity reflected by the degree of underweight.

Demonstrate weight/height measurements.

Mid-arm circumference (MAC) using the upper left arm

A wasting of body tissue due to a chronic dietary deficiency will be reflected by a reduced mid-arm circumference. This method is a useful and convenient tool to use in the community for determining dietary inadequacy, especially for identifying underweight in young children. The MAC of children does not change greatly between one and five years of age

Demonstrate how to take a mid-arm circumference measurement. Use the mid section of the upper left arm, approximately half way between the shoulder and elbow.

Notes for Teachers

and for healthy children in this age range is usually around 16 cm. Children between one and five years of age with a MAC between 12.5 cm to 13.5 cm are at risk of becoming definitely under-nourished.

The advantages of using the MAC measurement is that it is quick and easy to use, requires no expensive or sophisticated equipment and the age of the child does not have to be known with great accuracy.

Protein energy malnutrition (PEM), also referred to as protein calorie malnutrition (PCM), is the most common nutritional disorder in the developing countries of Southeast Asia. Energy deficiency is usually more common than protein deficiency but the two types are interrelated. Inadequate energy intake can result in the use of dietary protein for energy instead of for growth and maintenance. Protein deficiency with adequate energy intake may occur if the staple food has a low protein content, e.g. cassava, sweet potatoes, etc., or if young children are fed porridges, soup or gruel as their staple food without protein-rich foods added to it. The most usual causes of protein energy malnutrition are:

- Poor meal pattern

A young child needs at least three meals a day in order to meet food requirements. When a young child is left to older children to care for, attention to the young child's diet may be neglected.

Discuss the typical work load of rural women. How easy is it for them to prepare frequent meals? What solutions are available?

- Late introduction and quality of supplementary food for infants

When a child is 4-6 months old, breast milk alone usually cannot provide enough food. Supplementary feeding of mixed foods should be introduced by this age.

Demonstrate the preparation of one or two simple mixed dishes for young children.

Notes for Teachers

- Abrupt weaning

The abrupt removal of a child from the breast, as often happens when the mother becomes pregnant again, may result in loss of appetite by the child and the refusal of other foods.

- Infections/infestations

Repeated attacks of diarrhea which are likely to occur with the use of feeding bottles in unsanitary conditions in the place of breast feeding, or to supplement it, result in underweight. Intestinal parasites such as hookworm or tapeworm deplete the body nutrients. Fevers, such as malaria, often result in low food intake.

Early signs of PEM

The early signs of protein-energy deficiency include:

Low weight for age,
Low height for age,
Low weight/height for age,
Small mid-arm circumference.

Extreme forms of PEM

The extreme forms of PEM, marasmus and kwashiorkor, can easily be recognized. In marasmus there is extreme wasting of body; the child usually weighs less than 60% of the normal weight for age. In kwashiorkor there is less wasting and loss of weight but edema is present. The milder forms of protein-energy deficiency are far more widespread.

Although this may have been done earlier, if time allows, briefly outline again the signs of marasmus and kwashiorkor or, better still, ask one of the students to do so.

Additional types of malnutrition associated with PEM

Other types of malnutrition are usually found when PEM occurs, such as anemia and vitamin A deficiency:

Those nutritional deficiencies present in the area should be discussed. Ask the health officer for information on which deficiencies are prevalent.

Notes for Teachers

- Anemia is a major world-wide health problem. It is usually due to iron deficiency caused by parasitic infestation and/or poor diet and results in weakness, lethargy and lowered resistance to infection.

- Vitamin A deficiency is a common occurence in Southeast Asia. A deficiency of vitamin A causes a weakness of body tissues, the skin, and the lining of several of the body's organs, resulting in reduced resistance to infection and sometimes to a stunting of growth in children. The eye is one of the first parts of the body to show effects of vitamin A deficiency: the ability to see in dim light is decreased and, with continued lack of vitamin A intake, even more serious eye troubles develop. A serious and continued vitamin A deficiency can even produce total blindness.

4. EFFECTS OF MALNUTRITION IN ADULTS:

In adults, undernutrition causes physical weakness and lack of stamina for sustained work. It reduces initiative and increases sluggishness. All of these conditions lead to low work productivity, low earning capacity, poor living conditions and probably limited educational experiences. These, in turn, reduce social and economic development in the community. Energy and initiative are particularly important in farming communities because sustained hard work begun and completed at a specific time is needed during the planting and harvesting seasons. Food intake adequate to provide the energy needed for the hard work of the planting and the harvesting seasons is often lacking.

Refer to the diagram "It is A Vicious and Spiraling Cycle" on page 18.

Notes for Teachers

5. ERADICATION OF MALNUTRITION:

Malnutrition is often called a socio-economic condition. Its eradication depends not only on increased food production but also on:

Nutrition education,
Environmental improvement, and
Rural employment and income generation among the poor

Describe poverty among typical landless farm families, including accessibility to food and other opportunities.

SUGGESTED PRACTICAL ACTIVITIES

1. PLANNING AND CONDUCTING A SURVEY OF LOCAL CHILD-FEEDING PRACTICES:

In a group exercise, students should plan a simple questionnaire for use in the same households selected for nutritional status studies. Suggested areas on which to get information are:

- Usual length of time to breast feed a baby.
- Whether bottle feeding is used and why.
- Age of the child when other foods are first introduced.
- Names of foods introduced.
- Whether foods introduced are home produced or bought.
- Number of meals given the child per day.
- Any foods considered unsuitable for young children.
- Persons other than the mother who gives the food.

(A sample questionnaire is given on page 68.)

Analysis of data obtained should identify:

A. Practices likely to cause dietary inadequacy.
B. Possible topics for a nutrition education programme.

2. USING MID-ARM CIRCUMFERENCE MEASUREMENTS TO ASSESS THE NUTRITIONAL STATUS OF YOUNG CHILDREN:

Although an agricultural worker is not usually expected to assess nutritional status, the ability to use the MAC measurement would be of value if the agriculturist should wish to determine the impact of an agricultural improvement programme on the incidence of underweight and if health workers are unavailable to participate in the project.

Materials required: non-stretch tape or thin strips of non-stretch cord or old ex-ray film cut in strips. If non-stretch tapes are not available, measuring strips can be prepared from other materials listed above. They should be marked as indicated below in Figure 5.1.

Above 13.5 cm - satisfactory
13.5 cm to 12.5 cm - at risk
Below 12.5 cm - undernourished

(Insert Fig. 5.1 A simple mid-arm tape measure)

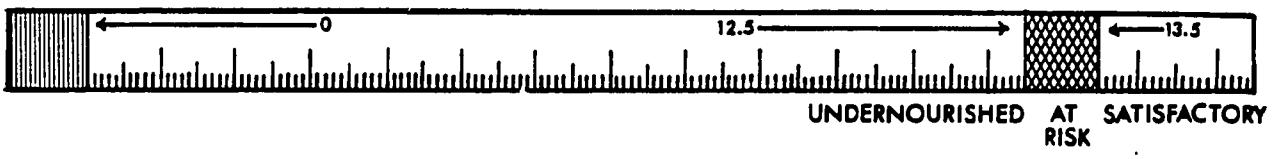


Figure 5.1 A simple mid-arm tape measure.

A convenient village or compound should be selected for a survey to assess the nutritional status of children, 1-5 years old. Prepare households for the survey by visiting the community leaders and the selected households to explain the reason for the survey and to ask for their help.

At each household the student should record the mid-arm circumference of the children known to be between the ages of 1 and 5 years.

Results could be tabulated as indicated below:

Household No.	Satisfactory	At Risk	Undernourished

Notes for Teachers

3. USING WEIGHT-HEIGHT MEASUREMENTS TO ASSESS THE NUTRITIONAL STATUS OF YOUNG CHILDREN:

The measurements are usually simple to take and agricultural workers should become familiar with the technique.

A. Materials required: A level balance preferably fixed with a height board graduated in centimeters.

B. Grading of malnutrition from standard weight tables should be demonstrated by the teacher using any of the standards in use by health workers or clinics in the locality.

Give a demonstration and supervise a few of the weight-height measurements in a class setting, or ask a health worker to supervise this activity before the students go to the village or compound to collect these measurements.

C. Selection of houses: Can be as described under measurement by mid-arm circumference.

D. Results can be tabulated as follows:

Classification of PEM Malnutrition from Height-Weight Data*

Household No.	Height	Weight	Normal 90% and above Standard	Mild Malnutrition 80-90% Standard	Moderate Malnutrition 70-80% Standard	Severe Malnutrition Below 70% Standard

*Standard used in this table: Waterlow, J.C. Nutrition in Preventive Medicine, WHO, Geneva, 1976.

Obtain standards used by the health workers for the vicinity to determine degree of normalcy and malnutrition.

SAMPLE QUESTIONNAIRE

For information regarding infant and child feeding practices to five years of age.

(Students should provide their own introductions)

Possible Questions	Answers
1. What are the ages of your children, 0-5 years? How many are boys? Girls?	Ages: Boys: Girls:
2. How long (in months) do you usually breast feed a baby?* How many times a day do you usually breast feed after 6 months of age?	Length of time Times a day
3. Do you ever bottle feed? If so why? At what age?*	Yes____; No____ Why? How old?
4. At what age do you usually first give food other than milk to your baby? What food do you usually give first?	Age Food ; how prepared
5. What foods do you offer next? At what age?	Food: Food: Food: Age: Age: Age:
6. After you start feeding your baby other foods, how many times a day do you give the food?	Once Twice Three times More often
7. How many meals a day at one year old? at two years old?	One year: Two years:
8. Do you always prepare the food for your infants and your children? If not, who usually prepares in your place?	Yes____; No____ Who else?
Do you always feed your infants and young children yourself? If not who else feeds them? How often? Why?	Yes____; No____ Who else? How often? Why?
9. If there are foods you believe infants and young children to 5 years old should not eat, what are they?	Foods not good for children? Reasons:

*If mother bottle feeds after weaning from breast, ask what age she weans child from bottle.

SUMMARY OF THE CONTENT OF TOPIC SIX: FOOD PROCESSING AND STORAGE

TOPIC SIX	OBJECTIVES	MAJOR CONCEPTS INVOLVED	SUMMARY OF CONTENT	PRACTICAL LEARNING EXPERIENCES	TEST OF UNDERSTANDING
Food processing and storage.	The student should learn to: 6.1 Describe local methods of food processing and storage and suggest improvements where needed. 6.2 Discuss the effects of processing methods on the nutritive value of foods. 6.3 Discuss the effects of storage methods on the quantity and nutritive value of foods available for food consumption.	Local methods of food processing and possible means of improvement for home use. The nutritive value of processed foods. Effects of different methods of storage on amount of food available for home consumption.	Processing of local foods: - Pounding/milling cereals, - "Polishing"/ parboiling rice, - Fermentation, - Drying/smoking, - Cooking. Effects of processing on nutritive value. Storage of foods for home consumption: - Baskets, - Small bins, - Storage houses, - Community storage facilities. Food losses in storage.	1. Case study to discuss improvements in food processing and storage. 2. Case-study to discuss post-harvest losses. 3. Visit to factories specializing in adequate food technologies for processing and storage if possible.	Describe the different steps in food processing and storage for the main food staple eaten in your country.

Topic Six

FOOD PROCESSING AND STORAGE METHODS

PERFORMANCE OBJECTS

The student should learn to:

6.1 Describe local methods of food processing and storage and suggest improvements where needed.

6.2 Discuss the effects of processing methods on the nutritive value of foods.

6.3 Discuss the effects of storage methods on the quantity and nutritive value of foods available for home consumption.

Notes for Teachers

CONTENT OUTLINE

1. TREATMENTS: PROCESSING METHODS:

The nutritive value of food eaten depends on any treatment it may receive from the time of harvest or slaughter until it is consumed. These treatments refer to both processing and storage methods used.

Ask students to describe methods of food processing and storage used in their home area.

Milling or pounding

Though these methods have little effect on the nutritive value of other types of foods they do affect the value of cereal products.

(Insert Fig. 6.1 Structure of a cereal grain)

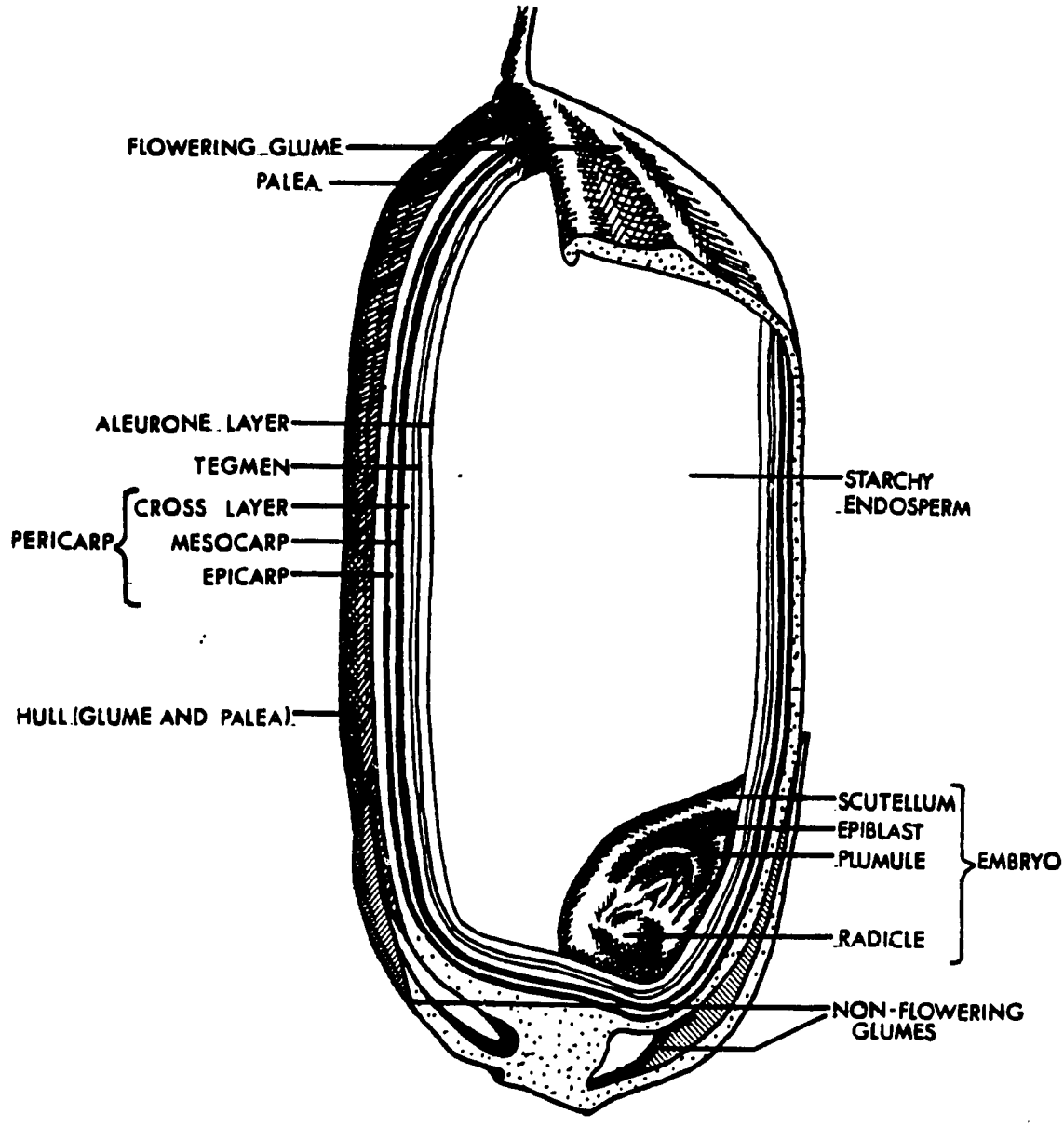


Figure 6.1 Structure of a cereal grain (rice).

Removal of the outer layers of the cereal grain lowers the nutrient content of that part of the grain that remains, such as rice. A comparison of the food value for rice and corn (maize) in relation to degree of milling is shown in Table 6.2.

Table 6.2 The effects of milling on the nutritive value of rice and corn flour (meal)

CEREAL	Nutrients per 100 grams*							
	Energy KCal	Protein gm	Fat gm	Iron mg	Calcium mg	Thiamin mg	Riboflavin mg	Niacin mg
Rice, Undermilled or home pounded	357	7.1	0.9	1.8	14	0.20	0.5	2.6
Rice, lightly milled and parboiled	354	8.0	1.5	2.0	10	0.25	0.05	2.0
Rice, milled, polished	352	7.0	0.5	1.0	5	0.06	0.03	1.0
Corn flour (meal), whole meal	362	9.5	4.0	2.5	12	0 30	0.13	1.5
Corn flour (meal), white (60% extraction)	354	8.0	1.5	2.0	9	0.05	0.03	0.6

*Figures for rice, undermilled or home pounded from Food Composition Table for Use in East Asia, FAO/U.S. Dept. HEW, 1972; other values from Platt: Tables For Representative Value of Foods Commonly Used in Tropical Countries, Special Report Series No. 302, Her Majesty's Stationery Office, London, 1977.

Notes for Teachers

"Polishing" of rice produces white rice with a very low thiamin content. Parboiling rice drives thiamin from the other layers into the starchy endosperm, resulting in smaller losses of the vitamin when rice is polished.

Fermentation in the presence of air, as in the production of sour milk or yoghurt, results in the formation of a weak acid which acts as a preservative. This process has little effect on the nutritive value of food.

In other methods of traditional food processing, the nutrients most affected are the vitamins, Thiamine, carotene, folic acid and vitamin C are destroyed by heat in the presence of air.

Drying reduces water content and stops most bacterial actions. In fish, protein content per kg of weight increases. However, water soluble vitamins are destroyed either partially or altogether. Riboflavin is destroyed by sunlight. Smoking is a drying method often used to preserve meat and fish.

Compile a list of preservation methods, using student's suggestions.

A list of some of the traditional methods used by Philippine farm families with recommendations for improvement follows:

Table 6.3 Some food preservation methods used in the Philippines

Food Materials	Traditional Method	Shortcomings	Improvements
Vegetables	Leaves, bulbs and roots fermented in brine and stored in clay pots or basins.	Store allows growth of surface micro-organisms.	Use of containers with small surface areas exposed to air; tightly fitted covers.
	Shredded vegetables packed in vinegar and sugar mixture.	Mushiness and discoloration	Slight heating in sugar-vinegar mixture.
Fruits	Large fruits sliced; small ones used whole; soaked in brine.	Softening	Careful selection of raw material, correct ratio of salt to water.
	Fruits whole or cut, cooked in sugar (in syrup, as paste or glaced).	Crystallization of sugar, mold development, fermentation	Proper concentration of sugar; air tight containers for storage.
Rootcrops	Thinly sliced sweet potato, sun dried.	Discoloration	Dry on metal sheets.
Meat	Pork and beef thinly sliced and cured with salt, sugar, soy sauce and spices; some meat ground or finely chopped with the same preservatives and then placed in sausage casings.	Microbial growth on surface, undesirable fermentation.	Less sugar, increase salt; packaging.

Fish	Small whole fish salted and sun dried; large fish split along back, degutted, salted and sun dried.	Too salty	Reduce levels of salt used (but still bacteriocidal).
	Fleshy fish (small and large) soaked in brine for a few hours and then boiled in same brine until well done. Air dried, then smoked until fish becomes brown or golden (depending on smoking material).	Microbial growth	Packing in air tight containers.
	Very small fish and softshell shrimp salted and allowed to undergo autolysis.	Too salty	Reduce levels of salt; proper packaging.
	Shrimp shelled and sun dried.		
Milk	Raw carabao's milk curdled with dried calf abumasum or vinegar, salted and molded in banana leaves.	Highly perishable, unsanitary handling	Pasturization of milk; removal of sufficient whey, use of proper equipment, proper packing.
	Raw carabao's milk cooked with sugar to a paste consistency, cooled, molded into small bars, then rolled in sugar.	Absorption of moisture from air, mold attack.	Proper packaging.

Notes for Teachers

Cooking

The longer the cooking method, the greater will be the losses of vitamins in the food. Losses of other nutrients are usually insignificant. The liquid in which food is cooked ("gravy"; "soup") usually has far less food value than the food itself, unless the food has a flaky or crumbly texture and has been thoroughly mixed into the liquid. The little food value found in the water in which food has been cooked comes from the soluble mineral salts and vitamins which leach out of the food on long cooking, some of which are destroyed by the heat.

Ask the students to recommend more effective food processing methods to make more food available for consumption.

The preservation of food allows a more varied diet during storage and may encourage the farmer to produce more, in the knowledge that it will not be wasted. Improving traditional methods of food preservation and preparation is very important to conserve the nutrient value of food.

2. TREATMENTS: STORAGE METHODS

In the dry or natural state is one of the ways used to preserve many foods for later family consumption. Food is usually stored in one of several ways:

- In baskets or bags,
- In bins,
- In the kitchen above the cooking place,
- In storage houses adjacent to homes, and
- In community storage facilities.

Ask the students for storage methods used in their home community. What improvements could be made to help make food available for the family throughout the year?

Some farm families need help in learning to handle these foods in a sanitary manner in order to avoid disease.

Losses are sometimes high due to molds, rotting, and destruction by insects, rodents and other animals. Some of these

animals also have diseases with them that may be transferred to humans later when they eat the food.

In many localities food availability could be increased by as much as 30% by helping farmers and farm families learn how to improve storage facilities.

SUGGESTED PRACTICAL ACTIVITIES

1. CASE STUDY TO DISCUSS IMPROVEMENTS IN FOOD PROCESSING AND STORAGE:

The students with the teacher will choose a staple food in the country (e.g. rice, corn, cassava or another important staple food) and study the different steps of food processing, handling, and storage at home or village level from the harvest to the table where it is eaten. The purpose of this study is to enable the students to:

A. Analyze the way in which raw staple foods are processed and later stored: to define as far as possible the physical, chemical and microbiological changes occurring in the food and their likely influence on the nutritive value;

B. Investigate (a) who makes decisions about what and how foods are processed and stored and (b) who does the work;

C. Make realistic proposals to improve food preservation and food storage methods of staple foods to save time and energy and to make more food available for home consumption throughout the year.

2. CASE STUDY TO DISCUSS POST-HARVEST LOSSES OF GRAINS:

In regions where cereals and/or grain legumes are important items of food consumption, with assistance from the teacher the students should:

A. List causal factors of the post-harvest losses (molds, insects, rodents, etc.) and classify them according to their importance in local conditions; summarize (a) farmers' attitude toward harvest losses and (b) what they are doing to improve the condition.

B. Determine whether or not the climatic conditions during the harvest season influence post-harvest losses;

C. Describe the storehouses used (shape, volume, fresh harvest placed in the storehouses, treatment of the fresh harvest for and in storage); where storehouses are too small or otherwise inadequate, find out from the farmers why they have not changed them;

D. Propose feasible improvements for storehouses.

3. VISIT TO A FOOD PROCESSING AND STORAGE FACILITY:

A visit to factories located within the community which specialize in adequate food technologies for processing and storage should be planned if possible. Such a visit will provide an opportunity for students to observe the processing and storage methods used in them. Ask the students to look for ways of better food storage and processing ideas that can be transferred to farming situations.

SUMMARY OF THE CONTENT OF TOPIC SEVEN: FOOD SUPPLY SYSTEMS

TOPIC SEVEN	OBJECTIVES	MAJOR CONCEPTS INVOLVED	SUMMARY OF CONTENT	PRACTICAL LEARNING EXPERIENCES	TEST OF UNDERSTANDING
Food supply systems	The student should learn to: 7.1 Discuss the factors that affect food production. 7.2 Understand and be able to use simple methods for monitoring food production. 7.3 Relate food supply to community food requirements and be able to recommend changes when needed.	The selection of indicators for monitoring production in different farming systems. Food supplies in relation to population requirements.	Food production systems: - Pastoral subsistence farming, - Settled subsistence farming, - Commercial farming, - Combination of commercial/subsistence farming. How these farming systems influence food supply. Choice of indicators: - Probable food production, - Actual food production. Assessing adequacy of food supplies by comparison: - Food production, - Incidence of malnutrition.	1. Comparison of crop production and nutrition requirement at farm level. 2. Preparation of a food flow chart to identify specific local problems in food production, food supply and food utilization.	The student should be able to: 1. Describe the early indicators for forecasting crop production according to the eco-system. 2. Compare food production of a hypothetical farm family with their nutritional requirements.

Topic Seven

FOOD SUPPLY SYSTEMS

PERFORMANCE OBJECTIVES

The student should learn to:

7.1 Discuss factors that affect food production.

7.2 Understand and be able to use simple methods for monitoring food production.

7.3 Relate food supply to community food requirements and be able to recommend changes when needed.

CONTENT OUTLINE

1. ADVANTAGES OF MONITORING AGRICULTURAL PRODUCTION:

A simple system for monitoring agricultural production improves the work performance of an agricultural worker by allowing him to:

- Assess the progress and beneficiaries of agricultural projects.
- Identify changes in levels of food produced for both home use and for sale.
- Assess the effects of cash cropping on local food supplies for home use.
- Identify deficits in food production for home use.
- Contribute valuable information for use by planners of agricultural and food and nutrition programmes.

2. AGRICULTURAL PRODUCTION SYSTEMS:

The production systems which an agricultural officer may encounter are:

Pastoral subsistence farming,
Settled subsistence farming,
Commercial farming and
A combination of subsistence/commercial farming.

The main factors which will influence production in these systems are summarized on the following page.

SYSTEM	FACTURES INFLUENCING SUPPLY	
	ECOLOGY	RESOURCE INFLUENCING SUPPLY
1. Pastoral subsistence farming	Rainfall, Pasture or ground carrying capacity, Pasture or ground area	Livestock and poultry: herd or flock numbers, productivity, disease, seasonal movements, Food stocks and losses, Sources of energy
2. Settled subsistence farming	Rainfall, Water availability periods, Cultivable capacity, Cultivable area/ family member	Agricultural equipment, Seeds, Pests and diseases, Credit, Cropping patterns, Food stocks and losses, Sources of energy
3. Commercial farming	Rainfall, Land utilization (cash vs. food-crop), Rural/urban	Food stocks, imports and exports, Food losses Price inputs, Demand, Price of produce, Sources of energy
4. Subsistence/ commercial farming	A mixture of the factors listed in (1), (2), (3), above	

Other factors may also influence production, e.g. road conditions, vehicle maintenance, presence of skilled personnel.

The factors listed above which influence food supply can be used to <u>indicate</u> food production.

3. FOOD SUPPLY INDICATORS:

The indicators selected for monitoring supplies should allow for both early indication of probable food supplies and actual production. Indicators are applicable to other commodities, though time restrictions may limit monitoring.

SYSTEM	EARLY INDICATORS	LATER INDICATORS
Cropping, subsistence or commercial	Rainfall patterns and surface water availability	Harvested outputs,
Key crops only e.g. legumes, staples (unless a complete picture is required)	Crop areas Predicted yields Major pests and diseases	Storage conditions
Livestock, poultry, etc.	Rainfall patterns and surface water availability	Livestock and flock productivity,
Subsistence or commercial	Pasture availability Pasture pests, animal or flock diseases	Livestock and flock numbers

4. USE OF FOOD SUPPLY INDICATORS IN AGRICULTURE:

In his geographic location the agricultural worker will need to know exactly the production system which can include the four food production types listed on pages 80-81 and see to what extent the food production systems of the area can meet the economic and nutritional requirements of the population.

On the basis of certain early indicators already described for each type of agricultural ecology, the agriculturist will be able to forecast increase, decrease, etc. in production. He can use this early warning system of crop production as a monitoring device for nutritional surveillance. He can forewarn the relevant authorities what to expect in the near future. This can be further supplemented in cooperation and coordination with local health workers by measuring the weight for age or mid-arm circumference of 1-5 year old children selected randomly from the locality. Combination of these two will make an ideal early warning system for nutritional surveillance in a locality.

Notes for Teachers

This monitoring system can be further improved by actual data collection on crop production and food supplies and a comparison of the data with nutritional requirements. Any decrease in commodity production relative to population size, unless compensated for by increasing production of another commodity of similar food value, will adversely affect the variety and amount of food available for home consumption in the subsistence sector.

In the data analysis, the agricultural officer must be able to compare the food supply with the nutritional requirement, at least at the local level. He must be familiar with the balance sheet method of comparing food supplies with food requirements. He can use this food monitoring system at:

- Farm
- Village, or
- National level

as demanded by his level of responsibility. When working with farmers, this balance-sheet method of comparing available food supplies and requirements is an excellent technique to learn to use effectively.

From an agricultural officer or an agricultural economist the teacher can obtain a production/supply/requirements balance sheet. Show this to the students and, if needed, ask an agricultural economist to talk to them about this method of monitoring food supply/requirements.

Using a food balance sheet to relate food availability to nutritional requirements:

At national levels: This is usually done by compiling a food balance sheet for the country and comparing available nutrients with nutrient requirements.

On the credit side, a balance sheet takes into account total production of food, imports, and new manufactured food. On the debit side, the food balance sheet includes foods used for seed, animal feed, other non-food uses of food, exports, food waste, and foods used for manufacture of new foods. From this, one works up the balance for each item of food available for human consumption for a particular year, as:

Food Balance Sheet For Food A

Debits		Credits	
Used as seed	y	Total production	xxxx
Used as feed	y	Imports	x
Other non food uses	y	New food manufacturing	x
Exports	y		
Food waste	y		
New food manufacturing	y		
Total	yyyyy		xxxxxx

Credits (xxxxxx) - debits (yyyyy) =
food available for consumption.

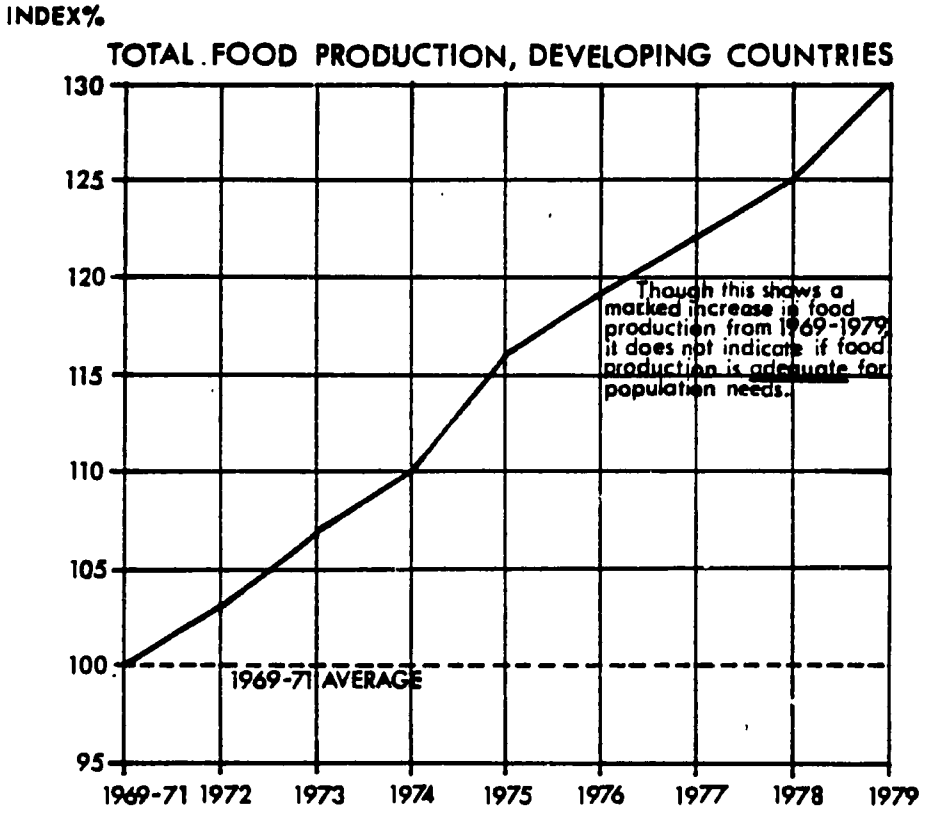
The average per person availability of each food item is then obtained by dividing the food items with mid-year population of the country. It is then converted into nutrients at the retail level. Food balance sheets provide a valuable trend in food availability over a period of time.

(Insert Fig. 7.1 Index of total and per caput food production in developing countries, 1969-71 to 1979 [includes China]*)

*1979 FAO Production Year Book, Vol. 33. Food and Agricultural Organization of the United Nations, 1980.

INDEX OF FOOD PRODUCTION IN DEVELOPING COUNTRIES (INCLUDES CHINA)

YEAR	TOTAL	PER CAPUT
1969-71	100	100
1972	103	98
1973	107	100
1974	110	101
1975	116	103
1976	119	104
1977	122	103
1978	125	104
1979	130	106



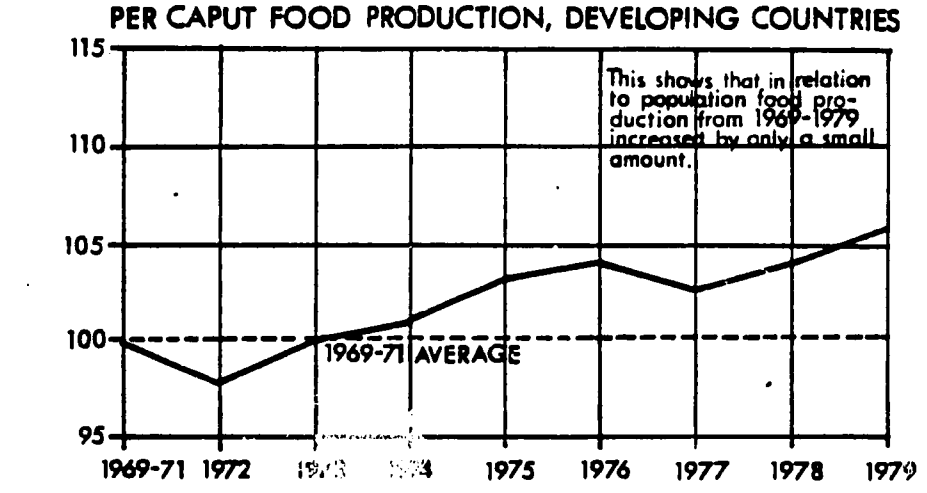


Figure 7.1 Index of total and per caput food production in developing countries, 1969-71 to 1979 (includes China).

Figure 7.1 is a presentation of the index of total food production in developing countries compared with the index of per capita food production in these same countries, using 1969-71 as the standard (6). From 1969-71 through 1979 total food production increased by 30 percentage points. However, an analysis of food production alone does not indicate if food production is adequate for population needs. The per caput food production chart shows that when food production is related to population for the past 10 years (per caput food production), food available has increased by only a small amount.

At farm and community levels: This can be worked out on the same principle as for in the national level, but in a more exact way, and can be compared with nutrient requirements for the family or the community.

A record of increases in food production will indicate changes in agricultural development programmes but will not of themselves indicate if the nutritional status of the community is improving. If the population remains constant, then increases in food productions could be assumed to result in increased food consumption. However, in many rural areas the population is increasing more rapidly than food production. Also, some of the crop is usually sold outside the community. Thus the use of the food balance sheet, which takes these factors into account, is helpful.

Using food supply/malnutrition incidence data:

Another method the agriculturist can use to monitor adequacy of food supplies at the community level is to compare local food production figures with the local incidence of malnutrition. Health statistics, particularly anthropometric data for pre-school and school-age children, can indicate how satisfactory previous food supplies may have been and assist in the developing of food production targets.

This type of record keeping allows the agricultural worker to evaluate his own programme and relate its effects to the food and nutrition situation in the community.

(Insert Fig. 7.2 A flow chart, showing some factors affecting food flow)

Using a food flow chart:

Working in the neighborhood or the area of a vacation project, the student should compile a simple chart to show how food reaches the consumer on his table and is used in his body. The student will then be able to identify particular sites in the flow system where food supply or utilization might be impeded. An example of such a food flow is presented in Figure 7.2, with suggestions for compiling a local food flow system.

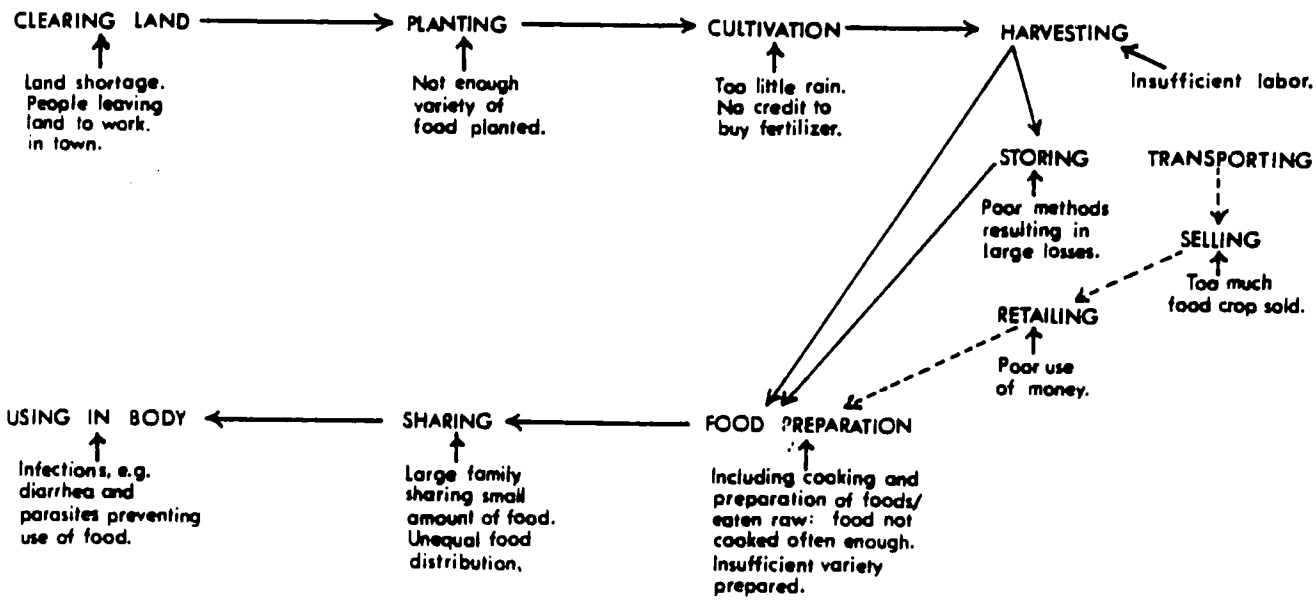


Figure 7.2 A food flow chart, showing some factors affecting food flow.

SUGGESTED PRACTICAL ACTIVITIES

1. ESTIMATION OF FOOD PRODUCTION/FOOD AVAILABILITY FOR A FARM FAMILY:

   Annual crop production in a farmer's family should be estimated from agricultural data provided on the one had by the farmer (such as amount of seeds used, area cultivated, etc.) and on the other hand by the agricultural services (average yield). For crops, the amount of the stored crop retained for use of the household as well as the amount to be sold should also be estimated. The teacher can suggest to the students sources available for data from agricultural services if the farmer does not have information available.

   These figures could be compared with food eaten (see Topic Three) and with nutritional requirements.

2. PREPARATION OF A FOOD CHART:

   A food flow chart for a family or a community should be prepared using the outline shown in the topic.

SUMMARY OF THE CONTENT OF TOPIC EIGHT: FOOD DIVERSIFICATION SYSTEMS

TOPIC EIGHT	OBJECTIVES	MAJOR CONCEPTS INVOLVED	SUMMARY OF CONTENT	PRACTICAL LEARNING EXPERIENCES	TEST OF UNDERSTANDING
Food diversification systems	The students should learn to: 8.1 Relate existing local food production systems to community food needs. 8.2 Relate diet quality of vulnerable population groups within the community to amount and variety of food production and to the methods of food processing, storage and distribution used. 8.3 Recommend ways to diversify food systems in relation to food production, processing, storage and distribution in order to meet the nutritional needs of population groups within the community.	Local patterns of food production and farm diversification.	Likely deficiencies of a typical rural diet: - Energy - Fat Foods which would improve a typical diet. Consideration of farm diversification such as: - Acceptability, - Input costs/returns, - Labor requirements, - Market potential.	Group discussions and case study analysis on the improvement of agricultural patterns in relation to food consumption, using local data. Whenever possible farmers should be invited to the class to comment on recommendations made.	The student should be able to: Discuss the main defects in local diets. Make appropriate recommendations for crop diversification for removing diet defects. Analyze case studies and local food production situations to improve both income and nutritional status of farm families.

Topic Eight

FOOD DIVERSIFICATION SYSTEMS

PERFORMANCE OBJECTIVES

Notes for Teachers

The student should learn to:

8.1 Relate existing local food production systems to community food needs.

8.2 Relate diet quality of vulnerable population groups within the community to amount and variety of food production and to the methods of food processing, storage, and distribution used.

8.3 Recommend ways to diversify food systems in relation to food production, processing, storage and distribution in order to meet the nutritional needs of population groups within the community.

CONTENT OUTLINE

The quality of a diet depends on the variety of food it contains. Diets with little variety are likely to be inadequate in nutrient content. When planning a food diversification programme to encourage production, distribution and consumption of a mixture of foods, consideration should be given to such factors as:

1. EXISTING FOOD PATTERNS AND DIETARY DEFICIENCIES:

A typical rural diet in Southeast Asia consists largely of a carbohydrate-rich food, which is usually a cereal such as rice or, sometimes, corn. The fat content of the diet is usually low. In order to meet energy requirements, a large amount of food must be eaten. Energy deficiency in the diet is usually common, especially among young children whose food intake is limited by stomach size. An inadequate energy intake in

Refer to the typical local food consumption survey and patterns discussed in Topic Two.

Notes for Teachers

children can result in reduced utilization of protein for growth since, when dietary carbohydrate is inadequate, protein is used to satisfy the body's need for energy.

Since fat provides more than twice as much energy as carbohydrate, gram for gram, the energy content (or energy density) of the diet can be increased by encouraging greater use of oilseeds (sesame, soya, etc.) and vegetable oils, such as coconut and palm oil. Legumes (mung and climbing beans, chickpeas, cowpeas, etc.) are also useful in increasing the energy of the diet. In addition both oilseeds and grain legumes are good sources of protein. If the staple food is low in protein content (e.g. cassava, other roots and tubers) and the intake of oilseeds, grain legumes or animal products is also low, protein deficiency is likely to occur in children; however, the protein intake of adults is usually adequate if the dietary energy is sufficient.

Use food portions selected from Fig. 4.2, page 51. Illustrate difference in food value. Refer also to Topic Three.

The quality of protein intake is improved by the use of a mixture of foods in the diet. Since all proteins differ somewhat in amino acid content, a mixture of foods, especially when they are from vegetable sources, is more likely to provide all the amino acids in the amounts needed for humans.

2. ACCEPTABILITY:

The amount of staple food eaten will depend on the number of meals eaten per day and on the palatability/acceptability of the relish. For example, grain legumes, which provide excellent food value, are often not as acceptable as an animal product. If a new food crop is introduced or if greater consumption of a familiar food is to be encouraged, assistance from home economics extension workers should be sought to show women different ways to prepare the food.

Notes for Teachers

3. INPUT COSTS AND RETURNS:

Choice between two similar and equally acceptable foods may rest upon difference in costs. The feasibility of introducing a new crop or new type of livestock will depend upon funds available, reliability of supplies of seeds, fertilizers, feeds, water, etc.

4. LABOR REQUIREMENTS:

The introduction of a cash crop requiring heavy labor may conflict with cultivation of food crops for home consumption or remove labor from home improvement programmes. When this happens the amount of food produced for food consumption may decrease, but the individual farmer engaged in cash crop production may increase vegetable and fruit production on home lots if he understands the importance of doing so.

Quote any local example you know of the introduction of cash crops being associated with a change in the incidence of malnutrition.

5. MARKET POTENTIAL:

If livestock, poultry, fish or a crop has potential as a source of income there will be more incentive to produce it. A source of income should allow a family to buy foods to improve its diet, though often the money earned may be used to buy other non-food items such as clothes, radios or bicycles. Cash crops do not need to compete with or displace food crops for food consumption; both can and should be grown. If little or no food crop is grown, if the price of the cash crop or the market falls the consequences for the family diet could be severe. Likewise, without a source of income the family will also suffer. In his agricultural development programme the agricultural officer needs to help farmers learn to plan how to maximize land use in order to produce crops to provide for both income and home food supply.

6. NUTRITION EDUCATION:

Dietary adequacy may be threatened by the introduction of a cash crop if production of food for home consumption is allowed to decrease and enough of the cash crop income is not used to purchase the needed food. Thus nutrition education should be an important part of the agricultural programme.

7. HEALTH IMPLICATIONS:

Although fish ponds can be used to increase income, fish ponds and irrigation channels may also be potential sources of bilharzia or malaria. Regular checks should be made to insure that bilharzia-carrying snails do not become established. Conflicting messages may be given to farmers from various community agencies. Therefore the agriculturist may find it helpful to get the leaders of the agencies together to discuss health/agricultural issues with the farmers.

SUGGESTED PRACTICAL ACTIVITIES

1. GROUP DISCUSSION:

This exercise allows students to discuss possible ways in which local agricultural production patterns can be improved in order to increase amount and variety of food supplies.

The teacher should use local information to construct a case study, relating typical agricultural methods and production patterns to local nutritional problems. Students working in groups can discuss the implications of these case studies in terms of appropriate improvements in agricultural practices.

Alternatively, this exercise could be in the form of a field visit to discuss cropping patterns in the neighborhood and suggest improvements appropriate to the food and nutrition situation.

Two examples of case study outlines follow. These should be of value to the teacher in developing his own case study.

Example A

The area in Southeast Asia is one of acute land shortage. The average family holding is approximately 0.3 hectares (approximately 3/4 acre). Rainfall is more than 200 cm (more then 100 inches) and the soil is clay loam.

Yields of selected crops follow:

Rice	1,800 kg/hectare	or approximately 730 kg/acre
Corn (maize)	900 kg/hectare	or approximately 375 kg/acre
Sweet potatoes	8,000 kg/hectare	or approximately 3,250 kg/acre
Grain legumes	450 kg/hectare	or approximately 185 kg/acre

Cropping pattern

(Insert Fig. 8.1 A cropping pattern for case work study, limited land holding, ample rainfall)

Average food consumption gm/head/day	
Rice	300
Corn (maize)	50
Sweet potatoes	90
Soyabeans	30
Green leafy vegetables	142
Other vegetables	48
Red palm oil	35
Animal products	10

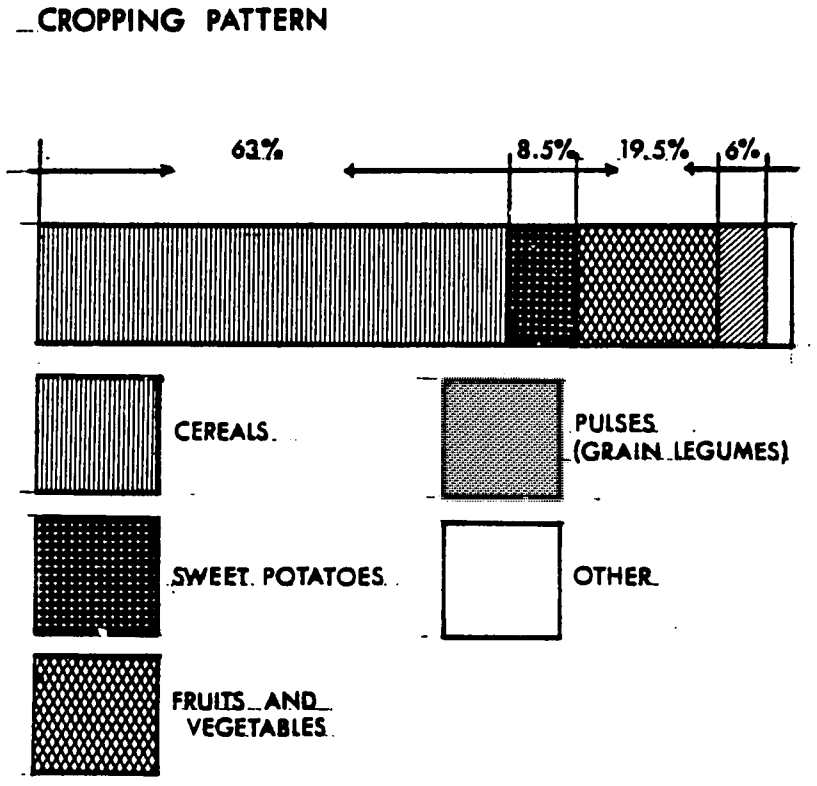


Figure 8.1 A cropping pattern for case study work, example A.

Notes for Teachers

Food consumption

The energy and protein intakes of the people are about 90% of requirements.

Students should discuss what recommendations they could make to improve the amount and variety of food produced.

Each group should present a brief report explaining their recommendations. If possible, farmers from the community should be invited to the class to comment on recommendations made.

A general discussion to select the most appropriate recommendations should be held.

Student suggestions could include the following:

- Use of a mixed cropping system,
- More mung beans and legumes as intercrops,
- Use of compost to increase yields,
- Increase amount of land given to legumes,
- Using a surveillance team (consisting of community members) to monitor and make recommendations for improvement at regular intervals.

Example B

This area has no land shortages. The average farm is approximately 10 hectares (approximately 25 acres). The area cultivated is limited largely by agricultural implements (hoes). The "slash and burn" method of cultivation is used. Rainfall is less than 125 cm (less than 50 inches).

Yields of selected crops follow:

Rice	1,750 kg/hectare	or approximately 1,700 kg/acre
Corn (maize)	850 kg/hectare	or approximately 350 kg/acre
Grain legumes	450 kg/hectare	or approximately 185 kg/acre

Cropping pattern

(Insert Fig. 8.2 A cropping pattern for case study work, ample land, limited farm implements, limited rainfall)

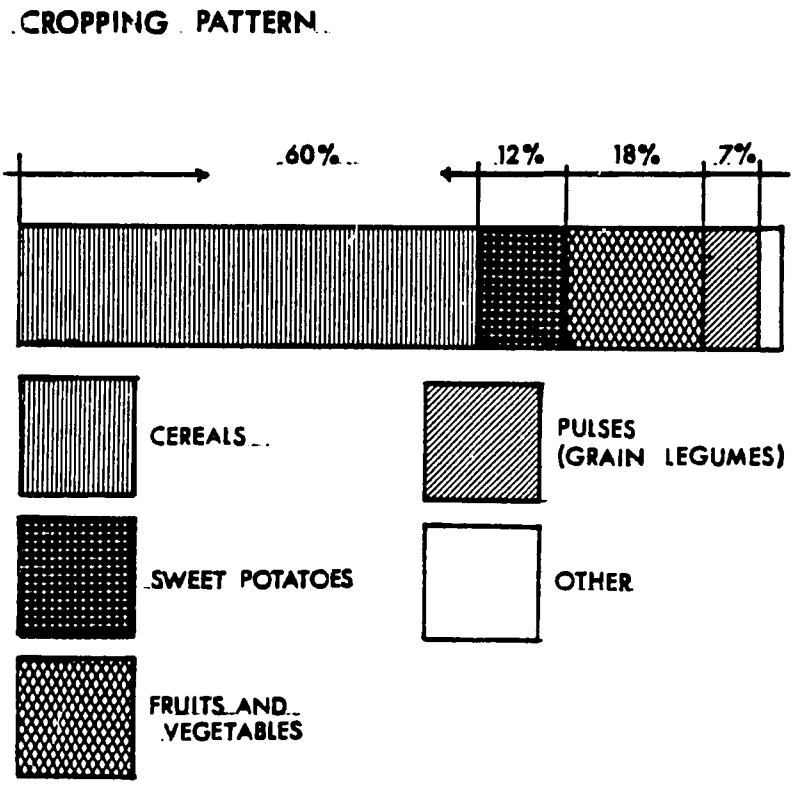


Figure 8.2 A cropping pattern for case study work, example B.

Average food consumption
gm/head/day

Rice	400
Sweet potatoes	55
Grain legumes	10
Leafy vegetables	43
Other vegetables	89
Animal products	50
Fruit	9
Fats and oils	10

Food consumption

The energy intake of the people is about 85% of requirements. Protein intakes are adequate. Intake of vitamin A is low.

Students should discuss what recommendations they could make to improve the amount and variety of food produced.

Each group should present a brief report explaining their recommendations. A panel of community farmers to react to the recommendations and make additional ones would be helpful.

A general discussion to select the most appropriate recommendations should be held.

Students should be encouraged to keep their notes for these problems handy; an opportunity to use these ideas for implementation work will be provided in later topics.

Notes for Teachers

Student suggestions could include the following:

- Use of compost,
- Increase amount of land for legume/bean production and for green leafy vegetables,
- Grow fruit trees on land near house,
- Raise chickens,
- Use a surveillance team consisting of community members to monitor and make recommendstions for improvements at appropriate intervals.

2. NUTRIENT SOURCES:

This exercise is to remind students of the nutritive value of foods. It could be done as a piece of evening work. However, prior to beginning the assignment, students would benefit from seeing posters and slides that show the signs of nutritional diseases given below.

Students should complete the reference sheet, giving for each nutrient included:

A. Signs of deficiency in man
B. Three examples of locally available foods which are good sources of the nutrient
C. Brief notes on the cultivation of each food listed e.g. planting time, expected yields.

Table 8.3 Providing foods to prevent common diseases related to nutritional deficiencies.

Signs	Nutritional disease	3 examples of suitable food sources	Notes on production of these foods
Emaciated children	PEM Marasmus type		
Children with oedema hair changes, etc.	PEM kwashiorkor type		
Pale skin and mucous membranes	Anemia		
Blindness in dim light	Avitaminosis A		
Swelling of the thyroid	Goiter		

SUMMARY OF THE CONTENT OF TOPIC NINE: FOOD AND NUTRITION PROGRAMMES AT NATIONAL AND COMMUNITY LEVELS

TOPIC NINE	OBJECTIVES	MAJOR CONCEPTS INVOLVED	SUMMARY OF CONTENT	PRACTICAL LEARNING EXPERIENCES	TEST OF UNDERSTANDING
Food and nutrition programmes	The student should learn to: 9.1 Understand and interpret to community groups national nutrition policies or goals (as the case may be) aimed at improving nutritional status. 9.2 Given the food and nutrition situation of a family or a community, help develop an appropriate food and nutrition programme.	National food and nutrition policy to improve food availability and utilization. The integration of nutrition policy into national planning for social and economic development and functions of each sector of the economy in implementing this policy from national to local levels. Use nutrition as a tool, an objective and an indicator of development. The need for and support of integrated programmes to improve nutritional status, especially at the local level.	A review of government policies which have an impact on human nutrition, such as: - A national nutritional body with responsibility for food and nutrition planning, - Food production, - Nutrition education programmes, - Feeding programmes, - Food subsidies, - Food stocks, - Food fortification, - Health, home economics and agricultural extension services, - Complementary programmes: (1) health and sanitation, (2) income generation, (3) employment opportunities. Organization of community-based nutrition programmes.	1. Local nutrition official invited to talk on national and local food and nutrition programmes. 2. Use of case study to discuss, analyze and make recommendations for human nutrition improvement programmes applicable to the community level. 3. Appraisal of an existing or completed agricultural development programme/project.	The student should be able to: Discuss five important components of a national nutrition programme. State at least three important components of a nutrition programme in his country. Using three components in the national nutrition programme in his country, relate how he would use these components in a community-based programme.

Topic Nine

FOOD AND NUTRITION PROGRAMMES AT COMMUNITY AND NATIONAL LEVELS

PERFORMANCE OBJECTIVES

Notes for Teachers

The student should learn to:

9.1 Understand and interpret to community groups national nutrition policies or goals (as the case may be) aimed at improving nutritional status.

9.2 Given the food and nutrition situation of a family or a community, help develop an appropriate nutrition programme to improve the situation.

9.3 Integrate a nutrition component into his own agricultural programme and use nutrition as a tool, an objective and an indicator of agricultural development.

CONTENT OUTLINE

Malnutrition is a multi-faceted problem and its eradication needs multi-faceted approaches. The root causes of malnutrition in Southeast Asia lie in social and economic underdevelopment of most of the countries of the region. Therefore nutrition planning must be an integral part of national planning for social and economic development and should involve nutrition surveillance. National goals for nutrition must be established and put into the overall national development plan. The role of each sector of the economy must be clearly defined in relation to the nutrition goals and the machinery for implementing and coordinating these goals in relation to all segments of national and local government must be provided. Possible measures include:

This topic covers the types of activities which may be used to improve the food and nutrition situations of the country in Southeast Asia where the student lives.

1. FOOD PRODUCTION AND DISTRIBUTION PROGRAMMES:

   Government policy may provide for various institutions such as schools to

Notes for Teachers

operate food production units in order to promote interest in agriculture and in increasing food production. Special incentives may be offered to farmers to encourage production of a new food commodity or to increase level of output. Marketing facilities and cooperatives should be developed. Prices of selected items such as fertilizers, feeds, pesticides, etc. can be kept low by government contributions. Rural roads and electrification are also important inputs of government.

2. HEALTH SERVICES PROGRAMMES:

Free or subsidized health services assist in lowering mortality from malnutrition. Budgets providing for preventive health measures, however, are usually low in both developed and developing countries. For the most part, the countries in Southeast Asia are no exception. In many developing countries preventive medicine is often in the form of occasional lectures or demonstrations to mothers attending baby clinics and may have little impact on the problem of malnutrition. Attention should also be paid to other health programmes such as those dealing with potable water, innoculations, deworming, use of local health aides and indigenous medicines which can affect nutrition.

Discuss any special nutrition oriented programmes sponsored by the Department of Health such as:

- Rehabilitation centers.
- Treatment of underweight by vitamin-protein supplements.
- Food supplementation programmes for infants, 6 mos.-1 year.

Ask if there are special health service programmes in the students' communities. If so, how do they work and how are they evaluated?

3. NUTRITION PROGRAMMES, INCLUDING:

Nutrition education programmes:

Nutrition education should be an integral part of any development programme. Outlets for nutrition education may include political organizations, the mass media, the school curriculum, extension services, maternal-and-child health clinics, farm cooperatives, woman's clubs, other community-based groups and organizations.

Discuss how nutrition oriented programmes sponsored by the Ministry of Health can be linked with the nutrition interests and programmes sponsored by agricultural interest groups.

Notes for Teachers

Feeding programmes:

Many countries have supplemental feeding programmes for the nutritionally vulnerable groups within the population, such as

- Pregnant and lactating women,
- Infants and very young children,
- School-age children, and
- Disadvantaged farm families.

The programmes usually provide some foodstuffs needed to relieve malnutrition in the community. The supplementary food or foods may be provided without cost to all individuals in the community who qualify, or at a very minimum cost. School lunches are sometimes provided free of charge to school children in economically depressed geographic areas. Other supplemental feeding programs may be community-based and offer extra food for all those families showing signs of malnutrition. In some countries and localities the community-based programmes may only offer supplemental foodstuffs to one group of the nutritionally vulnerable people in the community.

Supplemental feeding programmes, when joined to nutrition education and farm improvement programmes, are usually very effective. These educational programmes help to increase local food production and use.

Ask the students to tell about the supplemental feeding programmes in their communities if there are any. Ask them if they know or have heard of the Food-for-Work program where unemployed persons may be paid for specified work in food commodities instead of money.

Students should be asked to make a list of the various types of food programmes available in the country, specify the sources, types of operation, what foods are provided, recipients, and other helpful information.

Food subsidies:

Another way of making food available to economically disadvantaged people is for the government to subsidize a part of the cost of foods important to the nutrition and diets of the people. A policy in some of the Southeast Asian countries is a partial subsidy of rice so that its retail price can be maintained at a price most people can afford.

An agricultural economist might be invited to talk about government food subsidies, how they work, etc.

Notes for Teachers

Food stocks:

In times of abundant harvests, the government may purchase stocks of staple foods to store and hold for times of food scarcity or to maintain prices of surplus food produced by farmers. These food stocks are usually nutritious foods consumed by the people in large amounts. By use of food stocks, when a food scarcity occurs food supply can be increased by releasing the food stocks to the market.

Food fortification:

Nutrients may be added to foods to improve the diet, e.g. iodine to salt for the prevention of goiter, thiamin to rice for the prevention of beri-beri. However, such measures are of limited benefit to farm families which exist at subsistence levels and spend very little money on food.

4. EMPLOYMENT AND INCOME GENERATION PROGRAMMES:

Ideally, nutrition programmes need an integrated approach in order to be effective. Joint programmes involving the departments of agriculture, health and rural or social development will result in more rapid development than a programme carried out in isolation.

Ask students to identify sources of income for landless farmers. Since malnutrition is more prevalent among the poor and landless farmers, food production projects must employ technologies which will use idle farm labor. Income generating projects, e.g. cottage industries are essential to enable the rural poor to buy other essential foods and necessities not produced on the farm.

5. DISTRICT/VILLAGE LEVEL PROGRAMMES:

These community-based programmes may be under the supervision of the District Development Committee or another community-wide organization. The

Discuss the approach used in an intensified or "model" development area in the country.

Notes for Teachers

components of these programmes may include:

- Crop diversification.
- Improved crop, animal husbandry, and other food stuffs.
- Supplementary feeding.
- Improved water supplies.
- Improved hygiene and sanitation.
- Improved marketing and distribution.
- Income generating projects.
- Farm employment.

Because of the many and varied factors which influence food production and utilization of food, different types of activities are needed to improve the nutritional status of a population. An agricultural officer should, by working with his colleagues from other agencies at the local level, secure wide and active community participation in decision-making and program activities. This participatory community process will help ensure that programmes the officer plans for agricultural development will also assist in improving the food and nutrition situation of the community, particularly among the landless and poor families.

Refer back to Fig. 1.1, Topic One, page 18, "Factors affecting nutritional status."

The collection of nutritional data should be undertaken at the same time as the collection of agricultural data is made. In this way a nutritional surveillance becomes an integral and on-going part of the community agricultural programme. It serves as a sound basis for recommending changes and additions to the agricultural programme which will improve nutritional status within the community.

SUGGESTED PRACTICAL ACTIVITIES

1. A LOCAL NUTRITION OFFICIAL TO SPEAK:

   Invite a local official involved in nutrition programmes to speak to students about national and local nutrition goals and measures which are being implemented to improve the food and nutrition situation. Ask students to write a summary of the presentations and, in addition, to include any ideas they may have to improve:

   - The goals.
   - Implementation of the goals.

2. CASE STUDY: (Case-study 9.1: the Applied Nutrition Programme, an 8-year report)

   The case study below briefly reviews the Applied Nutrition Programme in 8 pilot villages in Korea in a project that was begun in 1968. The food and nutrition problems encountered in that country are similar to those at several other developing countries in Southeast Asia. Using this case study for these 8 villages for purposes of comparison with local situations, students should work in groups of three or four to discuss the suggested topics. Following these group discussions a general class discussion should be held to propose suitable approaches to develop and reach appropriate food and nutrition objectives for improvement in the amount and variety of food available in the communities in which the students live.

   A. The situation, Korea:

   Korea is a rice-eating country of fairly high population density; the average family land holding is only about 0.9 hectares (2.23 acres).

   (1) Food consumption before the start of A.N.P.:

   Rice was the chief article of the diet, though small amounts of barley, wheat and sweet potatoes were also eaten. Soya beans, other grain legumes and vegetables were eaten with the staple food. The intake of animal products was very small.

   (2) Contribution of various types of foods as % of the total food intake in the 8 villages at start of A.N.P.:

	%
Cereals, mainly rice	52
Sweet potatoes	4
Soyabeans and other grain legumes	6
Green leafy vegetables	10
Other vegetables	25
Animal products	3

(3) Most vulnerable groups to malnutrition:

Unequal distribution of food and the traditional meal pattern of usually one meal a day indicated that children and pregnant women were nutritionally vulnerable. Young children received no supplementary feeding until they were 12-18 months old.

(4) Conditions of general health:

The incidence of round worms was reported to be about 70-90% and of hookworm, 15-30%. Typhoid and dysentary were common.

B. Objectives of the Applied Nutrition Programme:

The objectives of A.N.P. were to (1) improve both amount and variety in the daily diet and (2) decrease rice imports and more specifically to:

- Promote the production and consumption of selected nutritious foods.
- Improve methods of food processing and preservation.
- Improve village water supplies.
- Establish village nutrition centres for:
  Vulnerable group feeding and
  Nutrition education.
- Train and orient project personnel.

C. Implementation of A.N.P.:

(1) Programme outline:

A number of pilot villages (11 initially and additional villages added in successive years) covering all districts in the country would be selected to receive government assistance to meet A.N.P. objectives. These pilot villages would serve as models to demonstrate improved farming methods and improved food and living habits to neighbouring villages on a wholly self-help basis. (This case study reports the results in eight of these villages.)

(2) Targets for each pilot village:

- Each household would be encouraged to use 100 m^2 of land for growing green leafy and yellow vegetables with the government providing seeds, fertilizers, and insecticides.
- Each household would plant two fruit trees provided from government sources.
- Each household would be encouraged to use 200 m^2 of land for soya bean cultivation.
- Each village would receive two poultry units, each with 30 layers with the government providing two-month-old chicks and funds for disease control. Later each village would return the same number of two-month-old chicks to be used in other villages.

- The government would provide baby goats, farmers returning in time the same number of goats of the same sex and size as the ones received.
- Each village would receive handpumps and cement aprons for two wells which they would dig.
- An intensive nutrition education programme would be carried out.

(3) Funding:

In addition to the seeds, fertilizers, insecticides, fruit trees, poultry units and baby chicks, goats, handpumps and cement provided from government sources, a revolving fund system was also established (households returning cash or kind for assistance received) to enable as many households as possible in the pilot villages to adopt improved methods. Approximate budget per village: $850.00

D. Report of some of the 8-year results obtained for the 1976 evaluation:

(1) Number of pilot villages in A.N.P.

Year:	1970	1973	1974	1975	1976
	171	447	597	707	827

(2) Number of villages joining A.N.P. on self-help (no financial aid) basis: 138

(3) Food production in tons per year:

Food	1968-70	1971-73	1974-75
Legumes (esp. soya)	23	235	431
Green leafy and yellow vegetables	503	2,238	2,860
Eggs (millions)	1.66	14.61	18.61

(4) Food consumption (gm/head/day) of selected commodities:

Food	1968	1976	% Change
Rice*	552	374	-32
Protein foods	45	130	+189
Green leafy and yellow vegetables	64	181	+183
Calcium foods	8	38	+375
Fats and oils	1	13	+1,200

*Villagers produced and ate more wheat, barley and sweet potatoes in place of rice. This helped reduce rice imports and was beneficial in saving foreign exchange.

(5) Anthropometic measurements:

Weights and heights of school children for the same ages from A.N.P. villages were about 3 cm and 1 kg higher on an average in 1974 than in 1968.

E. Suggested points for student discussion:

- What conclusions about A.N.P. can be drawn from the findings of the evaluation given here?
- What additional information would assist such an evaluation?
- Is an increase in fat/oil intake desirable in this situation?
- In what ways would the objectives of an A.N.P. differ in your country/community or village?
- The production and consumption of which foods would you encourage in a similar situation in your country?
- What would be the approximate input costs to provide 100 households with material for the vegetable, soya bean and fruit tree projects? For the initial chicks and goat projects?
- What would be the expected yield from 200 m^2 of an acceptable: legume, e.g., mung beans, peanuts, soya beans, etc., in your area? What intake would this allow per head per day, assuming a family size of six? What method of storage would you recommend to ensure an all-year-round supply?
- What factors could limit the voluntary spread of such a development programme in your country? What feasible solutions are there?
- What similar programmes are currently being operated in your country? What effects are they having; or are they expected to have, on the food and nutrition situation?

F. Suggested background questions for the leader to use to encourage students to consider methods of approach for integrated applied nutrition development programmes:

- What are the problems of the present food and nutrition programme in your country?
- What would be realistic objectives for improving the present situation in your community (village)? What objectives would you like to propose (or if objectives are already included as nutrition goals in your community, how would you implement them)?
- How would the effects of such a programme on the food and nutrition situation in your community be measured and evaluated?

3. APPRAISAL OF AN EXISTING OR COMPLETED AGRICULTURAL DEVELOPMENT PROGRAM/PROJECT:

A study of the project and its impact on the nutritional status of people in the area could be undertaken. Available collected data from project staff reports or project leaders could be used. A successful project might be studied; however, study of a project which has (or had) little effect on improving nutritional status might be more beneficial.

SUMMARY OF THE CONTENT OF TOPIC TEN: NUTRITION EDUCATION METHODOLOGY

TOPIC TEN	OBJECTIVES	MAJOR CONCEPTS INVOLVED	SUMMARY OF CONTENT	PRACTICAL LEARNING EXPERIENCES	TEST OF UNDERSTANDING
Nutrition education methodology	The student should learn to: 10.1 Appreciate the importance of education in improving nutritional status. 10.2 Participate in the development of a nutrition education programme to meet community needs. 10.3 Integrate nutrition education into his own agriculatural programme to meet local needs and situations.	The importance of nutrition education in improving food production and food use; hence nutritional status. Planning nutrition education programmes.	Measures needed to eradicate malnutrition. Steps in planning a nutrition education programme: - Who is malnourished? - How are they malnourished? - Why are they malnourished? - Who are the target groups? - What is the message? - How should the message be presented? - How should a nutrition education programme be evaluated?	Role-play exercise: Nutrition education in an agricultural programme. Developing a questionnaire for evaluation of a nutrition education programme.	The student should be able to: 1. Describe four ways to eradicate malnutrition in South-east Asia. 2. Mention four important steps to be taken to decide the target group and contnet of nutrition education programme. 3. Describe four important criteria of a good nutrition education message.

Topic Ten

NUTRITION EDUCATION METHODOLOGY

PERFORMANCE OBJECTIVES

The student should learn to:

10.1 Appreciate the importance of education in improving nutritional status.

10.2 Participate in the development of a nutrition education programme to meet community needs.

10.3 Integrate nutrition education into his own agricultural programme to meet local situations and needs.

COURSE CONTENT

1. THE ROLE OF THE AGRICULTURAL WORKER IN NUTRITION EDUCATION PROGRAMMES:

Eradication of malnutrition in Southeast Asia depends largely on:

- Improving the amount and variety of food supplies.
- Improving family incomes.
- Improving food consumption to meet individual food needs with the family.
- Improving environmental hygiene.

Agricultural programmes are usually planned to improve:

- Food availability through use of improved agricultural practices, and
- Income levels by the promotion of cash crops or livestock.

Such programmes may not necessarily result in improved food consumption. Therefore the agricultural worker, who has a vital role in nutrition improvement programmes, needs to learn how to incorporate a nutrition education component into his programme to encourage improved food consumption patterns among the malnourished members of the community.

A good agricultural extension officer or any other local agricultural worker is in close contact with the members of the community in which he works. He should therefore be familiar with local customs, be able to discuss local problems, and be eager to assist in developing solutions to these problems.

When participating in planning a nutrition education programme, the agricultural worker should consider:

2. QUESTIONS TO ANSWER IN PLANNING A NUTRITION EDUCATION PROGRAMME:

Who is malnourished?

Young children, from about 6 months to 5 years of age, are at greatest risk from malnutrition and first priority should be given to achieving dietary adequacy in this group. Pregnant women and primary school children should be next in order of priority.

Why types of malnutrition occur?

Local health workers should be able to provide information on this point. Inadequate food intake resulting in energy deficiency is generally the commonest problem, though the quality and quantity of the protein intake may be inadequate especially for young children. Anemia is likely to be present. Vitamin A deficiency may also occur.

Why does malnutrition occur?

The agricultural officer should know the types of foods grown in the area. He should be able to judge if the amounts grown are likely to be adequate and if the types of food grown will allow a sufficiently varied diet. He should also know how much food is lost in storage. His close contact with the community should allow him to learn their food habits. Health and community development extension officers should also be able to contribute to this type of information.

Which are the target groups?

Using the information obtained relating to malnutrition, the worker needs to decide the target groups on which to focus. The tendency is often to direct nutrition education largely to women, but other groups in the community should also be reached.

Men often have considerable influence on family food supplies by controlling the use of any cash income, by their traditional privileges in food distribution, and by their authority over their wives.

School children are future food producers and consumers and should be encouraged to appreciate the importance of agricultural development and food habits.

What should the nutrition message encourage?

This will depend on the specific problems of the community and on the target groups. In general, nutrition education should encourage

- The production of acceptable foods of high nutritional value.
- Sensible budgeting.
- Good hygiene practices.

Notes for Teachers

What should the nutrition message be?

Suggested message areas for inclusion in a programme are:

For men:

- The types of foods to plant and harvest for an adequate family diet.
- The need to relate family size to family resources.
- The cost of providing an adequate diet in a cash cropping system.
- The total work load of women.
- The family budget and the man's part in its control.

Ask students what outlets are available for nutrition education directed to men, women and families.

For women:

- The improvement of variety and amount of foods produced for home consumption.
- Other foods in addition to breast milk for infants from four months of age.
- The need for three meals a day, especially for children.
- The special food needs of children and pregnant and lactating women.
- The need to relate family size to family resources.
- The value of money when buying food (in a cash economy).

How should the message be presented?

Both formally and informally:

- Formally through talks, lectures or discussions
- Informally by references to human nutrition when covering agricultural topics.

When covering agricultural topics, quote examples relating to the local situation e.g. reference to family planning and spacing when discussing plant needs; the special food needs of children when discussing the feeding needs of young animals.

The message should be:

- Accurate.
- Expressed in simple and familiar terms.
- Relevant to the local situation.
- Straightforward.

- Coordinated with colleagues in other extension services and community programmes in order to

  - Increase impact.
  - Avoid presentation of conflicting information which may confuse the target group
  - Avoid unnecessary duplication of effort.

How often should the message be given?

Day-to-day contact with the community gives the extension worker an excellent opportunity to influence and improve local food consumption. Nutrition information should be provided at every opportunity in as many ways as possible.

3. ASSESSMENT OF PROGRAMME EFFECTIVENESS:

Nutrition knowledge can be assessed by informal discussion or by a simple questionnaire related to the subjects and targets outlined in this topic.

Application of nutrition knowledge, which is more important, can be assessed by estimating the number of people adopting improved practices and by monitoring the incidence of malnutrition, particularly among young children. Coordination with local health workers and representatives of other community agencies as well as designated community members will assist greatly in such evaluations.

SUGGESTED PRACTICAL ACTIVITIES

1. ROLE PLAY EXERCIES:

Working in groups, students should select an undesirable practice likely to be associated with malnutrition in their home area.

Possible selections might be:

- Large family with small food resources.
- Inadequate intake of grain legumes.
- Poor food storage.
- The belief that breast feeding milk is sour in pregnancy.
- Insufficient money spent on food.
- Poor meal patterns.
- The use of only gravy and staple in child-feeding.
- Excessive beer drinking.

Students should formulate a message for presentation to subsistence or semi-commercial farmers. The message should be presented as part of an agricultural extension programme and not as a separate lecture in human nutrition.

Example: "Inadequate intake of grain legumes".

Students might select the topic of "how to grow soyabeans" and incorporate their nutrition message into this topic.

Each group should be allowed 5 to 10 minutes to present their message, the other groups acting as the audience. After each presentation the content, style of presentation and clarity of the message should be discussed.

2. EVALUATION OF A NUTRITION EDUCATION PROGRAMME:

Help the students develop a questionnaire for the evaluation of a nutrition education programme.

SUMMARY OF THE CONTENT OF TOPIC ELEVEN: PROGRAMME PLANNING, IMPLEMENTATION AND EVALUATION

TOPIC ELEVEN	OBJECTIVES	MAJOR CONCEPTS INVOLVED	SUMMARY OF CONTENT	PRACTICAL LEARNING EXPERIENCES	TEST OF UNDERSTANDING
Programme planning, implementation, and evaluation.	The student should learn to: 11.1 Collect, analyze and interpret baseline information necessary to identify food supply problems which contribute to malnutrition in the community. 11.2 Working with the community, set realistic goals for an agriculatural programme planned to overcome defined food supply problems at the community level. 11.3 Working with the community, plan a community agricultural programme directed toward achieving the stated goals and objectives. 11.4 Choose indicators for use in monitoring and evaluating the programme, establish a systematic plan for reviewing results, and, as needed, make appropriate changes in the plan of action. 11.5 Work as a member of the community rural development leadership team to develop a suitable programme to: 11.5.1 Accelerate economic development in the community by increasing agricultural production for income and for home consumption, and 11.5.2 Contribute to needed social development within the community.	The steps involved in developing realistic and feasible programmes of work. The most important factor in programme success is community involvement in planning and implementation at every step of the way, with effective monitoring and evaluation included as an integral part of the programme.	Steps in programme planning: 1. Identify the problem, 2. State what is to be achieved, 3. Plan a programme of activities considering resources and constraints, 4. Implement the programme, 5. Monitor and evaluate the programme, 6. Make programme changes as necessary.	Programme planning exercises using local data: (The teacher may obtain the data for a community programme from an agricultural officer or another source). Analyze the situation of a community using available data; identify priority problems; recommended alternative approaches for developing an agricultural programme to solve the food and nutrition problem identified.	Describe the six steps needed for efficient program planning. Discuss the five types of data needed to define the existing nutrition situation in a locality. Outline an agricultural program plan for his own village which incorporates a nutrition component.

Topic Eleven

PROGRAMME PLANNING, IMPLEMENTATION AND EVALUATION

PERFORMANCE OBJECTIVES

The student should learn to:

11.1 Working with the community, collect, analyze, and interpret base-line information necessary to identify food supply problems which contribute to malnutrition in the community.

11.2 Working with the community, set realistic goals for an agricultural programme planned to overcome defined food supply problems at the community level.

11.3 Working with community members, plan a community agricultural programme directed toward achieving the stated goals and objectives.

11.4 Choose indicators for use in monitoring and evaluating the programme, establish a systematic plan for reviewing results and, as needed, make appropriate changes in the plan of action.

11.5 Work as a member of the community rural development leadership team to develop a suitable programme to:

11.5.1 Accelerate economic development in the community by increasing agricultural production for income and home consumption.

11.5.2 Contribute to needed social development within the community, with special emphasis on improving the nutritional status of its vulnerable groups.

CONTENT OUTLINE

Work activities, at any level, must be carefully planned, managed and evaluated if they achieve worthwhile and lasting results. The human and material resources available to undertake and carry through on a programme are often limited. However, careful programme planning can ensure that the resources available are used in an efficient and productive manner. Time, human effort and limited economic resources are often wasted because the project leader or team does not consider very carefully what he is trying to accomplish or relate his activities to the problems of the community in which he is working.

1. THE OVERALL PROGRAMME PLAN:

To develop an efficient and worthwhile programme of activities, it is necessary to:

Identify the problem:

- By the collection and analysis of relevant information concerning the existing situation including assessment of resources and current utilization (this information is called base-line information).

- By involving community members, especially those who are leaders, in identifying and prioritizing components of the problems.

Identify existing resources and constraints:

- By determining the human and material resources which will be useful in developing a viable programme of work and those factors which may be a draw back to successful implementation.

- By making decisions about how to maximize available resources and overcome the constraints.

State what is to be achieved:

- With the help of community leaders to set realistic goals and objectives which indicate what impact the agricultural officer expects his activities to have on problem solution.

- To make provisions for necessary organizational and structural plans, local training, financial support, cooperation with other agencies in the community, and commitment from both the agencies and the individuals in the community.

- To achieve the stated objectives.

Plan a programme of activities:

- To show what actions and alternatives the agricultural officer, working with community members, intends to take in order to achieve its objectives.

- How he will use his time and resources to carry out the activities planned.

- How he will evaluate programme progress and the intervals at which evaluation will take place.

Implement the programme:

- To achieve the stated objectives.

- To include the community and the people responsible for each activity.

Monitor and evaluate the programme:

- By following the effects of activities during programme implementation and by measuring the results or impact on the community at intervals during operation of the programme and at the completion of it.

- Certain problems implicit to evaluation of agricultural programmes need to be considered, such as the agricultural cycle itself and the length of time (usually 3 or more years) required for realistic evaluation.

Change and adapt the programme as needed:

- By using results of evaluations, the agricultural officer and the community leaders can see weak and ineffective parts of the program.

- When this occurs, the programme objectives and approaches need to be re-evaluated and the plan of action needs to be altered accordingly.

2. THE PLAN OF WORK:

A job description usually indicates to the agricultural officer the general areas in which he will work and the results he is expected to accomplish. Within the terms of reference of the job description he should be able to plan an efficient and productive programme (plan of work).

Data collection and analysis:

Information which could assist in defining the existing food and nutrition situation and identifying areas of action should include:

- Food production patterns:	the amount and variety of foods produced and methods used to produce and store them.
- Food consumption patterns:	the types of foods people eat; the amounts eaten; the meal patterns, including how often food is eaten; how the food is obtained.
- Socio-economic data:	income levels; occupational groups; attitudes toward food and agriculture; marketing and distribution of produce; land ownership; type of farming.
- Health statistics:	malnourished community groups; types of malnutrition; degrees of malnutrition.

- Environmental factors: waste/garbage disposal; toilet facilities; sanitary water supply; insects and vermin; food hygiene; etc.

- Other factors: land use, rainfall; soil types; etc.

Notes to Teachers

If a general area of project activity has been stated, then information collected should be relevant to it. Remember people do not like to answer long or personal questionnaires; many times they do not wish to reveal the information requested. Only that information likely to be useful in programme planning and evaluation should be collected. Since information gathering is time consuming, a good plan to follow is to collect family data at the same time data related to agricultural development are sought. Officers from other related fields of service, such as Health, Education and Culture and workers from other community development agencies may be able to supply useful information. Data from planning and census offices and group surveys made at the village level may also be helpful.

For example, if the area of activity is oilseed production, data on poultry or animal husbandry is of no relevance. However, such things as area cultivation size, yields, and how the crop is used are relevant.

Analysis of the information will probably show a production deficit or excessive storage losses in one or more commodities leading to both food and economic deficits. Results of analysis should also indicate how agricultural production and employment are related to nutritional status in the community.

If oilseed production is being studied, appropriate examples would be: who presently cultivates oil seeds? If some of the malnourished segments of the community were involved in oilseed production, would this overcome a major constraint of earnings in relation to nutritional status? Could production targets still be met?

Definition of objectives:

A goal or objective is a statement of expected achievements. Goals or objectives may be long-term or short-term, depending on the scale of the project.

Long-term objectives:

Examples of long-term objectives (often called goals) might be:

- To achieve self-sufficiency in the production of a commodity.

- To achieve food consumption patterns giving adequate nutrient intakes to all members of the community.

These goals or objectives are not specific and not easily measurable.

Short-term objectives:

Short-term objectives should make a statement about a definite activity to improve a specific aspect of the situation in a stated time period, i.e. objectives set a realistic target.

Examples of short-term objectives might be to:

- Increase legume production by 20% in two years, using hybrid seed and fertilizers.

- Persuade at least 50% of farmers to adopt an improved method of legume storage by the time of the next harvest.

- Persuade at least 50% of households to have at least two main meals a day by six month's time.

Such objectives allow the progress of a programme to be measured.

Programme plans:

The programme will be designed, together with community members to meet the objectives by the easiest, cheapest and most acceptable means. For example, to achieve short-term objective (2), the improved method of storage must be easily constructed from locally available materials and should not require components which are financially unobtainable. The attainment of short-term objective (3) will require that some of the householders will need to be given the opportunity to grow and buy more food. Can the programme be so planned?

The programme of work should include:

- The specific list of projects and activities (what has to be done?).
- The timing (order and duration of each project).
- Resources (items, money, personnel required).
- Areas of cooperation (involvement of the people of the community and rural development personnel in the programme development and implementation).
- Arrangements for outside assistance from government and private agencies.
- Selected indicators for monitoring and evaluation.

Working with community leaders and consulting with colleagues from other ministries or departments will ensure that the programme will not conflict with other activities already under way. Such planning, consultation and cooperation can reduce wastage of time and other resources, improve efficiency and increase the activities on community problems. Through these efforts the programme will become an integral part of community life.

The value of a preliminary study:

A preliminary study (sometimes called a pilot project) should always be included in a large-scale project where a large input of resources is required. Such a preliminary plan is also very helpful in small-scale projects if they are planned for a period of time longer than 3-4 months. The results of a preliminary study will indicate the likelihood of a project being acceptable or not. For example, if the project is the introduction of a new crop to substitute for current imports of food, the feasibility of the project will depend on such factors as:

- Soil and climatic suitability.
- Water availability.
- Willingness of the farmers to grow the crop.
- Seed and fertilizer quality, availability and cost.
- Ease of transport of materials.
- Expertise available.
- Production costs.
- Economic and financial benefits.

The preliminary study should allow for the selection of pilot areas where the project is likely to achieve a satisfactory level of success.

Programme implementation:

Results of the preliminary study will indicate:

- Any necessary reworking of objectives.
- Adjustment of the programme if indicated.
- Selection of the locality for the programme.

With incorporation of desirable changes, the revised programme plan can be put into operation with a far greater probability of success. Effective results can only be expected if constant supervision and collaboration are included.

Monitoring and evaluation:

The system to continually record and check (monitor) present conditions, situations, external circumstances affecting the plan, and the activities of the plan itself as outlined in the programme of work must be followed methodically in order to prepare for a realistic and meaningful evaluation. Evaluation at intervals during the programme and at its completion allows the worker to measure progress achieved, identify actions producing

positive and negative results, an opportunity to make needed changes and allow a more rapid advancement toward achieving the programme objectives.

Evaluation should allow the agricultural officer to answer these questions:

- Have the stated objectives been reached (or is accomplishment of objectives on schedule)?

- How has this programme improved or is improving the situation?

- What inputs were required to reach the objectives or reach this point in programme progress?

By following changes in the baseline situation, the agricultural officer can measure the impact of the programme.

Indicators selected to show these changes should be:

- Fairly simple to collect and interpret.
- As objective as possible.
- Numerically measurable.
- As specific as possible to the changes the programme is attempting to promote.

Possible indicators might be:

- Number of farmers participating in the programme, number of additional people employed.
- Area planted in the crop or devoted to poultry or livestock production.
- Crop yield.
- Losses in storage.
- Income derived.
- Crop or other kind of food production consumed by the family.
- Incidence of malnutrition in young children.

If different activities were used to achieve a similar objective, evaluation should attempt to assess which of the activities was most effective.

Example

In order to improve soya bean production, two extension methods were tried:

> In one community the area extension officer held a one day session for 15 farmers at the farm training center in that community. The purpose of this session was to demonstrate and explain improved farming methods beneficial to soya bean cultivation and production. A discussion followed and each farmer was asked how he planned to improve his farming methods for the next growing season.

In a second community the area extension officer held a one-day session for another group of 15 farmers at the farm training center in their community. The purpose of the meeting was the same: to demonstrate and explain improved farming methods of value to soya bean cultivation and production. A discussion followed and each farmer told how he planned to improve his farming methods that season. The extension officer made notes of these plans; he told the farmers that from time to time during the planting, growing, and harvesting season he would visit each of them to discuss their progress and see if he could be of further assistance in helping them to meet their food production goals.

The next week he called on each farmer, discussed the previous meeting and through his encouragement helped each farmer make specific plans. Once a month until harvest he visited each of the 15 farmers again to help him measure progress and offer additional assistance when that was needed. The extension officer kept detailed notes of each farmer's questions, problems and progress.

In both communities a record was kept of the number of farmers adopting the improved methods and their soya bean production yields. Through a study of these records and observations (his monitoring system) the extension officer was able to assess (evaluate):

- The extension method that had been the most successful, and

- What he needed to plan for the next growing season in order to be of greater assistance to the farmers in the communities in which he worked.

Evaluation should also consider the cost of a programme in terms of finances, man-hours and other resources. By comparing the impact of programmes with the costs involved, it is possible to identify the cheapest method of achieving an objective.

Adaptation of programme as needed:

Agricultural programmes, to be effective must meet the needs of communities and the people who live there. Evaluation of programme status (the factors which contribute to the economic and social needs of people and those which are ineffective) is worth little if programme improvements are not initiated when indicated. Thus justifiable changes of agricultural programmes of work are vital for programme success.

3. SUMMARY: PROGRAMME PLANNING AND MANAGEMENT

The steps of programme planning and management can be summarized as follows:

- Information collection and analysis (to identify the problems),

- Definition of goals and objective (what impact the programme is supposed to have on the problem),
- Plan of programme activities (to achieve stated goals and obj
- Programme implementation,
- Monitoring and evaluating the programme,
- Programme change and adaptation as needed.

SUGGESTED PRACTICAL ACTIVITIES

1. A PLAN TO DEVELOP, IMPLEMENT, AND EVALUATE A COMMUNITY AGRICULTURAL PROGRAMME TO IMPROVE THE NUTRITIONAL STATUS OF VILLAGE PEOPLE:

   Using information collected during the course or during a vacation project, students should:

   A. Identify a problem in the food and nutrition situation of a community.

   B. Set realistic objectives to alleviate the problem.

   C. Plan a programme of activities and a budget outline to achieve the stated objectives.

   D. State the indicators to be used in monitoring and evaluating the programme.

   Each student should be allowed about fifteen minutes in which to present his programme. If necessary, students should work in groups on programme planning in order to allow sufficient time for presentatior and discussion.

   If students have no available information, then the following outlin may be used by the teacher as a guide for the preparation of an outline of a local situation.

   Situation outline

   Area X, in Southeast Asia has an average rainfall of more than 100 i (more than 202 cm). The soil is clay loam. Subsistence farming is "slash-and-burn" methods. The land cultivated is approximately one hectare (approximately 2.5 acres).

   The cropping pattern is approximately as follows:

Crop	% land cultivated to crop
Rice	50
Corn	15
Vegetables	25
Sweet potatoes	2
Legumes	2
Others	6

   The yield of rice is approximately 1,800 kg/hectare (725 kg/acre)

   The yield of corn is approximately 900 kg/hectare (375 kg/acre)

   The annual production of grain legumes/family is about 10 kg (equivalent to 500 kg/hectare or 200 kg/acre).

Post-harvest grain losses average 20%, mostly from insect infestations.

The area is close to a river, though catches of fish are low, largely because of over-fishing.

The average annual income in the subsistence sector is about $100.

Notes to Teachers

The food consumption pattern of subsistence households given below provides about 85% of the estimated energy requirements. The animal protein consumed provides only 16% of the total protein intake.

Serious growth retardation in children 0-4 years is about 20%. The average incidence of hookworm infestation in the total population is about 25%. The average incidence of marked anemia in the total population is approximately 20%.

Average daily food consumption of subsistence household (grams per person)

Rice	300
Corn	50
Sweet potatoes	20
Leafy vegetables	30
Other vegetables	44
Legumes	4
Fish	11
Other animal products	5
Fats and oils	5
Fruit	3

Students should be told what is the average daily food consumption in different income groups and therefore realize that programmes are to be adapted to the local situation.

Students should suggest a wide variety of project areas, such as:

- Intensifying rice or maize production,
- Intensifying grain legume production,
- Improving methods of poulty husbandry,
- Improving storage methods,
- Improving fishing methods.

Students should not be over-ambitious in their aims and should set objectives which are realistic to the total situation in terms of both available resources and students' probably job responsibilities. They should be able to explain the effects they would expect their programmes to have on the food and nutrition situation of the community and how they would measure the effectiveness of their programmes.

References Cited

1. FAO/WHO Expert Group. Food and Agricultural Organization of the United Nations, Rome, 1961, 1965, 1970, 1972.

2. FAO/U.S. Dept. HEW: Food Composition Tables for Use in East Asia. Food Policy and Nutrition Division, FAO/Public Health Service, U.S. Department of Health, Education and Welfare, Rome, 1972.

3. FAO: The Fourth World Food Survey, Food and Agriculture Organization of the United Nations, Rome, 1977.

4. FAO: Food and Nutrition Paper 1/2: Review of Food Consumption Surveys 1977, vol. 2. Food and Agriculgural Organization of the United Nations, Rome, 1979.

5. FAO: The State of Nutrition and Agriculture, 1978. FAO Agriculture series No. 9. Food and Agriculture Organization of the United Nations, Rome, 1979.

6. FAO: 1979 FAO Production Year Book, Vol. 33, Food and Agricultural Organization of the United Nations, Rome, 1980.

7. Food and Nutrition Research Institute: First Nationwide Nutrition Survey, 1978, Summary Report. FNRI, National Science Development Board, Manila, Philippines, 1979.

8. Food and Nutrition Research Institute: Handbook I, Food Composition Tables Recommended for use in the Philippines, 1980.

9. Key Indicators of Developing Member Countries of the Asia Development Bank, vol. 11, No. 1. Economic Office, Asian Development Bank, April, 1980.

10. Platt, B.S.: Tables of Representative Values of Foods Commonly Used in Tropical Countries. Special Series No. 302, Medical Research Council, Her Majesty's Stationery Office, London, 1962.

11. United Nation's World Food Conference, 1974: Extracts of Papers Presented in Food and Nutrition, vol. 1, FAO, Rome, 1975.

12. Waterlow, J. C. Nutrition in Prevention Medicine. World Health Organization, Geneva, 1976.

APPENDIX

APPENDIX I

A QUICK GUIDE TO SOURCES OF NUTRIENTS

This is a rough guide to the nutrient content of foods. However, all foods are mixtures of nutrients and only foods providing a significant amount of a nutrient are listed.

FOODS PROVIDING ENERGY

Corn (maize)
Sorghum
Millets
Rice
Wheat, in any form
Cassava
Potatoes, all types
Yams
Starch roots
Sugar and sugar products
Bananas
Avocado
Oils and fats
Groundnuts, peanuts
Soyabeans, sesame and other oilseeds
Peas, beans

FOODS RICH IN PROTEIN

Meat, all types
Poultry
Fish, all types
Wild birds and other game meat
Soyabeans
Beans, peas
Eggs
Milk, all types
Cheese
Yoghurt

FOODS PROVIDING IRON

Offal, e.g. liver, kidney
Insects
Groundnuts, peanuts
Beans, peas
Meat, fish
Eggs
Dark green leafy vegetables
Dried fruits

FOODS PROVIDING CALCIUM

Milk, cheese
Eggs
Groundnuts, peanuts
Dark green leafy vegetables
Beans, peas
Small fish eaten whole
Sesame seed
Gourds
Millet

FOODS PROVIDING VITAMIN A

Coloured fruits and vegetables - the darker the colour, the higher the vitamin content

Examples:

Dark green leaves
Mango
Papaya
Guava
Carrots
Avocado

Also:

Butter
Margarine
Eggs
Milk
Cod-liver oil

FOODS PROVIDING VITAMIN B

Dark green leafy vegetables
Groundnuts, peanuts
Beans, peas
Cereals (especially wholemeal)
Meat, fish
Eggs

FOODS PROVIDING VITAMIN C

Fruits and vegetables
Liver
Potatoes

APPENDIX II

NOTES ON VITAMINS

VITAMIN	MAIN FUNCTION	GOOD SOURCES	RESULTS OF DEFICIENCY
Water-soluble			
Thiamin (B_1)	Energy release	Home pounded cereals, legumes, pork, vegetables, fish	Bari-beri
Riboflavin (B_2)	Energy release	Legumes, meat and fish, milk, green leafy vegetables	Sores at corners of mouth
Nicotinic acid	Energy release	Meat, fish, peanuts, yeast	Pellagra
Folic acid	Blood formation	Liver, dark green leafy vegetables	Megaloblastic anemia
Vitamin B_{12}	Blood formation	Animal products	Pernicious anemia
Vitamin C	Collagen formation Wound healing Blood formation	Fruits and vegetables (green, leafy)	Scurvy
Fat-soluble			
Vitamin A	Vision in dim light Healthy epithelium	Dairy produce, liver, coloured fruits and vegetables	Night blindness, permanent blindness, skin roughening
Vitamin D	Bone formation	Dairy produce, sunlight	Rickets
Vitamin E	Utilization of fats	Vegetable fats/oil (soybeans, peanuts, corn, cereals, eggs)	None reported in humans
Vitamin K	Blood clotting	Dark green vegetables	Rare in adults. Slow blood clotting in young infants.

APPENDIX III

NUTRIENT COMPOSITION OF SELECTED FOODS
Expressed per 100 grams edible portion

FOOD	MOISTURE %	ENERGY KCal	PROTEIN gm	FAT gm	CARBOHYDRATE gm	IRON mgs	CALCIUM mgs	THIAMIN mgs	RIBOFLAVIN mgs	NICOTINAMIDE mgs	VITAMIN A VALUE R.E.*
CEREALS											
Corn meal, 96% extraction	12	362	9.5	4.0	72	2.5	12	0.30	0.13	1.5	Tr
Corn meal, refined about 60% extraction	12	354	9.0	1.5	77	2.0	9	0.05	0.03	0.6	Tr
Corn, stiff porridge		130	3.3								
Millet, finger, meal	13	336	5.6	1.4	77	5.0	316	0.15	0.07	0.8	Tr
Rice, lightly milled	12	354	8.0	1.5	77	2.0	10	0.25	0.05	2.0	Tr
Rice, highly milled	12	352	7.0	0.5	80	1.0	5	0.06	0.03	1.0	Tr
Rice, cooked	63	155	2.5	0.4	34	0.6	5	0.02	0.01	0.3	-
Rice gruel, thin	96	17	0.1	0.2	4	0.1	-	-	-	-	-
Sorghum flour	12	353	10.0	2.5	73	4.0	20	0.40	0.10	3.0	Tr
Wheat, bread, white	38	243	8.0	1.5	53						
STARCH ROOTS, TUBERS AND FRUITS											
Cassava, fresh	60	153	0.7	0.2	37	1.0	25	0.07	0.03	0.7	Tr
Cassava, flour	12	342	1.5	Tr	84	2.0	55	0.04	0.04	0.8	Tr
Banana (plaintain), cooked	80	77	1.3	Tr	18	0.3	4	0.02	0.02	0.2	18
Potato, sweet	70	114	1.5	0.3	26	1.0	25	0.10	0.04	0.7	30
Yam, fresh	73	104	2.0	0.2	24	1.2	10	0.10	0.03	0.4	4
Yam, flour	18	317	3.5	0.3	75	10.0	20	0.15	0.10	1.0	Tr
GRAIN LEGUMES AND OILSEEDS											
Chickpea, dry	10	358	20	5.0	61	9.0	120	0.30	0.15	1.3	4
Cowpea, dry	10	340	22	1.5	60	5.0	90	0.90	0.15	2.0	6
Lima Bean	12	326	20	1.5	58	6.0	90	0.30	0.14	1.5	Tr
Mung beans (seeds dry)	11	344	21	1.6	63	8.4	110	0.58	0.20	2.3	20
Peanuts, groundnuts, dry	6	579	27	45.0	17	2.5	50	0.90	0.15	17.0	Tr
Soyabean seed	8	382	35	18.0	20	7.0	200	1.10	0.30	2.0	Tr
Sesame seed	5	592	20	50.0	16	10.0	1500	1.00	0.25	5.0	Tr
VEGETABLES											
Leaves, dark green, e.g. sweet potato tops	85	48	5.0	0.7	5	4.0	250	0.10	0.03	1.5	1000
Leaves, medium dark, e.g. cassava leaves, pumpkin leaves	91	28	2.0	0.3	4	2.5	80	0.08	0.02	0.5	300
Leaves, pale green, e.g. cabbage	93	23	1.5	0.2	4	0.5	40	0.05	0.05	0.3	10
Tomato	94	20	1.0	Tr	4	0.4	5	0.06	0.04	0.7	75
ANIMAL PRODUCTS											
Beef, cooked	68	172	23.0	8.0	Tr	2.8	16	0.06	0.20	7.0	Tr
Chicken, boiled	61	203	26.0	10.0	0	2.1	11	0.05	0.06	8.0	Tr
Egg	74	158	13.0	11.5	0.5	2.8	55	0.12	0.35	0.01	300
Liver, beef	72	128	19.0	3.0	3	8.7	7	0.32	1.98	12.8	14285
Milk, cow's whole	88	64	3.3	3.6	5	0.1	120	0.04	0.15	0.1	45
Pork, roasted	54	249	26.2	14.6	2	2.5	34	0.31	0.13	-	-
Bream, steamed	74	118	20.0	4.0	0	0.4	28	-	-	-	-
Catfish, steamed	74	118	20.0	3.7	0	0.6	14	-	-	-	-

*R.E. = retinol equivalents Tr = trace - = not determined

Food values reported or used in these guidelines have been taken from:

Food Composition Table for Use in East Asia.
F.A.O./U.S. Department of Health, Education and Welfare.

Tables of Representative Values of Foods Commonly Used in Tropical Countries.
B.S. Platt, H.M.S.O., London.

Composition of Foods. R.A. Mc-Cance and E.M. Widdowson. H.M.S.O., London.

Food Composition Tables Recommended for the Philippines. Food and Nutrition Research Institute, National Science Development Board, Manila.

This short list of common commodities is included for use in practical activities where food tables are required. However, food tables for use in specific regions are published and should be used if possible.

Note: Units used to express the energy value of foods are:

Kilocalorie (KCal) or Calorie (Cal)
Joule (J)

A kilocalorie is defined as the amount of heat required to raise 1 kilogram (2.2 pounds) of water 1 degree centigrade from 14.5 to 15.50 centigrade.

The joule is a very small unit for convenience the kilojoule (kj) is used.

A kilojoule is the amount of energy expended when a kilogram is moved one meter by a force of one newton.

Kilocaries may be converted to kilojoules using the relationship of:

1 KCal = 4.2 kj

APPENDIX IV

RECOMMENDED INTAKES OF NUTRIENTS (DIETARY ALLOWANCES)

AGE	BODY WEIGHT	ENERGY 1/	PROTEIN 1/ 2/	VITAMIN A 3/ 4/	VITAMIN D 5/ 6/	THIAMINE 3/	RIBOFLAVIN 3/	NIACIN 3/	FOLIC ACID 5/	VITAMIN B_{12} 5/	ASCORBIC ACID 5/	CALCIUM 7/	IRON 5/ 8/
	kg	KCal	grams	micrograms	micrograms	milli-grams	milligrams	milli-grams	micro-grams	micrograms	milli-grams	grams	milli-grams
Children													
1	7.3	820	14	300	10.0	0.3	0.5	5.4	60	0.3	20	0.5-0.6	5-10
1-3	13.4	1360	16	250	10.0	0.5	0.8	9.0	100	0.9	20	0.4-0.5	5-10
4-6	20.2	1830	20	300	10.0	0.7	1.1	12.1	100	1.5	20	0.4-0.5	5-10
7-9	28.1	2190	25	400	2.5	0.9	1.3	14.5	100	1.5	20	0.4-0.5	5-10
Male adolescents													
10-12	36.9	2600	30	575	2.5	1.0	1.6	17.2	100	2.0	20	0.6-0.7	5-10
13-15	51.3	2900	37	725	2.5	1.2	1.7	19.1	200	2.0	30	0.6-0.7	9-18
16-19	62.9	3070	38	750	2.5	1.2	1.8	20.3	200	2.0	30	0.5-0.6	5-9
Female adolescents													
10-12	38.0	2350	20	575	2.5	0.9	1.4	15.5	100	2.0	20	0.6-0.7	5-10
13-15	49.9	2490	31	725	2.5	1.0	1.5	16.4	200	2.0	30	0.6-0.7	12-24
16-19	54.4	2310	30	750	2.5	0.9	1.4	15.2	200	2.0	30	0.5-0.6	14-28
Adult man (moderately active)	65.0	3000	37	750	2.5	1.2	1.8	19.8	200	2.0	30	0.4-0.5	5-9
Adult woman (moderately active)	55.0	2200	29	750	2.5	0.9	1.3	14.5	200	2.0	30	0.4-0.5	14-28
Pregnancy (later half)		+350	38	750	10.0	+0.1	+0.2	+2.3	400	3.0	50	1.0-1.2	9/
Lactation (first 6 months)		+550	46	1200	10.0	+0.2	+0.4	+3.7	300	2.5	50	1.0-1.2	9/

Footnotes

1/ Energy and Protein Requirements, Report of a Joint FAO/WHO Expert Group, FAO, Rome, 1972.

2/ As egg or milk protein.

3/ Requirements of Vitamin A, Thiamine, Riboflavin and Niacin. Report of a Joint FAO/WHO Expert Group, FAO, Rome, 1965.

4/ As retinol.

5/ Requirements of Ascorbic Acid, Vitamin D, Vitamin B_{12}, Folate and Iron. Report of a Joint FAO/WHO Expert Group, FAO, Rome, 1970.

6/ As cholecalciferol.

7/ Calcium Requirements. Report of a FAO/WHO Expert Group, FAO, Rome, 1961.

8/ On each line the lower value applies when over 25 percent of calories in the diet come from animal foods, and the higher value when animal foods represent less than 10 percent of calories.

9/ For women whose iron intake throughout life has been at the level recommended in this table, the daily intake of iron during pregnancy and lactation should be the same as that recommended for non-pregnant, non-lactating women of childbearing age. For women whose iron status is not satisfactory at the beginning of pregnancy, the requirement is increased, and in the extreme situation of women with no iron stores, the requirement can probably not meet without supplementation.

APPENDIX V

REFERENCE MATERIAL

Bogert, L. J., G. M. Biggs and D. H. Calloway: Nutrition and Physical Fitness, 10th Edition. W. B. Saunders, Philadelphia, Pa., 1979.

Davidson, S., R. Passmore, J. Brock, and A. S. Truswell: Human Nutrition and Dietetics, 6th Edition, Churchill Livingstone, London, U. K., 1972.

FAO: Food Composition Tables for Use in East Asia. FAO/U.S. Dept. HEW, Rome, Italy, 1972.

FAO: Energy and Protein Requirements: Report of a Joint FAO/WHO and hoc Expert Committee. FAO Food and Nutrition Series No. 7, Rome Italy, 1973.

FAO: Handbook on Human Nutritional Requirements. FAO Nutritional Studies No. 28, Rome, Italy, 1974.

FAO: Food and Nutritional Strategies in National Development; Ninth Report of the Joint FAO/WHO Expert Committee on Nutrition. FAO Food and Nutrition Series No. 5, Rome, Italy, 1976.

Guthrie, H.: Introctory Nutrition, 2nd Edition, C. V. Mosby, St. Louis, Mo., 1975.

Kreutler, P. A.: Nutrition in Perspective, Prentice-Hall, Englewood Cliffs, New Jersey, 1980.

Jelliffe, D. B.: The Assessment of Nutritional Status of a Community. World Health Organization Series No. 53, Geneva, Switzerland, 1966.

Latham, M. C.: Planning and Evaluation of Applied Nutrition Programmes. FAO Food and Nutrition Serives No. 26, Rome, Italy, 1972.

Latham, M. C.: Human Nutrition in Tropical Africa. FAO Food and Nutrition Series No. 11, Revision 1, Rome, Italy, 1979.

Platt, B. S.: Tables for Representative Values of Foods Commonly Used in Tropical Countries. Medical Research Council, Special Report Series No. 302. Her Majesty's Stationery Office, London, U. K., 1977.

Ritchie, J. A. S.: Learning Better Nutrition: A Second Study of Approaches and Techniques. FAO Nutritional Series No. 20, Rome, Italy, 1967.

Scrimshaw, N. S. and M. Behar: Nutrition and Agricultural Development. Plenum, New York, N.Y., 1976.

Wilson, E. D., K. H. Fisher, and P. Garcia: Principles of Nutrition, 4th Education. John Wiley, New York, N.Y., 1979.

APPENDIX VI

The Southeast Asian Workshop
to review and adapt

FOOD, NUTRITION AND AGRICULTURE

Guidelines for Curriculum Content for Agricultural Training
in Southeast Asia
January 11-16, 1981
was held at the
Continuing Education Center
University of the Philippines at Los Baños
College, Laguna 3720, Philippines

Delegates and Consultants

Representatives chosen by their respective governments from Indonesia, Malaysia, the Philippines, and Thailand participated in the workshop. They were

INDONESIA:

Dr. Djiteng Roedjito, Professor
Department of Nutrition
Agriculture University
Bogor, Indonesia

Mr. T. O. Soemarno, Head
Lembang Agricultural
Training Center
AAETE Agency
Lembang, West Java, Indonesia

MALAYSIA:

Mrs. Noraini Ahmad, Assistant
Agricultural Officer
Agriculture Institute
Ayer, Hitam, Malaysia

Mr. Sharifuddin Hamid,
Deputy Dean
Faculty of Agriculture
Universiti Pertanian Malaysia
Serdang, Selangor, Malaysia

PHILIPPINES:

Dr. Esther M. Cabotaje, Vice President
for Academic Affairs
Central Nindanao University
Musuan, Bukidnon, Philippines

Mrs. Rosario Icarro
Bureau of Agricultural Extension
Ministry of Agriculture
Diliman University
Quezon City, Philippines

Mrs. Silvina Laya, Executive Director
School Health and Nutrition Center
Ministry of Education and Culture
Aroceros Street, Metro Manila,
Philippines

Mr. Jose Sal Tan, Secretary
Asian Association of Agricultural
College and Universities, and
Professor
Viseyas State College of Agriculture
Baybay, Leyte, Philippines

THAILAND:

Mrs. Ganjanes Attawipakpatsan, Head
Academic Research Agricultural
Extension Education
Lasetsart University
Bangkok, Thailand

Mr. Sumit Mangkang, Chief
Agricultural Education and
Extension
Agricultural College Division
Department of Vocational
Education
Ministry of Education
Bangkok, Thailand

Consultants who participated in the workshop were:

PHILIPPINES:

Dr. Higino A. Ables, Vice-Chancellor
for Academic Affairs
University of the Philippines
at Los Baños
College, Laguna, Philippines

Mrs. Delfina B. Aguillon,
Deputy Director
National Nutrition Council
of the Philippines
South Superhighway
Makati, Metro Manila, Philippines

Dr. Amando M. Dalisay, Fellow
in Agricultural Economics
Center for Policy and Development
Studies
University of the Philippines at
Los Baños

Dr. Josefa S. Eusebio, Team
Leader
Human Nutrition and Foods
Institute of Human Ecology
University of the Philippines
at Los Baños

Food and Agricultural Organization:

Dr. Pierre Baron, Nutrition Officer
Food and Agricultural Organization
of the United Nations
00100 Rome, Italy

FAO and USAID

Dr. Laura Jane Harper,
Dean Emeritus and Professor
Virginia Polytechnic Institute
and State University
Blacksburg, Virginia 24061,
U.S.A.

Workshop Deliberations

In review of the guidelines and recommendations for their adaptation to the Southeast Asian situation in agricultural education the following topics were considered:

- -Purpose of the workshop;
- -Workshop programme goals, organization and group responsibilities;
- -Agricultural policies in Southeast Asia;
- -Nutrition policy in Southeast Asia, impact and evaluation;
- -Important nutrition concepts and their relevance to agricultural education;
- -Effective communication methods for nutrition in agriculture;
- -Helping agricultural students learn how to develop, adapt, and evaluate community-based programmes;
- -Developing, adapting and evaluating nutrition content in agriculture to meet changing agricultural situations in Southeast Asia;
- -Organization and structure of Agricultural education in Southeast Asia and implications for introduction of nutrition content into agricultural curricula;
- -Institutionalizing and implementing workshop, national and regional levels.

Throughout the workshop the participants worked in groups to make recommendations for modifications to the guidelines which are appropriate to Southeast Asia. A copy of the proceedings of the workshop may be obtained by writing to Dr. Josefa S. Eusebio, Workshop Director, Institute of Human Ecology, University of the Philippines at Los Baños.

The guidelines developed, modified, and adapted to the Southeast Asian scene are recommendations and suggestions for the development, introduction, and implementation of a course of study to be used in agricultural programmes in Southeast Asia. Before these guidelines are used in a particular programme and country, they must be

- -Adapted to the country and area of the country in which they are to be used
- -Adapted to the educational level and background of the student/practitioners who will participate in the course
- -Adapted to the purpose of the agricultural education in nutrition, such as pre-service or in-service education
- -Adapted to the faculty and the teaching style to be employed
- -Supplemented with appropriate textbooks, laboratory/experiential learning manuals and activities and with other appropriate teaching materials.

In addition to representatives of country governments and consultants who participated in the revision of this Southeast Asia adaptation of Food, Agriculture and Nutrition a number of other people have contributed to these guidelines. A FAO consultant, Miss Norah Gibson, had major responsibility for the preliminary version. Mis Barbara Purvis, Home Economics and Social Programmes Service, FAO, and Messrs. H. Hoffman and N. Doron, Agricultural Education Groups, Human Resources, Institutions and Agrarian Reform Division, FAO, helped greatly, with comments and suggestions through the development of the Guidelines. Mr. Pierre Baron, Nutrition Programmes Service, FAO, with assistance from Mr. M. Hussain, Consultant, revised the preliminary version. Mr. L. Cobley, FAO consultant and former Chief, Agricultural Education Service, Division of Literary, Adult Education and Rural Development, UNESCO, also prepared an option indicating how to integrate the nutrition concepts presented in the guidelines into existing agricultural subjects. This Southeast Asia adaptation is based on the publication drafts prepared by Mr. Baron and Mr. Cobley.