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PROGRAM PLANNING WORKSHOP
FOOD NUTRITION SYSTEMS IN CASSAVA DEPENDENT NIGERIA
JUNE 16-18, 1975

SPONSORS:

OFFICE OF NUTRITION, TECHNICAL ASSISTANCE BUREAU,
AGENCY FOR INTERNATIONAL DEVELOPMENT

&

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT,
MISSION LAGOS, NIGERIA

RAPPORTEURS:

TAXIMETRICS LABORATORY, UNIVERSITY OF COLORADO

HELD AT:

INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE (IITA)
IBADAN, NIGERIA

FOREWORD

During 1973 and 1974, a research group at the Taximetrics Laboratory from the University of Colorado undertook a pilot study of the cassava dependent food system of Southern Nigeria. A systems approach was used in this descriptive investigation. The objective of the effort was to maintain an overview, to attempt a description of the entire food system without focusing on specific statistical tasks. Concerns for the overall features of the cassava dependent food system limited the team's efforts to a qualitative appraisal of the system. The team felt it would be inappropriate to generate detailed statistics about components of the system until a broad mapping of the entire system had been developed. Furthermore, as previously cited, without an adequate overview it would not be appropriate to develop quantitative in-depth information about sub-elements of the problem.

Inappropriate actions have resulted in the past, based on statistical information developed without an adequate overview of the problem. For example, efforts have been made to foster large-scale intermediate processing of gari and starch while production and assembly of material for the new factories was ignored as well as postprocessing steps concerned with packaging and marketing. The report of this investigation was made available to Nigerian officials and the USAID Mission in Nigeria in September of 1974. The workshop was planned to examine the study and to serve as a point of departure for the development and coordination of specific recommendations and action programs.

INTRODUCTION

The nutritional goals of developing nations are emerging to the forefront of their national policy objectives. Nutritional programs, in addition to improving the quality of life, can indeed lead to economic development and national advancement. While nutritional policy decisions can easily be stated, achieving the stated goals is often difficult, because food and nutrition systems are complex. Recently a Cassava Program Planning Workshop was held in Ibadan, Nigeria concerning nutritional policy. It focused on the total food system of the cassava dependent people of Southern Nigeria.

This workshop brought together those concerned with cassava and its role in the food system of Nigeria. A systems perspective was used to view the problem broadly. Information from persons having many specialties is essential to understand and intervene in the entire food nutrition system. Thus, persons involved in all aspects of cassava and related food sources were invited to the workshop to discuss production, distribution and consumption within the food nutrition system.

Dr. B. N. Okigbo, Chairman of the Agricultural Research Council of Nigeria, presented a keynote address, directing the participants to put their efforts on critical policy issues and the needed actions for the cassava food system. Emphasizing the importance of the systems approach in solving the interdisciplinary problems of the food situation, Dr. Okigbo expressed his desire that... "this workshop will not end with another report to be filed away but with recommendations on how cooperatively future work should be planned and executed on problems we identify as requiring priority in cassava production, harvesting, processing, marketing, storage as a basis for future action, advice and development of policy on nutrition."

The plan for the policy workshop was based on a project conducted by the University of Colorado, Taximetrics Laboratory team. It had been jointly sponsored by USAID, Office of Nutrition, Technical Assistance Bureau, and the government of Nigeria and there had been joint participation from the International Institute of Tropical Agriculture.

The original project was initiated to develop systems analytical methods and intervention planning and to examine food nutrition systems including the policy research and implementation aspects for a given area. Cassava was chosen as the first nutritional dependency crop to examine. The current workshop drew upon aspects of this work.

Following discussions on cassava dependent food system problems, the workshop divided into task groups to develop a set of proposals outlining research and pilot project schemes for future programs. These proposals are presented in this report. In addition to the proposals, plans for their implementation were organized. Proper dissemination of the policy workshop report to interested government agencies was considered a vital step. Further, training of competent personnel in food nutrition systems analysis for policy making was recommended to insure the continuation of the research and implementation efforts. Finally, the establishment of a Nutrition Advisory Board was recommended with representation from the National Accelerated Food Production Program (NAFPP), several government departments, universities, the Nutrition Society of Nigeria and other national and international organizations. This board could institutionalize the cooperative joint efforts emanating from the workshop concerning nutrition systems programs.

The workshop focused on the formulation of programs to assure the nutritional well being of cassava dependent people. The workshop was designed for close participant interaction to assure that the varied experience and

expertise of the participants could concentrate on the total cassava food system problem. The expected output of the workshop was to be a set of clear recommendations - proposals aimed at specific organizational changes; investment development projects; research programs designed to solve specific critical problems within the cassava food system; and a program to monitor future cassava program developments. While the workshop dealt with Nigerian problems, it was developed to serve as a model for many countries dependent on other staple food crops.

THE FINDINGS AND RECOMMENDATIONS OF THE WORKSHOP

Following a keynote address by Dr. B. N. Okigbo, the University of Colorado study was summarized in a slide presentation. In the discussion during this presentation, a list of critical observations was developed.

Rural Processing - Drying
Amala in Western State

Mechanized Gari Preparation (Small Scale) -
Production Development Agency (PRODA)
East Central State

Amala Lafun Preparation,
Ibadan, Western State

Urban Gari Preparation at
Enugu, East Central State

Critical Observations from the University of Colorado Study

1. The genetic base of West African cassava is extremely narrow and subject to two very serious diseases, cassava mosaic and bacterial wilt.

2. Disease is now limiting output.

3. Production is small-scale with few exceptions. Peasant farmers and even urban households grow cassava intercropped with other complementary foods.

4. As a cloned product, expansion of production is inhibited by the small-scale informal exchange of plant material (sticks) by small-scale farmers.

5. Since harvesting of cassava goes on throughout the year, it becomes seasonally the primary source of starch when other crops are unavailable.

6. Cassava is among the most economic of medium- and high-rainfall tropical area food cultivars, requiring only marginal soils and little attention during growing.

7. Cassava is very labor intensive in almost all processed forms, but the opportunity cost for the workers is extremely low.

8. There is little evidence to suggest larger-scale processing and marketing can be cheaper than the present small-scale system, because the opportunity cost of large-scale inputs would likely be higher.

9. Price fluctuation appears to be less than for competing starches.

10. A majority of people in all income classes in Southern Nigeria appear to eat cassava regularly.

11. Cassava is not fed to infants when maize pap is available.

12. Complementary foods containing varying amounts of protein, vitamins and minerals are eaten with cassava at most meals at all income levels.

13. Complementary foods are more income responsive than cassava.

14. Most complementary foods that provide low income people with essential protein, vitamins and minerals are neglected by agricultural developers concerned with production, processing and marketing.

15. Seasonal variations in supply and price affect other starches more than cassava.

16. Consumers accept the necessity for elaborate preparation steps to avoid Hydrogen Cyanide (HCN) in critical doses. Thus, breeding to reduce HCN content may not be a cost-effective objective.

17. Small-scale processing is very fuel intensive utilizing charcoal. It is questionable how long this can remain economic.

The site chosen for the workshop, IITA, provided unusual opportunities for the participants to learn first-hand of important technical developments that can affect cassava dependent peoples' nutrition. The group toured the facilities of IITA and discussed the cassava, yam and farming systems work important to cassava farmers.

The cassava disease resistance development project was observed. The new disease resistant varieties were seen with production gains of several-fold over indigenously used materials, and the work continues on disease resistance improvement. The present new varieties need a wide distribution to significantly increase output in the areas that are subject to bacterial blight.

The new seed grown yams were also observed. Yam is an important starch source in cassava growing areas. The new seed grown varieties have the potential to significantly increase the yield over the present clone reproduced systems. Also, seed-grown yam can increase diversity of the genetic base.

Polyculture technology using small farm machines was also observed. New developments promise significant improvements in small farm yields of mixed crops.

The immediate application of the new disease resistant varieties was evident to the workshop, and steps were taken to include this application in the recommended actions.

The workshop developed recommendations in the form of tasks for two subgroups. These are described in Figure 1. The recommendations or tasks were then developed by workshop subgroups. Individual members were called upon to contribute their knowledge and special qualifications. Several of the recommendations were combined and reviewed in the plenary session. These

are presented on the following pages as specific proposals for action programs by appropriate agencies within the Nigerian government and other involved agencies.

The proposal programs are integrated to minimize overlap of activities and to minimize the training and government costs associated with the program. Critical to the workshop's efforts are suggestions for organizational development and training activities to implement the program. The workshop also focused on the strategy problems of disseminating results of the proposed surveys and on the difficulty of implementing the recommendations.

TOPICS FOR TASK GROUP I

1. Cassava Genetic Resources Collection*

2. Plant Material Multiplication, Dissemination, and Adoption **

3. Impact Analysis of New High Yielding, High Quality Cassava Material for Farmers, Processors, Distributors, Consumers ***

4. Quantification of Product Processing Channels for each type Cassava Food ****

5. Cassava Complementary Foods Production and Marketing Programs ****
   Egusi
   Fish
   Beans
   Others

TASKS FOR GROUP II

1. Consumer Expenditure and Food Intake Study ****
   Urban & rural by income class
   General population & targets
   Measuring preference differences
   Shopping & foods
   Nutrition differences
   By subgroup

2. Quantify Market Channel Maps for Cassava and Complementary Foods ****

3. Impact Analysis of
   Increased Cassava Supply
   Fortification vs. Complementary Food Development ****

4. Programs for Nutrition Improvement for Target Groups (after confirming by 1.) by Fortification, or Consumer Education, or Differentiated Foods ****

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* Proposal I which follows on page 13
** Proposal II which follows on page 17
*** Proposal III which follows on page 19
**** Proposal IV which follows on page 21

FIGURE I

LIST OF PARTICIPANTS

The interests represented included: breeding, plant genetics, physiology, entomology and farming systems, agricultural economics, agricultural extension, nutrition, education, agricultural research policy, and overall agricultural policy from both national and international perspectives.

Rapporteurs:

Dr. Jay E. April	University of Colorado Taximetrics Laboratory
Dr. Charles C. Slater	University of Colorado Taximetrics Laboratory

Keynote Speaker:

Dr. B. N. Okigbo	Chairman, Agricultural Research Council, Nigeria

Delegates

Mr. Agwu	Officer, Federal Institute for Industrial Research, Nigeria
Dr. H. R. Albrecht	Director General, IITA
Mrs. Amenechi	Nutritionist, Ministry of Health
Dr. L. Ene	Plant Breeder, Federal Agriculture Research and Training Station
Mr. N. O. Ezeilo	Cassava Coordinator, NAFPP
Dr. F. B. Fashakin	Professor of Food Technology, University of Ife
Dr. J. Flinn	Agricultural Economist, IITA
Dr. S. K. Hahn	Asst. Director, Roots and Tubers Program, IITA
Dr. I. Hornstein	Deputy Director, Office of Nutrition, USAID
Dr. D. L. Jennings	Plant Breeder, IITA
Dr. K. Leuschner	Entomologist, IITA
Mr. J. O. Ogunniyi	Agricultural Officer, Nigeria
Dr. R. O. Olson	Agricultural Officer, USAID
Dr. A. O. Omololu	Director, Food Science & Applied Nutrition Unit, University of Ibadan
Mr. Onojulu	Assistant Cassava Coordinator, NAFPP
Mr. James Otieno	Planning Officer, Ministry of Finance and Planning, Kenya
Dr. K. Rawal	Botanist, IITA
Dr. S. Sadik	Plant Physiologist, IITA
Mrs. O. Wali	Ed. Officer, Ministry of Education

PROBLEMS FACED IN IMPROVING DIETS OF CASSAVA DEPENDENT PEOPLE

Until recently, understanding cassava's role has been a low priority in food development programs in many national and international agricultural research centers. In the past and even now, suggestions have been made to eliminate cassava as a diet staple. However, Dr. Albrecht stated in his welcoming remarks, "Instead of phasing out cassava as a principal staple, it is now recognized that it must be given increasing attention to assure improved diet quality where cassava is important."

Efforts to minimize the role of cassava continue in part because the diet of cassava dependent people is not understood. Diets of most cassava dependent people contain complementary foods eaten at most meals in soups and stews along with cassava, but cassava is the main calorie energy source. This is particularly true in rural areas. In urban areas the increasing reliance on dried cassava products and a smaller variety of complementary foods in soups and stews may signal a reduction in the availability and utilization of protein, vitamin and mineral enriched foods in the urban diet. Even today with the increasing importance of various cassava products in the diet, research emphasis is still given to the development of cassava industrial or livestock end use. And the research resources that there are have been committed to the costly and botanically improbable task of increasing the protein content in the cassava root.

A further problem in the efforts to improve the food nutrition system of cassava dependent people has been the development of large-scale cassava processing facilities without considering the supply and distribution problems for effective performance. Large-scale plants have been built for starch

processing while evaluation of the necessary supply materials has been inadequate and large-scale gari (cassava meal) processing factories have been developed without enough concern for the input supply source and for the final product distribution. These errors in design and planning appear to occur because of inadequate system information and because of inadequate considerations for the complex interdependencies of a traditional food system such as cassava.

Unsatisfactory efforts have developed because the role of cassava in various food nutrition systems is not understood. This results in faulty research priority setting. A systems approach to the development of research priorities must be part of determining overall policies on food nutrition systems goals - thus, the purpose of this workshop.

Many knowledgeable people are forwarding extremely useful planning and research work in connection with cassava, but their efforts are not as effectively coordinated at this time as would be desirable. Improved varieties of disease resistant plant material have been developed. But these products have not been disseminated to the primary producers. The ground work for multiplication facilities exists and extension service skills are available with appropriate expansion to equip farmers with improved capacities. Well-trained nutritionists are working on elements of the problem but they lack the financial and technical support to generate necessary information about the consumption system. Organizational constraints prevent adequate information feed-back which would improve the technical work of interested participants in the cassava food system. Statistical information is both difficult to collect and variable in its quality. Thus, misleading information tends to confuse or limit decision makers in their efforts to promote change in the food system.

PROPOSALS FOR ACTION BY THE WORKSHOP

PROPOSAL I. CASSAVA GENETIC RESOURCES COLLECTION

(1) Problem: For a continuing program on cassava involvement, it has been recognized that the existing genetic base is too narrow. In particular, new germplasm is required for:

(a) Disease and pest resistance, e.g. Cassava Bacteria Blight and Mosaic

(b) Improved quality

(c) Higher yield

(d) Extending the ecological adaptation, e.g. for low rainfall areas and drought tolerant varieties

(e) Adaptation to different farming systems, e.g. modified plant habits for mechanization and improved shade tolerance for mixed cropping.

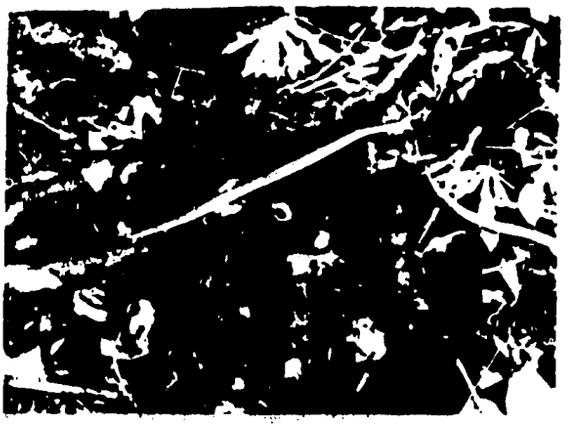
Cassava Plant, Enugu, East Central State

Cassava Plant with Bacterial Blight, Enugu, East Central State

(2) Background: Germplasm should be increased by collecting cultivars of the edible cassava (Manihot esculenta) and wild species of Manihot. There are listed about 130 Manihot species which occur in a much wider ecological zone than cultivated cassava and can be readily hybridized with cassava for solving the problems listed above.[2]

These sources of useful genetic variations have not been explored or utilized. Most of the species are to be found in Central and South America and have not been collected.

Worldwide, it is estimated that between 150 and 300 million people rely heavily upon cassava for their calorie source. In terms of expenditures, at an average minimum of $10 per capita per year market value for cassava, the world gross product value ranges from 1.5 to 3 billion dollars. Because of the critical nutritional contribution, however, the loss of this food supply could not be offset with several times this estimated value. The cost to develop and maintain cassava genetic resources can not be estimated at this time, but it would appear to have a high benefit to cost ratio.



Cassava Roots on Small Farm in Western State

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2 Rogers, David J. and S. G. Appan, Manihot Manihotoides, (Euphorbiaceae) Monograph No. 13, Organization for Flora Neotropica (New York: Hafner Press, 1973).

These resources may be lost if not collected, and thus the problem is a matter of urgency. Five tasks arise:

(a)	Collection:	A systematic and comprehensive collection of all known cultivars and wild species should be made.
(b)	Maintenance:	These collections must be maintained indefinitely and studies are required on the most appropriate methods.
(c)	Study and Evaluation:	There is a need to evaluate new characteristics discovered in these new germplasm sources.
(d)	Documentation:	Results of the evaluation should be carefully documented and made available to interested research workers.
(e)	Experimental Studies:	Biosystematic analysis of the genus Manihot through extensive hybridization between species with a view to introduce useful traits in cassava.
(f)	Distribution:	Methods of distribution must be evolved to satisfy plant quarantine regulations.

(3) Approach: The listed problems pose extremely complex questions which should be quickly studied by an international team of experts. This will involve maximum cooperation between research workers at IITA, CIAT, National Organizations for Cassava Improvement, as well as the International Board for Plant Genetic Resources (IBPGR), Rome, and their contracted systems center at the University of Colorado. We therefore recommend that a conference be held by the above group as a matter of urgency and that from this a program be undertaken to carry forward the resource collection.

PROPOSAL II. PLANT MATERIAL MULTIPLICATION, DISSEMINATION AND ADOPTION.

(1) Problem. If farmers are to receive and utilize planting materials of new varieties with a higher yield potential, certain problems in multiplication, dissemination and adoption must be overcome. Currently there is a scanty extension network to deal with numerous widely scattered illiterate small-scale farmers. Further, there is an inadequate supply of necessary materials,and processing and marketing organization is poor. The problems are specified in each of the above areas as follows:

(a) Multiplication: The clonal and bulky cassava planting material requires at least seven months' time to produce mature cuttings. Presently, there is a short supply of the basic breeders' stock. This problem is compounded by the many cuttings required to produce plants on a small acreage.

(b) Dissemination: There are transportation and storage problems associated with the distribution of the cuttings. The cuttings are bulky and somewhat perishable, needing to be planted within a few weeks of harvest. Further, cuttings are distributed to widely scattered small holders mostly over non-motorable roads.

(c) Adoption: Cassava is a lower priority crop and production is often restricted by poor soils (e.g. hydromorphic soils). Since it is a traditional crop, there is a tendency for improved technology education to be diluted with other beliefs.

(2) Background. Conditions indicate the importance of a planting material multiplication, dissemination, and adoption program. Cassava is a widely popular major staple. There is a demand for a greater supply of improved material and for a major intervention by the government and related agencies (e.g. N.A.F.P.P.). More breeding stock is becoming available from research and rapid multiplication technology is now shortening the time lag between improved variety development and utilization by farmers. Further, there is

evidence that many farmers are receptive to new workable and renumerative technologies such as decentralized multiplication, which is practical in farmers' plots and government centers. Since cassava is not a seasonal crop, it can be planted year round. Also, there are established channels in rural areas for reaching groups of farmers.

(3) Approach. Three phases to the approach have been identified: research, pilot projects, and action programs. For multiplication, further research is necessary to increase improved varieties and to improve rapid multiplication technology. Pilot projects should be established in rapid multiplication techniques and for private industry participation. Action programs should include rapid multiplication centers, government and farmer group corps supported in their later stages by private commercial enterprises with certification systems, and a program coordinating the national centers' responsibilities with support for new methods and materials.

The research phase of dissemination should investigate packaging for better storage of cuttings. Pilot projects should include a feasibility study for private industry participation and experiments in improved processing and marketing procedures for materials. The action programs should establish decentralized multiplication plots for faster and more efficient dissemination.

An adoption research study should be initiated to map the suitability of cassava soils to planting. A pilot project would develop visual aids and other communication techniques to promote the earlier adoption of newly developed cuttings. Finally, a set of action programs should be initiated for training extension workers and setting up an extension network to include:

(a) Improvement of the "package" of technology for farmer-level fertilizer and variety trials

(b) Demonstrations to teach and arouse the interest of farmers

(c) Group action endeavors to speed adoption

(d) An adequate supply of all necessary inputs.

PROPOSAL III. IMPACT ANALYSIS OF NEW HIGH YIELDING, HIGH QUALITY CASSAVA MATERIAL

(1) Problem. The problem is stated in the form of the following question: What will be the farm level ramifications, as new high yielding cassava varieties are accepted by farmers? What will be the economic, geographical and nutritional impacts of this increase in production on the supply of cassava, its subsequent processing, distribution and consumption? The answers to such questions are the vital basis for agricultural planning and policy formation for cassava with the N.A.F.P.P.

(2) Background. Cassava is a major starchy staple which affects the incomes, nutrition, and social well being of the majority of rural people and many lower income urban dwellers also, particularly those people living in the forest and derived savannah zones of Nigeria.

The cassava dependent regions of Nigeria are estimated to have populations of 25 to 35 million in 1975. Population growth trends predict a population of 35 to 50 million by 1985. Thus, while there may be short-term dislocation due to adoption of the higher yielding varieties, population growth will make this technical advance welcome.

Several questions must be posed and answered, related to a more product[illegible] cassava technology. By way of example, if higher yielding varieties are developed and disseminated to farmers:

(a) Will farmers reduce their acreages of cassava (and substitute other crops)?

(b) Will they increase their marketed surplus of cassava?

(c) What then will be the future cash resource base of cassava farms?

(d) Will the existing processing capacity enable the increased supply of roots to be processed, and into what forms? What will be the implied change in the processing industry?

(e) What alternative uses (both human and industrial) may be developed for cassava?

(3) Approach. To answer the above questions, information must be obtained from primary sources. In essence, there are sequences of processes.

(a) Positive data collection phase...what are the present characteristics of the system?

(b) Analysis of the relationships of cassava production at the village to regional level.

(c) A normative policy phase in which operating rules for "the revised" cassava system are identified.

(d) A testing, modification and shaping of these rules in a pilot phase.

(e) Implementation of rules at a regional to national level.

(a) Phase I. The data collection phase could be a continuation of the field studies being conducted by such institutions as government agencies, universities, Nigerian Institute for Social and Economical Research (NISER), IITA. Limited visit surveys to a number of sites stratified on (i) agroclimatic zones (ii) relation to markets (iii) income classes--would generate information on the existing state of the industry and provide a benchmark from which to assess the impact of the program. The survey would last twelve months.

(b) & (c) Phase II. Finalizing the analysis of the surveys and defining the operating rules for the cassava production and processing industry would be completed in six months.

(d) Phase III. Based on the findings of Phase I and Phase II, a number of pilot sites would be selected to test and modify the selected production,

processing and marketing strategies for the high yielding cassava technology. The duration would be eighteen months.

(e) Phase IV. Implementation of the tested cassava system on a regional to national basis, cost and duration to be estimated later.

PROPOSAL IV. DISTRIBUTION, CONSUMPTION AND NUTRITION PROPOSALS.

(1) Problem. The lack of an accurate measurement for the distribution, consumption and nutritional status of the diverse socio-economic groups in Nigeria results in an inadequate basis for agricultural and social policy. The problem is therefore to measure consumption, distribution of food, and nutritional status of a cross section of Nigerian society.

Large Urban Market at Enugu,
East Central State

Akpu in Owerri Market,
East Central State

Cassava Roots
in Owerri
Market,
East Central
State

Small Roadside Market near Egusu,
East Central State

(2) Background. The information available is both lacking in coverage and variable in its quality, although many of the needed technical capabilities are in existence and ready to contribute to the task. However, there is a need for increased coordination, executive energy and budgetary focus on the tasks of nutrition assessment. Some of the agencies capable of making significant contribution include:

(a) Federal Department of Statistics

(b) Ministries of Agriculture and Natural Resources, Health, Education and Economic Development and Reconstruction

(c) Universities, including Ibadan-Ife, ABU, Nssuka, etc. These are centers of technical skill in nutrition, economics, agriculture, rural sociology and other needed capabilities

(d) National Institute of Social and Economic Research (NISER)

(e) IITA

(f) NAFPP

(g) Institute of Child Health, Lagos.

Even with this capability, the last large-scale study of nutrition occurred in 1965-7 during the ICNND survey. This benchmark study is now out of date. Further, the focus now needs to include distributive issues and to link with a production study as well as consumption information. Smaller-scale studies do not provide the basis for evaluating such development questions as:

(A) Is nutrition adequate?

(B) Should Nigeria undertake large-scale food fortification?

(C) Should Nigeria undertake school feeding along with the U.P.E. scheme?

(D) Are baby foods adequate in supply, quality and acceptance?

(E) Can marketing channels regulations be improved by better knowledge of prices, costs, and sources of product?

(F) Are staple dependent groups (i.e. cassava or other foods staple groups) adequately nourished?

(G) Should large-scale food processing displace village processing?

Another set of related issues concerns the relationship of cassava production to substitution and complementary foods. There is a great need to collect accurate data on cassava production characteristics as related to other staple food crops such as yams, rice, and maize, and complementary foods such as beans, egusi, animal protein, etc. Attention should be paid to the nutritional role of complementary foods at various levels of cassava dependency. There is also a need to compile information on cassava derived products such as gari, flour, etc. Their utilization pattern and nutritive values need to be known as a basis for guidance on (i) improvement programs; (ii) processing projects; and (iii) marketing development.

These and other issues confront public and private planners, but the needed data are either not available or lacking in dependability. Moreover, emergency conditions may demand quick, accurate and economical feeding of target groups. Therefore, a system is needed to establish periodic benchmark studies and to continually monitor performance of the food system.

(3) Approach. The information needed involves several survey programs. These surveys will require continuing refinement to lower the cost and to improve accuracy so that decision makers are adequately informed.

(a) One such program would be a household survey program covering food purchasing behavior, including the outlet or farm source supply, prices paid, frequency of shopping or acquisition, as well as quantity by type and nutritional composition of foods. Income by source and application should be measured. Nutritional status, including anthropomorphic measures, should be taken. Sanitation facilities and practices, and water sources should be

surveyed. This survey program will require pilot steps to develop appropriate instruments, training, sampling and analysis procedures.

(b) Food composition studies should be updated to assure Nigerian users of accurate measures.

(c) Food distribution channels should be mapped to ascertain quantities, prices, margins, sources and risks as well as special problems of market participants.

This research should assist in improving technical assistance for private sector marketeers, regulations and price controls for administrators and services for consumers. The three results sought are:

(i) To provide the information needed to assure lower prices to consumers

(ii) To assure producers of a more dependable outlet

(iii) To foster a more stable marketing system.

(d) Improvement of child feeding programs. Pilot projects now exist for soya-enriched maize pap (soyogi). This work needs supplementary support to get answers to questions concerning supply of inputs, production methods and scale, distribution, and consumer education.

The first year only pilot surveys would be developed, thus enumerators would be retained only for a part of the first year of training and indoctrination. The program should become a continuing effort. Periodic benchmark studies should be supplemented by continuous monitoring by sampling and special studies of problem areas.

The development of a trained rural and urban enumerator force is a major infrastructural investment. The same field force could be used on other surveys of agriculture, housing, health, as well as serving as field supervisors for periodic regional or national census studies. In short, while the cost of a statistical field force can be justified by this program, the enumerators could assist in other work as well.

IMPLEMENTATION OF THE PROPOSALS

To bring about this program requires the full support of both government policy makers and technical resources. A coordinator needs to be appointed to assure the overall success of the projects outlined above and to form the necessary link with all the resources available to this project. This coordinator could be located in a key ministry or in a coordinating institution such as the recommended National Nutrition Council or a special office attached to the Cabinet or NISER. The critical thing is to coordinate the interdisciplinary work needed and to supervise the projects to assure the quality of output. This suggests the need for budgetary approval by the coordinator of production, consumer and marketing surveys as well as pilot and feasibility programs.

The nutritional welfare benefits can be enormous. These studies will assist agricultural planners to determine crop production requirements, price policy and regulatory activities. As a result, significant improvements in consumer income and producer output can be developed.

Food constitutes as much as half of disposable real income (including informal and traditional sectors). Thus, the budgets can be seen as investments in planning and development concerning a system of at least 5,000 times greater value.

SUMMARY

During the workshop, information concerning the cassava food system in Nigeria was presented and discussed. This information was disseminated in such a way as to communicate explicitly systems methods as they apply, not only to cassava and its related crops, but to agriculture, food and nutrition programs in general. Finally, not only were recommendations made but proposals were developed for implementing projects dealing with nutritional goals for people in cassava dependent cultures. The participants agreed that the workshop did not just end with another report. They felt that clear, unambiguous proposals were developed to be presented to the Federal Government of Nigeria for action projects, training in the methods of systems analysis, and the institutionalization of a systematic national nutrition program. Further, it is believed that this type of dynamic process of field study, workshop, and action projects could well serve as a model for other crops and regions.