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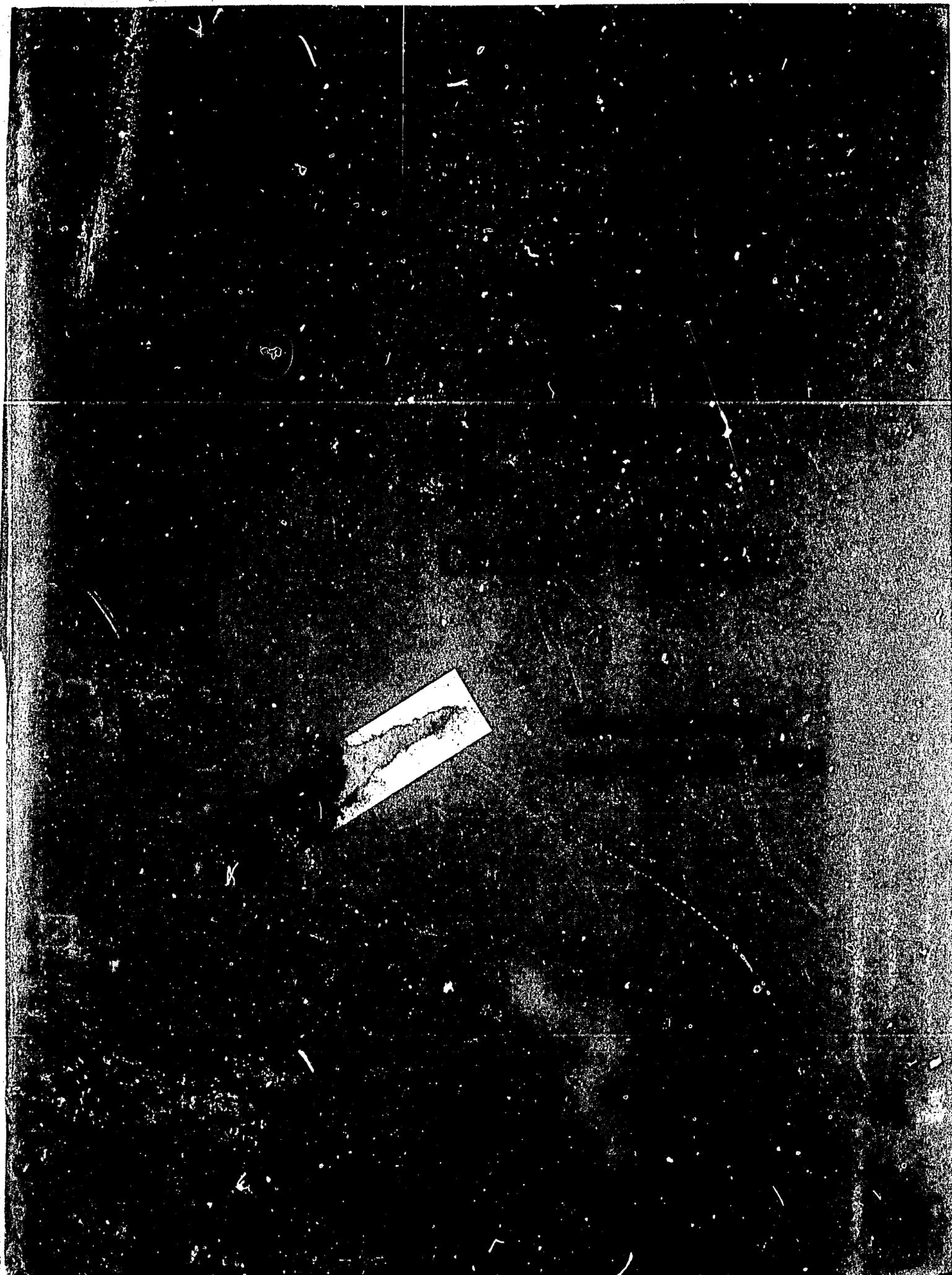
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9. ABSTRACT

This report includes the conference's opening addresses, country nutrition reports, thematic presentations, committee reports, and the closing ceremonies. Countries participating in the conference were: Dahomey, Gambia, Ghana, Guinea, Ivory Coast, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo, USA, and Upper Volta. The thematic presentations were: Nutrition and Health, Nutrition and Agriculture; Nutrition and Child Feeding, Nutrition and Education, Nutrition and Industry, and Nutrition and Coordination. The committees covered the same topics as the thematic presentations. There were no general conclusions or recommendations.

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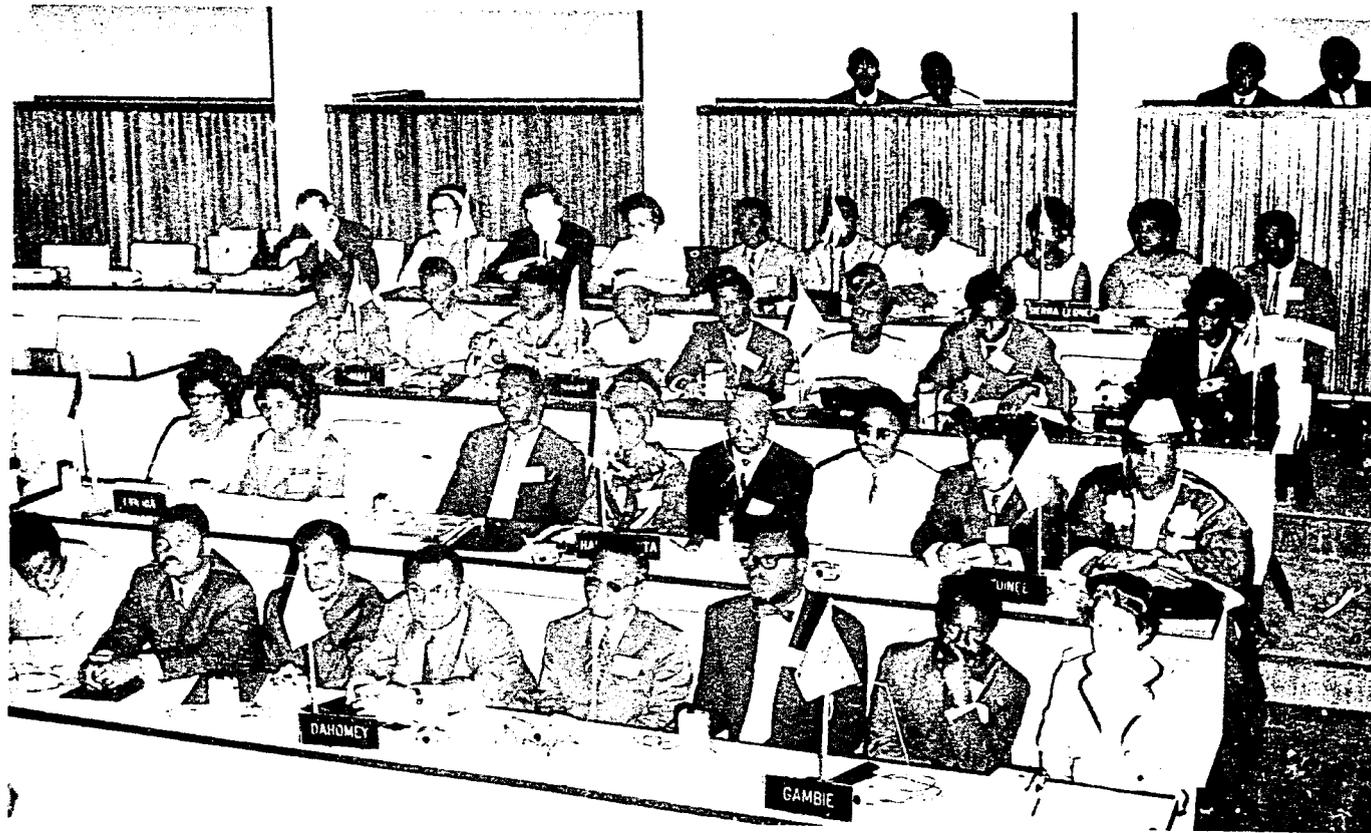




Proceedings of the  
West African Conference on Nutrition and Child Feeding  
Dakar, Senegal  
March 25-29, 1968

Sponsored by  
The Republic of Senegal  
and  
The United States of America Agency for International Development

With the Participation of  
The Food and Agriculture Organization of the United Nations  
Organisation de Coordination et de Coopération pour la lutte contre les Grandes Endémies  
The United Nations Children's Fund  
The World Health Organization



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The delegates in session. From left to right, bottom row: Ivory Coast - Mr. Ibrahim Touré, Mr. Vassindou Bamba (not pictured, Dr. Tahiri-Zagret); Dahomey - Mr. Joseph Ajavon, Dr. Edouard Campbell, Dr. Jean Hounsou; Gambia - Mr. Reuben Thomas, Dr. John Mahoney, Dr. Angela Fuller. Second row: Liberia - Mrs. Rachel Pearce-Marshall, Mrs. Nancy Nah (not pictured, Miss Bandele Bicaise); Upper Volta - Mr. Emmanuel Batiebo, Mrs. Rahamata Diallo, Mr. Sory Sie; Guinea - Mr. Naby-Moussa Touré, Dr. Mohamed Kader, Dr. Baba Kourouma. Third row: Mali - Dr. Bénitiéni Fofana, Mr. Abdoulaye Samaké, Mr. Seydou Diakité; Niger - Mr. Moroh Diakité; Nigeria - Dr. Adewale Omololu, Dr. V.A. Oyenuga, Dr. B.A. Johnson; Senegal - Dr. Thianar N'Doye. Fourth row: Mr. James Maher, U.S. Embassy; United States - Mrs. Joyce King, Dr. Martin Forman, Mrs. Jean Pinder; Togo - Mr. F.P.P. Kluga-O'Cloo; Dr. E.Z. Gadagbé; Dr. Paul Adjmagbo; Sierra Leone - Miss Queenie Jarrett, Dr. Ola During, Dr. Evelyn Cummings.



The delegates in session. Left to right, first row: Ghana - Dr. Frederick Sai, Mrs. Janet Tay, Dr. Samuel Ofosu-Amaah, Mr. E.K. Okpoti. Second row: OCCGE (observers) - Dr. Hellegouarc'h, Dr. Jacques Toury.



Left to right: The Honorable L. Dean Brown, Ambassador of the United States; His Excellency, Abdou Diouf, Minister of Planning and Industrial Development, Republic of Senegal, welcoming the delegates.

This Conference was planned and organized and the proceedings were prepared by the Nutrition Program of the U.S. Public Health Service under a Participating Agency Service Agreement with the Agency for International Development, with the assistance of the U.S. Embassy in Dakar.

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## INTRODUCTION

In its broadest sense, human nutrition involves a wide spectrum of activities which can be classified in three categories: (1) food production, protection, marketing, and distribution; (2) food selection and preparation; and (3) food consumption, metabolization, assimilation, and elimination.

The first category is the concern of a number of apparently unrelated disciplines such as agriculture, economics, food technology and education. The second category covers anthropology, culturology, and social sciences. The third category is essentially medical and physiological; it covers the study of the complex pathways followed by nutrients in the human body. Many scientific gatherings have brought together scientists concerned with the third category. Few meetings, if any, have brought together experts in the first two categories to discuss the problems of human nutrition.

Confronted with the critical discrepancy between the rate of world population growth and that of food production, the United States Government has placed among its highest foreign aid priorities, assistance in the fields of food production and nutrition. Since these two priorities demand an interdisciplinary approach to program planning, the idea was born to sponsor a series of conferences which would bring together planners, administrators and technical personnel from the developing countries to discuss the problems of food supply and nutrition, exchange information, and review past developments and perspectives for the future.

It was decided to hold the first such conference in Dakar, Senegal, for the French- and English-speaking countries of West Africa. Each country was invited to present a report on its food production and nutrition activities according to a prearranged outline. In addition, six of the most important themes which are part of the broad nutrition concept were selected to be presented by experts in each field and were discussed by the Conference as a whole. Six committees were appointed and given the task of summarizing the sense of the Conference and making recommendations.

The proceedings of the meeting follow and we hope that this volume will be helpful to those engaged in the arduous task of planning and programming for the future.

Jacques M. May, M.D.  
Chief, International Unit  
NP/NCCD/PHS  
September, 1968

## PROGRAM

### Opening Ceremonies

March 25, a.m.

Welcoming messages:

Ambassador L. Dean Brown, United States of America  
Minister Abdou Diouf, Minister of Plan, Republic of Senegal

Address:

Mr. Ben Mady Cissé, Director of Rural Animation and Expansion,  
Republic of Senegal

### Presentation of Country Reports

Chairman: Dr. Paul Adjmagbo

Report on Nutrition in the Ivory Coast  
Report on Nutrition in Dahomey  
Report on Nutrition in the Gambia  
Report on Nutrition in Ghana  
Report on Nutrition in Guinea

March 25, p.m.

Chairman: Dr. John Mahoney

Report on Nutrition in Upper Volta  
Report on Nutrition in Liberia  
Report on Nutrition in Mali  
Report on Nutrition in Niger  
Report on Nutrition in Nigeria  
Report on Nutrition in Senegal  
Report on Nutrition in Sierra Leone  
Report on Nutrition in Togo  
Report on Nutrition in the United States of America

### Presentation of Themes

March 26, a.m.

Chairman: Dr. Baba Kourouma

Nutrition and Health -- Dr. Bénitiéni Fofana  
General Discussion  
Nutrition and Agriculture -- Mr. Abdoulaye Samaké  
General Discussion

March 26, p.m.

Chairman: Dr. Frederick T. Sai

Nutrition and Child Feeding -- Mr. Peter  
Primus Kluga-O'Cloo  
General Discussion  
Nutrition and Education -- Dr. Adewale Omololu  
General Discussion

March 27, a.m.

Chairman: Dr. Edouard Campbell

Nutrition and Private Industry -- Dr. Thianar N'Doye  
General Discussion  
Nutrition and Coordination -- Dr. Frederick Sai  
General Discussion

March 27, p.m.

Travel arrangements

#### Committee Work

March 28, a.m.

Committee meetings

Committee on Nutrition and Health  
Committee on Nutrition and Agriculture  
Committee on Nutrition and Child Feeding  
Committee on Nutrition and Education  
Committee on Nutrition and Industry  
Committee on Nutrition and Coordination

March 28, p.m.

Committee work and consolidation of reports by rapporteurs

#### Committee Reports

March 29, a.m.

Chairman: Mr. Moroh Diakité

Report of the Committee on Nutrition and Health  
Report of the Committee on Nutrition and Agriculture

Report of the Committee on Nutrition and Child Feeding  
Report of the Committee on Nutrition and Education  
Report of the Committee on Nutrition and Industry  
Report of the Committee on Nutrition and Coordination

Closing Ceremonies

March 29, p.m.

Chairman: Mr. Ben Mady Cissé

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## OPENING CEREMONIES

### WELCOMING ADDRESS

by The Honorable L. Dean Brown, Ambassador of the United States

It is a great honor for me to speak to you on the opening of this important conference. In the coming five days, one of the most serious and most urgent problems Africa must face, that of feeding its growing population, will be discussed and examined.

President Johnson, himself, recently said that next to the problem of searching for peace, there is no problem more serious for the entire world than that of guarding against the growing imbalance between population and food requirements. This is why the conference taking place this week is so appropriate. It will permit us to examine a situation which is worldwide, one which is certain to be our prime consideration for the remainder of the century. I do not believe I am exaggerating when I say that man's destiny depends on solving the problems which you will be discussing this week. As I look over the conference agenda, which was carefully drawn up and well thought out, I note that each country represented will present a paper setting forth its nutrition problems and the measures taken to resolve them. During the conference, you will be taking part in discussions with other African authorities recognized for their expertise in the fields of health, agriculture, education, planning, and child feeding. These are subjects of major importance and a deep understanding of the relationships between them is essential to the resolution of problems of economic development and social progress.

Economists concerned with problems of development, and other specialists concerned with social questions, testify to the undeniable relationship that exists between economic development and a well-fed population. My sincere and profound wish is that this conference will contribute to the creation of a greater awareness of the retarding effects that malnutrition has on physical development, as well as on the mental and intellectual development of the individual.

Furthermore, it is undeniable that no individual, no population, can expend more energy than it receives from its food. Thus, the

general quality of human life is, in large measure, conditioned by the diet followed by the population. A poor diet inevitably dooms the population to a low rate of productivity, and thus tends to seriously slow down the country's economic and social development.

Recognizing the growing seriousness of the world's food problem, the United States has, by a new law, put a very high priority on its "Food for Freedom" program, in order to combat hunger and malnutrition and to stimulate agricultural productivity, thereby promoting general economic development and social well-being. This program is aimed at putting substantial quantities of food products at the disposal of developing countries, thus helping them to meet their present food requirements. The United States is also encouraging these countries to make more efficient use of the products they receive in order to take the lead in the race between food needed and food available to the population. The "Food for Freedom" program also furnishes food for the work programs, in other words, food resources are being used to encourage those people who are trying to improve their own living conditions.

So, the United States is paying ever increasing attention to the efficient utilization of its food resources in order to improve the nutrition of countries in general, and that of young children in particular. We believe that there are many opportunities to establish, or ensure the expansion of, significant programs to combat malnutrition, especially in infants and in preschool age children, and to encourage community development and indigenous efforts, while paying particular attention to increased agricultural production.

In conclusion, let me emphasize once again the importance my government attaches to the success of this conference. I would also like to take this opportunity to thank and congratulate the Government of Senegal for its generous hospitality and profound understanding of the prime significance of the problem of nutrition and for agreeing to sponsor, in cooperation with our Government, this conference on nutrition. I hope that the work of this conference will result in a positive contribution towards solving Africa's nutrition problems, thereby providing a greater degree of economic and social well-being to its growing population.

## WELCOMING ADDRESS

by His Excellency Abdou Diouf,

Minister of Planning and Industrial Development, Republic of Senegal

For twenty years, a wholesome concern has been spreading around the world. Men from all countries, rich and poor alike, are becoming more and more seriously disturbed about the problem of hunger. Little by little, they are coming to realize their common responsibilities, not only as concerns disasters, episodic or chronic famines (which are subjects of popular feelings), but also, and more profoundly, as concerns the permanent conditions of undernourishment or malnutrition in which a large part of humanity finds itself enchained. Millions of people do not have the bare necessities on which to survive or else these people are under the constant threat of disease and physical incapacity. Yet, on certain continents, it is a question of abundance. These conditions certainly constitute a danger for world peace, but do they not also endanger man's biological future?

After having sounded the alarm, experts from the various disciplines have made specific studies of this problem available to responsible officials of every country. Various international organizations, including private, goodwill, and government agencies, are, within the framework of solidarity between people, seeking practical solutions to these problems and offering their assistance alongside that of organized aid within the framework of bilateral cooperation. However, everyone agrees that no amount of foreign aid can replace the effort of each nation concerned to confront nutrition problems as they exist in each country and to develop and consolidate a concrete policy aimed at their solution.

Therefore, it was with a great deal of interest that the President of the Republic of Senegal welcomed the initiative and participation of the United States Agency for International Development when it proposed to organize a conference in Dakar that would bring together delegates of thirteen West African countries, to consider the problem of nutrition.

On behalf of the President of the Republic, I therefore have the honor of inaugurating this meeting which is going to consider, in a positive and concrete manner, a fundamental question regarding our populations. I would like to convey to you the wishes of the Chief of State in welcoming you to a city which stands as the capital of Senegal, as well as one of the crossroads where all Africans can feel at home. It is always with joy and hope that the sister countries of Africa meet again for a task which is valid only if it is common to them. Is it not around the dinner table that the family finds itself more at ease? Let it be, then, that your considerations to improve our food situation may increase our African brotherhood!

Addressing myself to the U.S. Agency for International Development, I convey your thanks and those of Senegal for its initiative and understanding of our problems and the effective cooperation which it is showing in many other circumstances today. Our thanks go also to the regional and international organizations which, in a like manner, have renewed their regular support of our development endeavors, a support on which we can always rely.

During the coming months, a top-level world conference will work diligently in an attempt to find ways that could remedy the dramatic disparities in world economy and fill the widening gap between industrial nations and the majority of men. In particular, Africa, which yesterday suffered a terrible drain of 200 million people through slavery, still feels the effects of a long period of slave-trade economy. Its population increases (2.5 percent in Senegal) while its food resources are unable to feed it. Yet, more manpower is needed to develop the continent. How do you develop entire regions when the population density is under 20 and even ten inhabitants per square kilometer? On the other hand, nutrition deficiencies, already largely responsible for an early mortality, often cause serious retardation in the somatic and psychomotor development of our children and limit the productive capacity of our adults. With the specialists, you will thoroughly study the scientific aspects of malnutrition. Let us just say now that, when it comes to our country's complete development, social as well as economic, it is the human potential and the African's future which is at stake in overcoming the problems which you are going to study during the course of this conference.

These problems have not escaped the attention of the governments of the developing countries. Since gaining independence, Senegal, for its part, has shown basic concern for them. Prior to its planning effort, many surveys conducted throughout the country revealed the extent of difficulties and also a mass of factors contributing to their extension, all of which had to be dealt with. In 1959, the colonial economic system forced Senegal to import nearly 15 billion CFA francs' worth of food products (including tobacco and drinks), which constituted 34 percent of all imports. These food imports included 3.8 billion CFA francs' worth of rice, and 3.4 billion francs' worth of sugar. The structure of Senegal's commercial balance, which is incompatible with economic research, reflects the production structure which is dominated by peanut speculation. In order to survive each year during the critical times of food shortage which cannot be bridged by one-crop planting, the Senegalese farmer became indebted by usurious rates which locked him into a vicious circle. Under such conditions, how was it possible to ask him to use his own efforts to strive for recovery from the nutrition situation? Serious structural reforms were imposed. They were accomplished by dismantling the slave trade economy and replacing it by another commercial system based on rural cooperatives

and State assistance to the farmers. Since then, Senegal has been able to prepare and launch its First Four Year Plan (1961 to 1964).

According to this plan, a country which does not produce enough to feed its population has to assign priority to food production during the first phase of agricultural development (p. 12). The Government of Senegal intends to reduce the present massive importation of food products by promoting its own production development through a better use of land by means of local land parceling and within the pioneer action zones (p. 19). Agricultural extension will be based primarily on food crop speculation. Within satisfactory costs, the country can produce certain foods that it presently imports such as millet and some rice. Crop diversification will permit improving the supply of corn and vegetables to the domestic food market (p. 45). The progress anticipated in the animal husbandry and fishing sectors should furnish the proteins that the Senegalese have been lacking. In the industrial sector, studies were initiated concerning peanut by-products, increasing the value of seeds and local flour, sugar production, meat canneries and tomato paste. The government has to devote itself to expanding these enterprises to an inter-African horizon. The First Four Year Plan analyzed the means necessary to reach these objectives: opening of zones rich in food-crop potentialities; research and experimentation; improvement of production factors whether it be seeds, fertilizer, fungicides or farm equipment; large land parceling designed to increase cultivated rice areas; land reform; a commercialization and price policy which would promote food production; and finally, producer promotion, a point which I will return to later.

The objectives that Senegal established in 1961 for 1964, we must admit, were not all attained, but the essential infrastructure of the country was established and put into the hands of the citizens. These institutions are ironing out their problems as planning becomes more accurate and flexible, and are adjusting to the near future based on past experience. If contingencies developed in a constantly unfavorable fashion, if the time for perfecting and achieving the projects turned out to be longer than planned, the productive equipment of the rural area steadfastly advanced and the villagers benefited from food supplied by their cooperatives; land regulations were reformed by preparing effective land organization, market-gardening crops and, above all, development of rice farming, particularly through the parceling of 30,000 hectares of land in the Senegal river delta; commercial tomato farming and sugarcane industries were established. There was an increase in the principal food production of millet and sorghum on one hand, and rice on the other. The former, above all, exceeded the plan's objectives while

rice is regularly increasing and attaining its objectives. The Institute of Food Technology worked with private enterprise and international organizations to develop a millet couscous and weaning food products which industry could prepare. It was during this period (1959 to 1964) that the second plan was designed gradually because many of the objectives established in the first plan will be attained between 1965 and 1969. This first plan for an integrated national development has proven to be a preparation for future plans.

In continuity with the first plan, and with the perspective of long term renovation, Senegal's Second Four Year Plan has undertaken three fundamental objectives for the rural sector: improvement of human resources; production diversification and increase; reorganization and expansion of commercial circuits. Because of the Law of National Domain (Law Number 64-46 of June 17, 1964) land reform now permits the parceling of intervillage land and the modernization of agriculture in the sense of intensive exploitation, including livestock.

In this manner, Senegal continues its efforts in food farming. Millet and sorghum production, which rose from 321,000 tons in 1959, to 440,000 tons in 1962, will easily reach 600,000 tons in 1969. Crop yield increased from 510 to 600 kg/ha. Corn production, which was about 27,000 tons in 1962, should reach about 50,000 tons. Bean (niébé) production should increase from 13,000 to 35,000 tons and cassava, from 157,000 to 250,000 tons. It has been shown that agricultural research now makes a very important contribution to improving food production.

Senegal is focusing its attention on an important rice farming program because in ten years rice imports increased from 50,000 to 160,000 tons, or two and a half times national production of white rice, and the demand for rice increases with population growth and the evolution of food habits. It is estimated that there are 250,000 hectares of cultivable rice areas in the country compared with 75,000 hectares presently cultivated. Taking into consideration an irrigation system which would control water on 20,000 new hectares and thus increase crop yields, the commercialization of local production, in addition to allowing significant local consumption in certain regions, will vary between 24,000 and 28,000 tons of white rice, which will reduce some of the imports at the end of the second plan.

Sugar is another important item on the list of potential food crops for Senegal: 50,000 tons were consumed in 1963. Experiments conducted since 1961 indicate the possibility of initiating local production which could amount to 15,000 tons of white sugar in 1969.

Other objectives are in the process of being achieved: increasing vegetable production to 50,000 tons and banana production to 7,000 tons; preparing for a sounder production of pineapples, kola-nuts, avocados, mangoes, citrus fruits, coconuts, nuts, and palm oil.

In my capacity as Minister of Planning, I can report on Senegal's current concern for livestock, forests, soil conservation, and river and deep-sea fishing. Large livestock operations must be based on, among other factors, an 80,000-hectare ranch, and also on the formation of feed reserves, slaughterhouses, and cold storage facilities. FAO and UNICEF, and in the future Canada, contribute to dairy activities designed to supply the rural centers in particular. The exploitation of the remarkable food reserves offered by the ocean on our coasts will lead to receiving equipment for local fishing and to a greater diversification of fish production, in which Senegal is not the only interested country. It is anticipated that line fishing will bring in 120,000 tons in 1969 compared to 87,000 tons in 1964; sardine fishing will bring 8,500 tons compared to 2,560 tons; and tuna fishing will bring 15,000 to 25,000 tons, following the development of the processing complex which these landings would supply.

But, above and beyond these operations, Senegal pursues an objective still more essential to its development.. the training of the people, its citizens, to be producers as well as consumers. It is to this end that rural animation has been working since 1959, mainly at the village and urban district levels, by training men and women instructors who will arouse their people to face the concrete problems of development, and by helping the people to organize so they can carry out activities resulting in awareness and responsibility. In its education programs, animation relies on the Rural Expansion Centers, that is, teams that include workers in the various branches of rural economy, as well as on varied technical services. The first step consists of ensuring, through adequate education, positive exchanges between adults--men and women--and the various technicians.

In this way, in each of the twenty-eight departments which make up the country's administrative structure, the Animation and Expansion staff personnel work in cooperation with technicians from the various branches, such as Agriculture, Livestock, Water and Forests, and also with personnel from Maternal and Child Protection, The National Bureau of Applied Nutrition (BANAS), Health Education and Home Economics. Interdisciplinary endeavors find a strong base there for the benefit of all.

I will leave it to the responsible technicians to present to you, in the next days, the methodology and steps for training men

and women animators, as well as the role given to nutrition education in this training. First and second degree courses, specialized courses--some for women in particular, some aimed at food crop development, some for livestock breeders and fishermen--are being conducted. The development of new techniques is carried out by means of multidisciplinary training courses presented in the fields, gardens, village poultry farms, workshops where fish can be processed, meat and dairy products marketing associations, and "grass roots" local projects. Two projects will probably merit your attention: children's nurseries and pilot villages, because they join together, for the same populations, various educational activities in programs intended to be coherent.

As this educational method employed by the Service demands their participation in a new and complementary plan, seminar classes are held annually for intermediate staff personnel in each Department. Technicians required by the range of local projects are trained in response to the basic needs and problems, within the framework of national and regional constraints.

Although it was necessary in the beginning stages to instruct and train, on a priority basis, the adults who were for the most part illiterate, it became more and more apparent to the government services that they also needed to be concerned with providing a more adequate education to the children and youth of rural areas. If we do not want to see them migrate to the city, we should instead arouse their interest in the actual development of rural activities.

In this regard, representatives of National Education will be able to relate to you their experience with the school cafeterias and gardens as well as the provisions of the project under way to train rural classes. Besides this, the President of the Republic will, immediately after the enactment of a new law, sign a decree organizing a Civic Action Service in the Army designed to train young people in agricultural activities and to integrate them in the existing land projects or within the pioneer zones.

Such is the panorama of Senegal's activities which testifies to its concern in combating malnutrition among its people. Each of the delegations present is going to have the opportunity to witness the experiments conducted by each of the countries represented here. Senegal will certainly learn new lessons from you which will permit it to more effectively advance in our common struggle. May this conference thus contribute to strengthening vital exchanges and to designing the bases for a method which will permit our

respective countries to provide better control of a crucial problem. We do not lack international aid. Senegal has already benefited from it and warmly thanks the institutions concerned: FAO, UNICEF, WHO, WFP, World Committee against Hunger, and the International Committee for Children. Senegal has tried, to the best of its ability, to integrate the various aids into the base of its development endeavors. This research has not yet succeeded, always and everywhere. Our own thoughts and our own resolutions alone will enable this integration, which we desire for greater effectiveness for all.

I declare this conference open.

## KEYNOTE ADDRESS

by Mr. Ben Mady Cissé

Director of Rural Animation and Expansion, Republic of Senegal

The problem of providing good nutrition for their populations must, in the coming years, receive the highest priority attention of governments, especially those of the developing countries. There are two major reasons for this urgency: one is of a biological nature, the other is of a demographic nature. First of all, in the light of recent experiments, it appears certain that food deficiencies in breast-fed babies less than 2 years of age create irreversible damages which limit their intellectual development and thereby their potential contribution to the development of their country. Second, it is evident that the general population, now protected against the ravages of diseases by medical advancements, is increasing more rapidly than food resources. These two fundamental facts reveal that healthy nutrition has become a medical and social problem at the same time, and that the solution capable of bringing results to these problems can be found only within the framework of multi-disciplinary collaboration.

Malnutrition must not be considered simply as a biochemical imbalance in the patient's blood, but more largely, as a veritable social sickness. It is possible to fight this social disease only by regrouping the potentialities of the different disciplines, such as health, agriculture, education, food industry, and planning. With your permission, we will study these five subjects, one after the other.

### HEALTH

Economic and social development is considered to be the first objective of a government in the underdeveloped regions of the world. It demands a huge mental and physical effort from the populations in order to be able to integrate new techniques into their daily existence in a lasting manner. In this regard, nutritional balances attained through tradition (and which, incidentally, have been hampered by a slave economy) no longer suffice. We must ensure the workers in the field, and in the city, of a minimum amount of Calories; and above all, we must find the best conditions to guarantee a qualitatively adequate diet adapted to this new living situation.

Nutritional deficiencies result in diseases which seriously overload the social and health services of the countries concerned.

Protein deficiencies lead to a serious stagnation of development in the child, and very often to death when they are not treated in time. Of particular concern is the dreadful disease known as kwashiorkor, which was recognized for the first time in Africa.

We also know that individuals suffering from malnutrition succumb more rapidly to communicable diseases than they would if proper nutrition provided them with a much stronger resistance. The antibodies formed in the blood by inoculations multiply with a very different rate, depending on whether the individual is well or improperly fed.

We are also aware of the ravages caused by vitamin A deficiency and of its tragic results which lead to complete blindness, a grievous outcome which could have been avoided with a few thousand units of vitamin A in the child's daily diet. The importance of iron in the fight against nutritional anemias appears, particularly in the countries where anemias are favored by the abundance of intestinal parasites which feed off the child's blood. Finally, we know the importance of calcium which, with vitamin D, is the basis of the defense against rickets. Its absence in the diet produces stunted individuals, often deprived of the necessary strength for their proper survival.

I do not want to extend this list; you will have the opportunity to hear discussions on the same subject by voices more authoritative than mine. It is the responsibility of the Ministry of Health to study and to set up joint operations in an attempt to prevent the deficiencies that we have brought out in concert with our colleagues in government. We hope that this first cooperation will be one of the main topics of our discussions.

#### AGRICULTURE

A second decisive element in the fight against malnutrition is food crop production. Most certainly, it can be tempting to prefer industrial crops over food crops, the former being indispensable for acquiring foreign capital with which the country can equip and industrialize itself. But crop diversification becomes an obvious exigency if, on the one hand, we realize to what degree malnutrition hampers the development of a country's labor force and, on the other hand, we understand the evolution of the world market.

In fact, the development of cash crops can provoke a drop in world prices for these products, while at the same time, the demand

for food crops increases. In 1920, the value of a quintal of peanuts was equal to that of a quintal of rice; this equivalence fell to the value of half a quintal of rice in 1965; and in 1968 to 1969 a quintal of peanuts is not worth more than 30 kilos of rice. A similar devaluation is noticed for coffee and cocoa.

The evolution of world markets can only engender a burdensome anxiety among the responsible authorities and the rural populations. The only possible valid answer lies in a productivity effort which leads the farmer to conceive and organize intensive farming. The possibilities concerning food production are, in general, greater than we can imagine. It is the responsibility of the Agriculture Department and of the Government as a whole to initiate measures which will promote and give momentum to the development of these products under new conditions, and which will also enable the producers to find outlets, first within the framework of marketing these products within each individual country. Thus, Senegal has started to organize the marketing of its millet when the production in certain areas exceeds the limits of local consumption.

Milk production is still very limited in Africa. Its expansion is, of course, necessary but demands an industrial support that cannot be created rapidly. Very often, it is still a harmful food as it frequently becomes very polluted. Even the utilization of powdered milk presents some disadvantages. Leguminous foods, correctly handled, can be used as an alternative to milk, and can advantageously make up for its lack.

## EDUCATION

The fight against nutritional deficiencies and the development of food crops are primarily the responsibilities of the Health Department and the Agriculture Department; but these operations demand education, which should be viewed in its broadest sense since, as we have seen, malnutrition is a social disease.

Obviously, mothers must be educated first, as they are directly concerned because of their children. The Mother and Child Care Centers, and all those concerned with infant and maternal care, have a decisive function in nutrition education and preventive medicine, not only for mothers but for all women who, through their families, are involved in the growth of children.

However, we must arouse entire communities and all social groups to be aware of nutrition problems. They must realize the importance of good nutrition more and more, and must acquire practical as well as theoretical notions, within the framework of mass education.

In the rural community, not only must food production result in raising the farmer's monetary level, but producers and their families must also comprehend that it is in their interest to diversify production in order to raise their own level of food consumption and to obtain a better-balanced diet.

In the urban communities, the deficiencies characterized by unbalanced nutrition risk being amplified by the so-called prestige foods or by imported foods. Experts will assist us in studying the obstacles confronting nutrition education on this subject and the most adequate manner of presenting it to a population attached to strong traditions with accumulated ancestral experiences.

Senegal, for its part, has included this preoccupation in its Animation Program based on the most overt and active education possible; among country and city dwellers, men and women, producers and consumers, thanks to a network of male and female instructors set up within urban neighborhoods and villages.

During the phases of first degree instruction where male and female instructors are trained, practical sessions are provided, as well as discussions and examples of decisions to be made on short notice. Second degree classes complete the training of female instructors in nutrition of infants, pregnant women and nursing mothers. Subsequently, these female instructors meet with the women of their villages and neighborhoods on a voluntary basis in order to convey, in a lively fashion, the acquired knowledge, along with dietary advice.

Among the obvious needs for which the female instructors have found an original solution, it is suitable to mention nurseries. During the long work days in certain regions, particularly in the Lower Casamance when the rice is transplanted, the women have organized, with help from the instructors, village nurseries for which they are materially and morally responsible, so that the children would not be left to themselves during that time. In addition to health education with inoculation campaigns, these nurseries provide the instructors and the mothers an opportunity to prepare balanced meals from local products.

It is from the evaluation of precise needs of the population, along with important national and regional requirements defined by the development plan, that the instructors are able to help the population to discover and think about their malnutrition problem.

A village pilot project currently being developed is designed to interest, through various integrated activities, the entire

population of certain villages capable of serving as models in their regions. Approximately 20 such villages already possess 1,000 - 1,500 m<sup>2</sup> collective gardens, the produce of which will be used locally first. It will be complemented by the collective raising of 100 chickens and by a fruit orchard, while rural community workers in the same area pursue the education of mothers in the subjects of nutrition and child rearing.

These two definite projects -- day-care nurseries and pilot villages -- are part of a broader plan which aims at concretizing, in the eyes of the farmers, the national development campaign which should result from their own efforts as well as those of State agents.

Everywhere, according to the potential of the region, specialized courses of instruction precede and support the creation of collective fields, especially millet fields, village gardens, and market-gardening cooperatives. The Agricultural Service and the Rural Education Centers enable these activities to become instruments of efficient demonstration throughout the country, along the lines of village structures.

Through pre-cooperative associations the livestock raisers are made aware of techniques for improving the feed and care of their cattle, for taking greater advantage of well drillings and watering places for their animals, and for organizing the marketing of meat and milk. A series of "Operation Fodder" programs, among others, has aroused a great interest among cattlemen.

It is the same with the fishermen who modernize their traditional fishing techniques while their wives learn how to perfect the method of fish preservation and how best to organize in order to facilitate the marketing of the fish. This latter task has traditionally been left to the fisherman's wife, just as the marketing of green vegetables is the task of the market gardener's wife.

Subsequent to these training courses, the instructors present all the village or neighborhood population with the problems that have been discussed above. Grass roots proposals are then defined on the basis of needs and available resources. They are often connected, directly or indirectly, with the nutritional situation. They are examined by the development agents who determine what technical or financial support is needed. Each year, for the purpose of training State agents in this program, the Office of Animation brings them together into workshops, called middle-level cadre courses. They are taught how to communicate constructively with the villagers on-the-spot, thus improving the conditions under which proposals are

formulated and matured and giving them a better chance of success and of growth.

This type of seminar, which serves as a model for other training and refresher courses, enables the participation of agents from the most varied technical services, civil servants, political cadres, and members of associations, in a pedagogic effort directed towards the masses, adapted to local realities, and set up with social prevention in mind. It is also of interest to social workers, dieticians, nurses, doctors and teachers, with whom the instructors collaborate.

However, an important task remains to be accomplished with educational, social and health services which have not yet acquired the need to concern themselves with preventive education and nutritional matters. Doctors and health personnel, who number very few, find themselves easily overwhelmed with curative medicine tasks. Perhaps the schools which train them do not sufficiently emphasize other priority aspects inherent to developing countries. Continuing education should take care of the sometimes conflicting demands of the present and the future.

As concerns education, the programs must increasingly integrate the progress already accomplished by science in the field of applied nutrition. In Senegal, for example, gardens and school lunch facilities have increased, thus interesting pupils in this subject through very practical activities. We have already mentioned the projected course for rural training classes whose purpose is to introduce the children who have completed the primary cycle of their education to agricultural work and to rural economy. The experts who recommend this experience will be able to tell you the role that is given to nutrition in the new type of training. Besides, we must hope that this aspect of education will not be lost in the Civic Service that Senegal is going to organize. In any case, it is necessary to be concerned, for all these tasks, with strong and adaptable training of all instructors within a multidisciplinary framework.

#### FOOD INDUSTRY

I think that during the course of this conference another topic will be discussed, that of food industry. Scientific progress has not only allowed for an increase in the output of food crops, through fertilizers, for instance, but it also offers the possibility of processing and preserving these products with more safety. The essential nutrients can be extracted and preserved. They can be better protected against damage, spoilage, decay, and so forth.

The industry can intervene still more directly by preparing food so as to contain complementary nutrients which are necessary to a well-balanced diet, taking age into consideration. Along these lines, Senegal has already experimented with an industrial preparation of millet couscous and is seeking a formula for a weaning food.

The problem is to place these industrial products, once marketed, within the range of the lowest income classes, that is, those who have the greatest need for them. In this regard, the Government must carefully advocate a price policy for a sufficiently large market, even if it is necessary to revise its import policy for foreign and costly products.

In other respects, would not the Government benefit from decentralizing these food industries, or at least some of them, so that the processing of the products being within range of the agricultural sector, the dynamic elements of the rural areas, the youth in particular, might feel better integrated into the general process of development? It is not sufficient to fight the rural exodus by attempting to reintegrate into the villages those who have left. Above all, they must be given a reason to remain there. The creation of food industries in predominantly rural areas can be an excellent method of introducing the money economy, which is necessary, into a subsistence economy. Without adopting a purely industrial position, it is therefore appropriate to study the possible forms of local processing of agricultural products, and we could very well start by the popularization of millet mills.

## PLANNING

The improvement of nutrition for the populations, as well as the struggle against malnutrition, demands the cooperation of a broad spectrum of expertise and all available goodwill. It cannot consist of purely sectorial operations; it necessitates teamwork and planning at different levels. Therefore, it is desirable that the governments treat this problem as an interministerial matter and that it be included in regular meetings where experts from different fields and different services would meet to harmonize concepts and operations. In addition, representatives of voluntary agencies can probably contribute to these meetings. The modalities will vary with each country.

One conclusion will certainly be outstanding at the end of this conference, namely, the importance that nutrition must have in the development of the countries which form the greater part of the uncommitted nations, in particular, the development of West Africa.

More precise conclusions, we hope, will define the urgencies according to environment, sex, and age, the guidelines to be followed with regard to the themes outlined above, also the policies through which every country will carry its coherent struggle against malnutrition, remembering that coherence and coordination are the conditions of efficiency.

## COUNTRY REPORTS

### REPORT ON NUTRITION IN DAHOMEY

presented by Dr. Edouard Campbell

#### I. BACKGROUND INFORMATION

##### A. Geography and Climate

Dahomey is situated in the southeastern part of West Africa in the humid, tropical zone. The country forms a strip of land oriented north to south which is noticeably wider in the north than in the south. Dahomey has a length of 657 km a width of 110 km in the south and 325 km in the north. It straddles the Paris meridian and is located between the sixth and twelfth parallels. Its neighbors are Togo on the west, Upper Volta and Niger on the north, and Nigeria on the east. Its coastline faces the Gulf of Guinea.

The relief is generally low. From the coast to the tenth parallel the land rises, barely reaching 400 m, then it declines in a northeasterly direction and descends to about 200 m in the Niger Valley. The only mountainous region consists of Mount Atacora in the northwest.

Dahomey can be divided into two climatic zones. In the south, one finds an equatorial climate characterized by high humidity, a constantly high temperature oscillating between 23°C and 32°C, and four seasons: two rainy seasons of unequal duration; and two dry seasons, one of which is short. Going northward, we notice a more accentuated difference in temperature and a progressively diminishing humidity. The climate in the northern region is clearly tropical, with a low nocturnal temperature and a lower degree of humidity than that of the south. In the north, the year is divided into two seasons: one rainy, one dry. In December, January, and February one can sometimes observe northeastern, dry (harmattan) winds which blow only in the morning and die out on the coast.

The quantity of rainfall diminishes going from east to west. In general, the interior up to the Tchaourou parallel (9°) receives less rainfall than the coast. In the north, the rains are more abundant than in Middle Dahomey and they are heavier in the Atacora Mountain region than in the Borgou Plain, but diminish going farther north.

Dahomey is well-irrigated and mention is made of only the three principal waterways: the Ouémé, the Mono, and the Couffo. The length of the Ouémé is 450 km of which 200 km are navigable by canoe. It divides into two branches, one emptying into Lake Nokoué, the other into the Porto-Novo Lagoon. The Ouémé's source is in the Atacora Mountains.

The Mono, essentially a Togolese river, has a length of 350 km; 100 km of its lower course forms the frontier between Togo and Dahomey. The Mono empties into the Grand Popo Lagoon and it is navigable for 100 km.

The Couffo, beginning in Togo, has a length of 125 km. The Couffo forms the vast Ahémé Lake with picturesque banks in Dahomey, bordered with fishing villages. The Couffo empties into the western lagoon network between Ouidah and Grand Popo.

#### B. Population

As of August 1, 1966, the total population figure was 2,442,200 and as of August 1, 1967, it was 2,508,500. The annual rate of increase is 2.8 percent. Distribution by age group, region, and occupation is indicated in the following tables:

#### Age Group Distribution (in thousands)

	<u>0 to 5</u>	<u>6 to 14</u>	<u>15 to 59</u>	<u>60 +</u>	<u>Total</u>
Men	240	311	625	58	1,234
Women	235	308	667	64	1,274
TOTAL	475	619	1,292	122	2,508

#### Regional Distribution

Ouémé	445,400
Atlantique	243,900
Mono	330,500
Zou	665,500
Borgou-Atacora	648,200
Cities	274,500
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	2,508,000

### Occupational Distribution

<u>Category of Work</u>	<u>Men</u>	<u>Women</u>	<u>Total</u>
<b>Primary Sector</b>			
Farming	471,270	109,530	580,800
Livestock raising	6,890	-	6,890
Fishing	16,000	-	16,000
Hunting and forestry	480	-	480
<b>Secondary Sector</b>			
Crafts	5,490	53,550	59,040
Industry and modern crafts	28,040	-	28,040
Buildings and public works	8,120	-	8,120
<b>Tertiary Sector</b>			
Commerce, banking, insurance	18,540	353,180	371,720
Transportation	7,020	-	7,020
Public services	15,000	-	16,710
Miscellaneous	9,200	-	9,200
Professions	-	-	-
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	586,050	516,260	1,102,310

The purchasing power (food budget) is very low, especially among the rural masses, who devote 75 percent of their budget to food as compared to 30 to 40 percent in the urban centers.

#### C. Government Agriculture Policy

The agrarian systems which have been tried are:

1. Mandatory cooperatives created within the framework of rural development boundaries;
2. Free cooperatives, the most important as much because of their numbers as because of the diversity of their formats;
3. Farm blocks, which consist of regrouping, in a viable economic domain, a certain number of peasant holdings in an attempt to acquire, under profitable conditions, modern means of production within the framework of joint-farming;
4. Collective fields achieved under the village council's responsibility and with the tutelage of the Regional Rural Development Committee; profits from the sale of crops support the villager's budget.

#### D. Foreign Aid Favoring Nutrition

Dahomey's Food and Applied Nutrition Section receives agricultural implements for school gardens, inspection vehicles and chemical fertilizer from UNICEF.

The Catholic Relief Service's distribution of cereal products was conducted on a fairly large-scale a few years ago, but its intensity has diminished noticeably due to the fact that distribution was made in a big city, which resulted in a failure to reach the most needy strata of the population.

## II. FOOD RESOURCES

### A. Food Crops

<u>Product</u>	<u>Production (tons)</u>
Cereals	
Sorghum	58,800
Small millet	5,700
Corn	218,100
Rice	1,400
Roots and Tubers	
Cassava	932,000
Yams	542,100
Sweet Potatoes	37,500
Legumes	
Beans	18,700
<u>Voandzou</u>	2,000

Fruits, nuts and green vegetables are grown on a small scale. No precise figures, of whatever small value they may be, can be cited.

### B. Cattle and Poultry

<u>Type of Animal</u>	<u>Production</u>
Cattle	471,700
Sheep	422,000
Goats	518,100
Pigs	271,800
Horses	3,000
Asses	700

Dahomey is compelled to import cattle from Niger to supply the cities. Poultry is widespread and provides subsistence food, except in the few specialized poultry centers. The number of birds can be evaluated at 1,500,000. There are no statistical data for dairy products.

### C. Fish

<u>Type of Fishing</u>	<u>Production (tons)</u>
<u>Local</u>	
Marine	5,000
Lagoon	20,000
River	5,000
<u>Commercial</u>	
Bass	368.0
Capitaine	220.9
Small fish	365.1
Machoiron	101.5
Gilt-head	77.1
Sole	73.2
Skate	160.0
Crustaceans	9.1
Miscellaneous	60.0
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TOTAL	31,434.9

### D. Production Problems

Up to this time, production has been hampered by a lack of organization. However, two years ago, well-structured action plans were implemented.

## III. DIETS

### A. Nutritional Levels

The average energy ration is 2,056 Calories per day, or 96 percent of the requirements. Eleven percent of the total intake is provided by proteins, 21 percent by fats, and 68 percent by carbohydrates. Therefore, there seems to be a satisfactory balance of elements, except for a slight excess of carbohydrates. However, in certain situations, such as large households, we have recorded intakes of less than 20 to 30 percent of the theoretical requirements, which must be considered unsatisfactory.

Corn and millet represent, from a quantitative point of view, the preponderant food, and the annual consumption is 93 kg per capita, taking into account the conversion factors for food preparations. Certain quantities of corn are replaced by rice and wheat in the cities; their consumption amounts to 4 kg, 400 kg, and 12 kg per person per year, respectively.

Consumption of legumes, especially green leafy vegetables, averages 68 gr per capita per day. Per capita meat consumption averages 18 gr per day in the city and 4 gr in the rural areas. Fish consumption amounts to 23 gr per capita per day in town; that of oleaginous products is 24 gr per capita per day of palm oil; and that of fruits is 22 gr per capita per day in the city and 13 gr in the rural areas.

Regarding seasonal variations, there is a decline in cereal consumption at the end of the dry season, corresponding to an increase in the price of corn and, unfortunately, occurring the moment when agricultural work is developing with the greatest intensity.

1. Daily mineral quota
  - a. Calcium: 342 mg (requirements estimated at 552 mg). Fish provide the principal calcium quota in all sectors (30 to 40 percent).
  - b. Iron: 15 mg (requirements estimated at 12.3 mg).
  
2. Daily quota of vitamins
  - a. Vitamin A: 4,618 I.U. (requirements estimated at 4,440 I.U.). The situation is more than satisfactory thanks to the quasi-exclusive consumption of palm oil, the principal source of provitamin A.
  - b. Vitamin B<sub>1</sub>: 1.26 mg (requirements estimated at 0.90 mg).
  - c. Vitamin B<sub>2</sub>: 0.63 mg (requirements estimated at 1.29 mg). Seventy percent of the vitamin B<sub>2</sub> consumed is provided by corn.
  - d. Vitamin PP: 9.4 mg (requirements estimated at 14.2 mg). The amount of tryptophan consumed is 5 mg per day; as tryptophan is the precursor of niacin, the daily quota is therefore  $9.4 + 5 = 14.4$  mg which means a consumption level comparable to requirements. Therefore, as suggested by the absence of pellagra, it seems that this corn base ration is not pellagrogenic.
  - e. Vitamin C: 47.5 mg (requirements estimated at 68 mg). A large part of this vitamin comes from roots and tubers.

On the whole, it appears that the qualitative requirements of the individual Dahomean are supplied by his daily diet to the extent of 83 percent in the urban area and 76 percent in the rural area, or an average of 78 percent. Calories originating from proteins represent 10.6 percent of the total intake.

Corn and millet occupy a preponderant position and provide about two-thirds of the Calories, proteins, iron, riboflavin and nicotinamide, although their individual consumption does not attain 100 kg per person per year. The tendency in the urban centers to consume rice is the principal reason for the switch from local cereals to an imported product. This trend towards diversification is desirable at the nutritional level, provided that commercialization includes lightly milled or parboiled rice.

From a quantitative point of view, energy intake is below satisfactory limits. A 10 to 15 percent augmentation of available cereals and oleaginous products would be sufficient to attain a caloric level satisfactory for all strata of the population.

B. Infantile Nutrition (Programs)

There are 24 school lunch facilities spread out over the entire country. For two years, 5,000 children have benefited from them, but the results have not yet been evaluated.

IV. NUTRITION EDUCATION PROGRAMS

A. University level: none.

B. Intermediary level: at the primary Education Certificate level, training courses (eight each year) for rural instructors are conducted at the Horticulture Center, patronized by NEDERF (Family Garden Program).

C. Maternal level: culinary preparation demonstrations (weaning foods) are conducted at the Mother and Child Care Centers.

V. PRINCIPAL OBSTACLES TO THE PROGRAMS

Prejudices and taboos.

VI. PLANS AND HOPES FOR THE FUTURE

A. Improved structuring of the Dahomean Section for Food and Applied Nutrition (SDANA).

B. Augmentation of the number of school lunch facilities, gardens, and school nurseries.

To do this, we have need for foreign financial and technical assistance.

## REPORT ON NUTRITION IN GAMBIA

presented by Dr. Angela Fuller

### I. BACKGROUND INFORMATION

The Gambia is a small wedge-shaped country about 250 miles (400 km) long. Apart from a coastline of 30 miles (50 km) it is surrounded by Senegal, with which country it has much in common. Its main asset is the River Gambia which rises in the east and flows through the length of the country. The climate is tropical with a rainy season of 4 to 4-1/2 months. The rest of the year is dry except for a very occasional shower, usually about Christmas time. After the end of the rains, there is a cool season, more marked on the coast where it continues until March or April. Then follows the hot weather which precedes the rain.

### II. FOOD RESOURCES

The population of 315,000 is mainly occupied in agriculture. The chief crop is groundnuts which are produced for home consumption and for export. Rice is also widely cultivated but not in sufficient quantity to satisfy the home market. As a result some has to be imported each year. Other cereals, chiefly corn, are also grown. In a few limited areas beans are cultivated. Citrus fruits, mangoes, and bananas grow well.

The main, and almost the only farming time is during the rainy season but efforts are being made to encourage the production of a second or even a third crop of rice during the year. In this regard valuable help is being given by the (Taiwan) Chinese Agricultural Mission, which is demonstrating improved methods of rice cultivation to local farmers. Rice is the staple food of the country and forms a very large part of the average diet although in some areas it is replaced by cassava, which is very easily grown, is often eaten, but usually not as the main carbohydrate constituent of the diet. Groundnuts, of course, are widely eaten and are the only common source of vegetable protein. They are often forbidden to pregnant women for fear of causing disease in the baby.

Animal protein in the more usually acceptable forms is less plentiful and tends to be expensive. Beef is the common form of meat but cattle are often kept as status symbols rather than as a source of food. Cow's milk is only commonly consumed by one tribe, the Fulas. Sheep are plentiful and goats even more so; these are rarely slaughtered for food except on high days and holidays.

Chickens are often kept but rarely grow to any size. Eggs are not usually given to women and girls as they are said to cause sterility - a story put about by men, no doubt, who wish to keep the eggs for themselves. Fish are plentiful on the coast and to a lesser extent in the river. Monkeys and giant pouched rats are eaten by Jolas and bush pigs by Christians and pagans.

### III. NUTRITIONAL STATUS

The general nutritional state of the country compares well with that in other similar places. Many Gambians are of fine physique and are capable of doing hard physical labor. Vitamin deficiencies are not commonly seen apart from various forms of vitamin B deficiency, much of which could be avoided by less vigorous polishing of rice. Riboflavin deficiency is most common towards the end of the rains and in the early weeks of the dry season. Because of this it is alleged to be caused by the cold winds which blow at that time.

Unfortunately, the nutritional state of infants and young children falls behind that of the adults. This is reflected in the high infant mortality rate, particularly in the remotest parts of the country. This is due to many factors, of which malaria is undoubtedly a very important one, but malnutrition certainly plays its part. Malnutrition is only rarely due to shortage of food, which is most marked during the rainy season, a time of increased sickness and a time when last year's food stores are exhausted before the new crop has been harvested.

Gambian women are good lactators and the rate of weight gain of breast-fed babies is usually better than that of their European counterparts for the first 6 months of life. After this time the growth curve of both weight and height falls below that of the European average; and in many cases, the weight remains stationary for several months or even falls until the end of the second year when weight is gained at the same rate as in a European child but at a lower level. This is a reflection of weaning practices and endemic diseases.

Cereal foods, usually corn, rice, or cassava pap, are introduced at about 6 months in the Bathurst area but generally rather late in country districts and in some cases not until the child is 2 years old. Until recently it was usual to continue breast feeding for two years or even longer. Unfortunately it is becoming increasingly common for a child to be taken off the breast earlier because the father wishes to reestablish marital relations with the mother, or because a pregnancy has already started. Another rather unfortunate recent tendency has been the giving of artificial feeds to very

young babies who are quite successfully breast feeding. In Bathurst, where this is more common, it usually results in nothing worse than diarrhea due to over feeding, but in the hands of the uneducated village mother giving a dilute feed in a rarely washed plastic feeding bottle, the results are often disastrous. Unfortunately, the breast milk is often blamed for causing the diarrhea and breast feeding is stopped.

The rainy season is apt to be a trying time for all, but more particularly for infants. The child who is too big to be carried on his mother's back while she is working on the farm (and a successfully breast-fed baby may reach this size at 5 or 6 months) is left at home in the care of an elderly relative or another child often not more than 5 years old. Before she goes to the farm, the mother breast feeds the baby and prepares a bowl of pap (something he may never have tasted before) which is to be fed to him during the day. It is likely that he will refuse it, and in any case it soon becomes sour in the hot, damp atmosphere at that time of year and is probably also contaminated by flies.

When the mother returns in the evening she again breast feeds the baby and these two breast feeds may be the only fluid and nourishment the child receives in the whole day. As the farming season advances it is probable that the hard working mother's breast milk will become less, particularly as she is likely to be suffering from malaria. Because of her immunity this is probably not severe but will tend to make her anemic. The baby is also liable to have malaria but in his case it is likely to be very severe as he has recently lost the immunity he had from his mother but has not built up his own.

Milk, which may be given to the very young breast-fed baby, is not often given to the child over 6 months as a part of his weaning diet. In Bathurst and other towns the modern mother frequently buys special foods for the baby which are more easily prepared than the traditional pap. Unfortunately, she usually considers that these are sufficient by themselves and rarely adds milk to the custard or corn flour. The former food, because of its yellow color is thought to contain eggs and therefore to be far superior to corn flour.

The child who survives the early hazards, at the age of 18 months to 2 years is permitted to share in the family meal, which usually consists of rice with a sauce made of groundnuts or palm oil with the occasional addition of vegetables, small pieces of meat on some days, and nearly always hot peppers. It is a wise child, indeed, who gets a fair share of protein from this mixed bowl. Fish, which may be given to adults, is often withheld from

children for fear of giving them worms. A degree of undernutrition is therefore not uncommon during the weaning and postweaning period. Malnutrition is rare except when it is precipitated by illness, commonly malaria, gastro-intestinal or respiratory tract infections, or measles. Kwashiorkor is not common but does occur, particularly following measles epidemics and in the latter part of the rainy season and ensuing months.

#### IV. NUTRITION EDUCATION

Maternity and Child Welfare Clinics are held in Bathurst and at 21 rural units throughout the country. Although they mainly serve as treatment centers, preventive inoculations and some health education, particularly advice on infant feeding, are given. Dried skimmed milk, which was first supplied by UNICEF and more recently by the Catholic Relief Service, is distributed when available with suitable advice as to its use. Dried full cream milk provided by the Gambian Government is also available in limited quantities and is usually given to orphans or twins if the family is not able to buy milk. The clinics are very popular with large numbers attending. It is hoped to establish regular health education sessions at these clinics.

Last year during the rainy season malaria prophylaxis in the form of Daraprin was distributed at the clinics to children between the ages of 6 months and 2 years. The success of this program has unfortunately been marred by the frequency with which the mothers seem to move about the country or even out of it.

Another very valuable preventive campaign, financed by the U.S.A., is the countrywide vaccination against smallpox of all those over 3 months of age and vaccination against measles of those between 6 months and 6 years. It is hoped that this will wipe out the terrible epidemics of measles which occurred in alternate years, causing a high death rate and followed by severe cases of malnutrition from which many suffered.

Several attempts have been made, with varying degrees of success, to establish day nurseries in the villages where small children can be adequately fed and cared for while their mothers are out at the farm. These have mostly been supported by the Gambian Red Cross Society or by women's organizations. Their popularity has often proved their undoing, the mothers seeking help proving too great for the staff to manage satisfactorily.

The Department of Agriculture has established mixed farming centers and ox ploughing schools (where young farmers are taught improved methods of farming) at many places in the country and advice

to farmers is given from time to time in the Gambia News Bulletin and over Radio Gambia. The increasing use of oxen on the farms enables the farmers to work on greater areas of land and so to obtain bigger yields, particularly of groundnuts. Cooperative Societies give help to farmers in the form of loans and assistance in the transport and sale of their crops.

The main aim for the future would seem to be more education - in the schools, in mixed farming centers, and at the clinics.

## REPORT ON NUTRITION IN GHANA

presented by Dr. Samuel Ofoosu-Amaah

### I. BACKGROUND INFORMATION

#### A. Geography and Climate

##### 1. Relief

Ghana lies along the Guinea Coast and is bordered by the Ivory Coast on the west, Upper Volta on the north, and Togo on the east. It has a coastline of 334 mi and a total land area of 92,100 sq mi. The relief is generally low, consisting of plains rising from sea level to 1,000 ft and a few areas rising to 2,000 ft. The highest peak is Mt. Afadjato which has an elevation of 2,905 ft.

##### 2. Temperature

Temperatures show an annual mean of  $26^{\circ}$  -  $29^{\circ}\text{C}$  with a daily range of only  $6.7^{\circ}$  -  $7.2^{\circ}\text{C}$  along the coast and  $10^{\circ}$  -  $16^{\circ}\text{C}$  in the north. The hottest months are February and March, just before the rains begin, while the coolest temperatures occur in January or in August along the coast.

##### 3. Rainfall

The climate is governed by the dry harmattan winds from the Sahara and the rain-laden monsoonal air from across the Atlantic. The mean annual rainfall diminishes northward from 45 in to 35 in, in the southern part from 86 in in the west to 45 in in the east. Around Accra rainfall is anomalously low at 40 in to 30 in per year.

##### 4. Water resources

The drainage is dominated by the Volta River, whose basin covers the northern two-thirds of the country. South of the Kwahu Plateau, which forms the main watershed, smaller rivers such as the Pra, Ankobra and Tano drain directly into the sea. The Volta has been dammed for hydroelectric power at Akosombo in southeast Ghana, where a 3,275-sq mi artificial lake (Volta Lake) has been created. The Volta project has required the resettlement of 80,000 persons. This problem is being tackled by the Government and the World Food Program.

## B. Population Profile

### 1. Total population

The 1960 census reported a population of 6.7 million with a male/female sex ratio of 102.2:100. Foreigners form 12 percent of the population. The estimated population on June 30, 1967, was 8,158,000.

### 2. Growth rate

The crude birth rate is 50 per 1,000 and the death rate 27 per 1,000. There is an annual natural increase of 2.3 percent but an estimated total rate of 2.7 percent.

### 3. Age distribution

Forty-five percent of the population is under 15 years of age; 52 percent belongs to the 15-64 age group; 3 percent is over 64 years.

### 4. Geographical distribution

Seventy-seven percent of the population lives in the rural areas, i.e., communities of less than 5,000 persons. Only 98 out of 30,397 localities had more than 5,000 inhabitants in 1960. The density of population varies from 494 persons per square mile in the capital region of Accra to 34 persons per square mile in the northern region, the average being 73 persons per square mile.

### 5. Occupational distribution

The total labor force consists of 2.6 million persons of whom 40 percent are women. Distribution by occupation is as follows: 61.8 percent of the labor force is engaged in agriculture; 15 percent is employed by industry; and 23.2 percent provides services. A further breakdown indicates that approximately 1,000,000 men and 600,000 women are involved in agriculture.

### 6. Income distribution

The estimated gross national product in 1966 was N¢ 779 million (US \$1,636 million). The real growth rate was 0.7 percent in 1965 and 1.6 percent in 1966.

Between 1960 and 1966 the increase in real gross national product was 17.3 percent as against an increase in population of 17.1 percent during the same period.

The per capita GNP was N¢226 in 1966. It was estimated that 66.5 percent of expenditures for private consumption was spent on food, 4 percent on goods such as clothing, 7.3 percent on rent, fuel and lighting, 3.5 percent on transportation and communication. As a result of the 1962 National Nutrition Survey, it was estimated that expenditure on food varied from 89 percent of total expenditures in the lowest income group to 25 percent in the highest income group.

### C. Government Agricultural Policies

#### 1. Price supports

Government price supports operate for cocoa and coffee through the State Cocoa Marketing Board, and for cereals (rice and corn) through the Food Marketing Corporation. It is hoped that soon more crops will come under price support programs.

#### 2. Tariffs

In the agricultural sector, export tariffs are levied on cocoa, kolanuts, and certain types of timber. In 1966 the cocoa duty amounted to N¢15.3 million at 6.6 percent of Central Government revenue. The year 1966 was bad for cocoa exports which fell by 20.9 percent in volume and 24.5 percent in price from the 1965 levels. It is hoped that this situation will improve in 1968.

Import tariffs are low or nonexistent on food, e.g., meat, meat products, milk, and rice, and on seeds for agricultural purposes, poultry feeds, and so forth.

#### 3. Land reform

Land tenure in Ghana takes many forms. There are absolute ownerships, freeholds, perpetual or temporary inheritable rights to land-use with no rights of sale, and lastly and most commonly, land held in trust for several families or clans, or as "stool lands." The land tenure system is, in short, chaotic and leads to frequent litigation. The Government has recently appointed a Land Tenure Commission to examine the whole situation and make recommendations.

#### 4. Agricultural credit

Agricultural credit is not new to Ghana, but in recent years great strides have been made in this field. Credit has been well organized in the cocoa industry where at the end of 1966 cocoa credit stood at N¢109.16 million.

Credit facilities are operated through the Agricultural Development Bank (established 1965), the Agricultural section of the National Investment Bank, Cooperative Banks, and through private money lenders.

#### 5. Crop protection and storage

Much work has been done in this area and continues to be done as an important aspect of agricultural development programs. Research in this field is carried on by the Crops Research Institute of the Ghana Academy of Sciences. The dissemination of research findings to the farmers is done by the Agricultural Extension Service Division. The readiness with which farmers receive new ideas on crop protection either in field or in storage is encouraging.

#### D. Foreign Aid Relevant to Food Production and Nutrition

1. Under the PL-480 agreement between the United States and Ghana Governments, aid is received in the form of food and agricultural commodities, such as rice, wheat, corn, powdered milk, eggs, and sardines. This food aid is channeled through the Volta River Authority Resettlement Farms and is given as a subsidy to the resettled people.

2. The Food and Agriculture Organization (FAO)-Freedom From Hunger Campaign Home Garden Project is designed to improve the family diet by producing better food for the home through the introduction and improvement of vegetable and fruit gardens around or near homes. Wherever possible, backyard poultry raising is encouraged in order to generate a supply of animal protein.

Participants receive aid in the form of seeds, tools, insecticides, fungicides, fertilizers, and technical supervision. Technical aid is also received in the form of technical personnel working in the fields of irrigation (Ghana/Canada), agricultural education (Ghana/Denmark, and Ghana/U.S.), and in agricultural extension (Ghana/U.S.). The World Food Program and UNICEF, also give technical assistance.

## II. FOOD RESOURCES

### A. Means of Production

#### 1. Size and nature of agricultural labor force

The agricultural labor force consists of 1,581,273 people representing 61.8 percent of the total labor force; of these, 1,002,339 are males and 578,934 are females.

#### 2. Types and number of farm implements and machinery (as controlled by the Ministry of Agriculture)

Types and numbers of farm implements continue to increase, although the proportion which have become unuseable gives cause for concern. The Ministry of Agriculture has in service 407 tractors, 591 wheel tractors, 538 disc plows, 365 disc harrows, 292 weeder cultivators, 42 combine harvesters, 15 rice threshers and lesser numbers of trailers, seed drills, planters, ridgers, and so forth. Figures for privately used farm machinery have been difficult to collect.

#### 3. Types and amounts of fertilizers and insecticides

The main type of fertilizer sold to the farmer by the Ministry of Agriculture is a varying mixture of sulphate of ammonia, single superphosphate, and muriate of potash, depending on the crop. However, 15:15:15 is the general purpose fertilizer mixture commonly used. Of course, farmers sometimes use organic fertilizers which they make themselves from cow dung and poultry manure.

Between 1600 - 2000 tons of the above described inorganic fertilizer is sold to farmers annually. This figure is expected to increase in the coming year.

It is difficult to give the quantities of insecticides used on crops in Ghana. However, commonly used insecticides are Aldrin, Ethylene dibromide, Dieldrin, Arkotine, Servin, Endrex, Gammalin (both liquid and dust), and Perenox. Gammalin '20' is used in the control of capsid on cocoa.

Over 40,000 spraying machines were sold in 1964 and 1965. Over 900,000 gallons of insecticide were sold between 1963 and 1967.

B. Principal Food Crops

	Total Production (Long tons)	
<u>Cereals</u>	<u>1965</u>	<u>1966</u>
Maize	153,160	216,820
Guinea corn (sorghum)	123,159	138,266
Millet	8,093	39,433
Rice	29,790	
	Total Production (Long tons)	
<u>Roots &amp; Tubers</u>	<u>1965</u>	<u>1966</u>
Cassava	1,496,070	2,151,214
Cocoyam	488,366	603,520
Yams	1,305,252	784,090
<u>Legumes</u>		
Groundnuts	23,796	23,280
<u>Fruits</u>		
Plantain	511,848	432,573
Banana	14,533	4,803
Pineapple	55,112	25,008
Oil palm	239,396	110,233
Coconut	185,098	188,813
Coffee	8,895	101,769
<u>Vegetables</u>		
Tomatoes	18,190	17,421
Onion/shallot	10,414	10,252

Considerable quantities of food are imported, e.g., 46,000 tons of rice, 5,000 tons of maize annually.

C. Livestock, Poultry and Dairy Products

Domestic Livestock Population - 1964-1966

<u>Kind of Animal</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>
Cattle	504,556	511,242	527,596
Sheep	332,774	354,677	486,292
Goats	319,117	380,477	411,998
Pigs	73,645	50,903	80,511
Horses	-	-	-
Poultry	811,385	347,773	941,335

Livestock Imports: 1964-1967

<u>Kind of Animal</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>
Cattle	371,890	62,780	60,666	58,325
Sheep	42,946	19,577	21,666	22,035
Goats	64,474	31,776	34,159	36,493
Pigs	-	-	24	7
Horses	173	169	210	100

D. Fish

Marine Fish Landings: 1964-1966

<u>Year</u>	<u>Fisheries Canoe</u>	<u>Motor Fishing Vessels</u>	<u>Landings/ Foreign Vessels</u>	<u>Total Landing in Metric Tons</u>
		<u>In Metric Tons</u>		
1964	43,322.3	29,974.8	19,920.2	93,217.3
1965	16,919.8	49,740.1	23,655.4	90,315.3
1966	25,022.7	49,345.9	24,775.4	99,344.0

Composition of Fish Consumption: 1964-1966

<u>Year</u>	<u>Tonnage</u>	<u>Value N¢</u>
1964	104,298.4	18,526.7
1965	109,488.1	31,899.8
1966	110,972.2	26,760.0

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**E. Production Problems**

1. Lack of well organized market and transportation systems.
2. Inability of farmers to get loans from the agricultural credit institutions.
3. Lack and shortage of improved and high yielding varieties of planting materials and seeds.
4. Inadequate storage facilities for harvested crops.
5. Lack and shortage of improved varieties of livestock.
6. High cost of poultry feed and lack of improved pastures for livestock.
7. Poor distribution of the right type of insecticides and fertilizers.
8. Inadequacy of and high hiring charges for agricultural machinery and implements.
9. Shortage of technical personnel of the right cadre.
10. Shortage of farm labor during demand periods - this labor is expensive if available.

**F. Food Industries**

Manufacturing industries received a boost in 1966 because of the new government's recognition of the essential role of private industry. As a result, production increased 12.5 percent over the 1965 level. In the food industry there were increases in the food preservation and packaging sectors. There are factories processing tomatoes, mangoes, pineapples, coffee, cocoa products, meat, and fish as well as oil mills, flour mills, and others. The total food industry production was valued at N¢4,710,000 in 1964. Output by value rose to N¢9,620,600 in 1965 and to N¢10,791,000 in 1966. There are over 100 soft drink factories and 9 distilleries with production up from a value of N¢14,261,000 in 1964 to N¢31,483,000 in 1966.

**III. Diets**

**A. Levels of Nutrition**

Ghana may be subdivided nutritionally into three broad areas: Northern Savannah, Southern Forest, Southern Savannah.

### 1. Northern savanna diets

Northern savanna diets consist chiefly of cereals (corn, sorghum, and millet), vegetables, oilseeds, and fruits in small quantities. Little meat or fish is consumed.

In the northern savanna there are marked differences between the Upper Region and the Northern Region. In the Northern Region yams, corn, and some rice are the main crops, while in the Upper Region millet, guinea corn, some yams, rice, and groundnuts are the crops. Vegetables include tomatoes, onions, pepper, and okra. Cattle are kept in both regions.

The main problems in these two regions are:

- a. The absolute insufficiency of food resulting in a "hungry season" from February to July. There is an annual harvest and dependence on stored food for much of the year.
- b. The shortage of vitamin A Bitot spots, follicular hyperkeratosis, and so forth, are frequent. (In addition, a fair amount of endemic goiter is seen, much more commonly in females than in males).

### 2. Southern forest diets

In the forest areas consumption of plantain and starchy roots is high while intake of maize and other cereals is low. Meat is consumed more frequently in the forest than in other places. Vegetables, some fish, palm nuts, and oil are consumed, but little fruit is eaten.

### 3. Southern savanna diets

Diets in the southern savanna are characterized by cassava and corn, vegetables, fish (in fishing villages), small amounts of meat, fruit, and some oil (palm, coconut). Cassava consumption is high but plantain and other roots are much less used than in the forest areas. Maize consumption is high. More fish is eaten in the coastal areas.

The pattern of diets in Accra is different from the rest - there being a high level of consumption of maize and other cereals as well as of fish, palmnuts, and relatively little cassava.

In general, the towns seem to attract most kinds of food. Seasonal variation occurs in all areas more or less, and this affects the weights of adults and the growth of children.

B. Child Feeding Programs - involve the following organizations:

Catholic Relief Services  
Christian Service Committee  
Ghana Government Services - Ministry of Health Social Welfare  
and Community Development  
Private organizations

1. Types of programs

a. Nutrition extension work

Nutrition advice is given to mothers and children along with demonstrations of foodstuff: food preparation, technical help in menu planning, and so forth. This is carried out by government agencies, especially the Nutrition Division and the Public Health Nursing Service of the Ministry of Health, and community development workers of the Ministry of Social Welfare.

b. Food distribution programs

Food is distributed to mothers and school children through school meal programs, day nursery food programs, children's clinics, hospitals, child care homes, orphanages, and other institutions.

2. Number of children reached

The Catholic Relief Services reach about 164,000 persons from 200 distribution points. These include 73,000 children in 200 schools all over Ghana. The Christian Service Committee has 80 distributing stations. Food supplements reach over 10,000 malnourished children in 225 clinics all over the country through the Public Health Nurses and Community Health Nurses. There is also supervision feeding of some of the 40,000 children in 480 day nurseries by Social Welfare and the Ministry of Health Nutrition Service.

3. Kinds of supplements given

The supplements given include: bulgur wheat, skimmed milk, dried milks, soybean oil, cornmeal, oatmeal, and vitamins. Most of the food comes from the United States through the PL-480 program, from the World Church Services (including the Christian Rural Overseas Program), from the World Food Program, and many other agencies abroad.

#### 4. Evaluation procedures used

Evaluation procedures include work done through the Hospital Services and the Nutrition Division of the Ministry of Health. In 1961-62, a major National Nutrition Survey was carried out by the Ghana Food and Nutrition Board. Sectional studies are being carried out all the time at different institutions throughout the country, e.g., at the Princess Marie Louise Hospital, Accra, which is devoted principally to the clinical and epidemiological study of protein-Calorie malnutrition under the department of Preventive and Social Medicine, Ghana Medical School; at the Nutrition Division, Ministry of Health; at the Food Research Institute, Department of Biochemistry and Nutrition at Legon; at the University of Ghana; and also at the University of Science and Technology, Kumasi, among others. Two broad areas of work are being covered:

a. The following of growth and development of children through measurements of weight and stature, dietary details usually of the 24-hour recall type or actual weighing of foods, and clinical examination for determination of such indices as hemoglobin;

b. Chemical laboratory studies and analyses of the quantity and composition of breast milk, as well as foods commonly used. There has been, however, poor coordination of various research projects.

#### 5. Major problems

a. The administrative cost of relief food services is great and sometimes difficulties arise from failure to pay and failure to collect food at the docks, especially where a Government Ministry is concerned.

b. Transportation is usually inadequate to keep all areas well supplied with food supplements. This also means that problems of storage arise.

c. Difficulties also arise from diversion of supplies away from the needy; sometimes some of the food finds its way to markets.

d. The lack of trained or properly oriented staff at all levels creates problems, especially at the rural level.

#### IV. NUTRITION EDUCATION PROGRAMS

##### A. University Level

Departments of Nutrition, Food Science and Biochemistry have been producing university graduates since 1965. There are two courses, Biochemistry and Nutrition, as part of a general degree including one other subject, and Biochemistry, Nutrition, and Food Science. So far there have been 36 graduates of the Biochemistry and Nutrition course and 20 graduates of the Nutrition and Food Science course. Of these, 12 have gone on to take further courses, special degrees in Biochemistry and Nutrition or Food Science, and three have gone overseas to take further courses.

A Home Science Department will produce its first graduates in 1969. Nutrition is important in many other University courses, particularly Medicine, Agriculture, Economics, Sociology, and in the Diploma course in nursing.

##### B. Vocational Level

The Department of Social Welfare and Community Development has well developed training programs for their staff at all levels, including training in Nutrition. The Public Health Nurses' training includes nutrition and dietetics. About 12 students receive this training each year. The college for Community Health Nurses accepts about 90 students each year. There are about 140 Public Health Nurses and 160 Community Health Nurses. There are over 1000 persons in community development work, of whom 300 are women.

The Nutrition Division of the Ministry of Health has just re-organized its training course. In the future they will take girls with the General Certificate of Education for a 3-year training program before appointment as Assistant Nutrition Officers. At present there are 350 such workers.

Training in the catering trades is carried out at the Accra Polytechnic Institute. There is no local training for dietitians as yet.

##### C. Lay Level

Nutrition training courses for the public, particularly the mothers of young children, are carried out throughout the country by the Department of Social Welfare and Community Development, the Public Health and Community Health Nurses, and the staff of the Nutrition Division.

V. MAJOR PROBLEMS INHIBITING PROGRAMS TO COMBAT MALNUTRITION

- A. General state of the economy: slowly recovering from depression, imbalance and inflation.
- B. Food distribution: transportation and marketing facilities, food storage and preservation.
- C. Ignorance, harmful beliefs, the general level of education, and individual poverty in the urban areas.
- D. Low agricultural productivity.

VI. PLANS

- A. Increased agricultural productivity per farmer.
- B. Expanded agricultural credit, price supports, better marketing.
- C. Construction of feeder roads to alleviate unemployment and improve food distribution.
- D. Intensive nutrition education through community development, Public Health and Nutrition Service, T.V., radio, and so forth, and general education in schools and colleges.

## REPORT ON NUTRITION IN GUINEA

presented by Dr. Baba Kourouma

From this speaker's platform and on behalf of the Guinean delegation, it is an honor and pleasure to greet the honorable and distinguished representatives and personalities who, by their presence, enhance this international nutrition seminar that our brother, the Government of Senegal, and our friend, the Government of the United States of America, have kindly consented to organize within the framework of indispensable exchanges and confrontations inevitably experienced and tested in the western part of our continent.

We are sure that this fortunate initiative demonstrates obvious concern to strengthen inter-African cooperation on the one hand, and to produce more efficient mutual exchanges between Africa and her loyal partners, on the other. Convinced of the historic solidarity of the peoples of the world, the Republic of Guinea has made it a point to attend this conference where it expects to learn more than it teaches.

Honorable Delegates, at this very moment, complex and obstinate realities characterize the lives of our people. Aside from social afflictions, degeneration and episodic distresses, ignorance and famine constitute the burdensome retinue of misfortune. The world's population is estimated at 3 billion, the annual population growth is figured at 60 to 70 million, which indicates that the year 2000 will coincide with a population of 6 billion inhabitants. The dominant factor, however, is that 80 percent of the food resources available to the world are in the hands of a third of the earth's population and only 20 percent is destined to feed the remaining two-thirds. The food deficit has been estimated at 360 billion francs for 1970 and at 1,920 billion francs for 1980.

By this, I mean how reasonable and just it is to sound the alarm to periodically reassess the consciences of individuals and of the collective population concerning this important problem of nutrition and feeding, where mistakes, if they exist, are repeated three times a day and sometimes more when children are concerned.

It is superfluous to prove that where people suffer or die from starvation, liberty is not yet liberty, or that where people suffer from hunger and misery, peace is not yet peace. If Western Europe suffered numerous shocks from the Middle Ages to the last

century, it is because of experiencing more than 400 famines during this interval. During this era, there was trade, more or less, but little or no communication, hardly any mingling of peoples and hardly any active solidarity between countries at all, even between neighbors. Foreign aid was impossible. It was, therefore, an era of "each man for himself."

This phenomenon and reality are two different things nowadays. At the same time, we are producers and consumers greedy for civilization, and all of us must be either convinced of success or condemned to fall together. Humanity faces the threat of a famine bomb which is more dangerous than the other types of bombs; if atomic energy, a contemporary necessity, were applied to peaceful means, it would enable us to feed billions of human beings. The famine bomb can lead to nothing except the end of humanity. At this level, you see, we recognize that our people, burdened by sickness and famine, without mentioning ignorance, finally find themselves without health and security.

Imagine, then, the increasing amount of large and various tasks to be solved in order to improve the realities inherent in our respective countries for the betterment of the living conditions of the populations of our regions; hence the cooperative endeavors which are increasing between peoples and nations.

The mourned and immortal President John Fitzgerald Kennedy devoted a good part of his life to approach these points of view and the levels of life between rich and poor people. He launched and reiterated his call for a mixing of ideas, of the people, and of their interest. He denounced the pitfall that exists between the industrialized and insecure countries, an extremely dangerous pitfall, which is becoming hollowed out and deeper. Is not this the same, clear-sighted preoccupation of that great African, President Senghor, who drew the world's attention to "deterioration of the exchange rates?"

This is the basis for the meetings between our leaders and officials. Now allow me to thank the hierarchy of OERS which has reunited four great patriots, builders of the new Africa: Presidents Léopold Sédar Senghor, Modibo Keita and Mokhtar Ould Daddah, alongside their brother and friend, President Ahmed Sékou Touré.

Honorable Delegates, the struggle for advancement and happiness of our populations is difficult in our regions, all the more so because geo-climatic conditions are so unfavorable that it has been written and said that in the tropical zone where afflictions such as malaria prevail, "Anyone who farms the earth, digs his grave."

Let us examine some characteristics of the Republic of Guinea, faced with its development exigencies.

## I. BACKGROUND INFORMATION

### A. Geography

The Republic of Guinea is located in the northern hemisphere of the African continent between the 7th and 13th degrees north latitude (therefore entirely in the humid, tropical zone), and between the 8th and 15th degrees west longitude.

Guinea is bordered on the west by the Atlantic Ocean, on the east by Mali and the Ivory Coast, on the north by Senegal, Mali and Bissao Guinea, and on the south by Liberia and Sierra Leone.

Guinea stretches for about 800 km from east to west; 530 km from north to south in its eastern part, and 400 km from north to south in its western part. Its surface area is 94,925 sq mi. Half of the country's surface area (total of 25 million ha) is not cultivable. Seven million hectares (of which one million is actually being farmed) are used for agro-pastoral activities.

The relief is varied and rough. Guinea is dominated by the Fouta Djallon Massif (600 m to 1500 m) extending in all directions. The Mali Massif reaches 1,506 m in the north at Mount Loura; in the southeast, the Daro Massif culminates at 1,345 m at Mount Kononou; and in the south, Mount Nimba rises to 1,752 m.

Two types of plains are noticeable: the coastal plain, bordering the Atlantic Ocean, which is a large zone of marshes; and the plains of Upper Guinea (Plateau Manding) where the Niger River and its affluents flow. In this region, the soil is essentially primary, composed of quartziferous schists and micaceous schists.

The coast is low, often marshy with majestic estuaries. The ocean current flows from west to east with an offshore south to north counter current. The tides are very strong. Alluvium deposited by the rivers is very intense.

Guinea is the best irrigated West African country and, because of the Fouta Djallon Massif, it is a huge water reservoir. A large number of the tributaries of Guinea's main river flow into the neighboring countries:

1. The Bafing, the Bakoy, and the Falémé form the Senegal basin;

2. A number of rivers flow through the Upper Guinea plain to form the Niger basin which becomes navigable at Kouroussa.

3. The coastal rivers, one of which is the powerful Konkouré, form a vast reserve of energy, and complete control of these rivers will guarantee the industrialization of the country. The coastal rivers have many waterfalls and terminate in vast estuaries.

#### B. Climate

Except for the southern forest region, which enjoys a Guinean equatorial climate, the remainder of the country shares a Sudanian, tropical climate characterized by two alternative seasons: a rainy season, which lasts seven months in the south and which progressively diminishes as it rises to the north; and a dry season. The differences in temperature become more and more distinct going from south to north and as it rises in altitude.

The wind is characterized by the rainy season monsoon and by the dry, continental harmattan blowing from a northeasterly direction for three to four months, but not reaching the coast. The rainy season begins and ends with tornadoes which reach a maximum in July and August.

We must, however, distinguish four types of regional climates:

##### 1. Lower Guinea climate

The intertropical and humid climate covers the coastal plains. It is characterized by abundant rainfall from April to November, accumulating an average of 3,682 mm for 123 days. The maximum is in July and August, with 4 m registered in the Conakry Region. The temperature is almost constantly between 22°C and 32°C, with a minimum in January. The two seasons are distinct, the atmosphere is always humid and the climate is debilitating for man but favorable for palm, coconut, kolanut, and banana trees.

##### 2. Fouta Djallon climate

The climate of this mountainous region is influenced by the altitude and the proximity to the ocean. Precipitation accumulates 2 m to 2.5 m on the west side of the watershed and 1.5 m to 2 m on the other side. The average is 1.831 mm for 119 days, with a maximum in August. The temperature is lowered by the altitude. Important differences exist (the temperature can drop as low as 4°C to 6°C). The average high is about 29°C and the average low is about 17°C; these differences cause two seasons of equal length, interrupted by the harmattan, but cooler from December to March.

### 3. Lower Sudanian climate

In the plain of the northeastern region, the rainfall accumulates about 1,455 mm for 108 days, with differences of temperature ranging from 18°C to 40°C daily. August is the coolest month and January and April are the hottest months. The dry season, which is the longest, extends from November to May; the harmattan blows during a four month period, drying up the entire vegetation.

### 4. Equatorial Guinean climate

The climate in the southeastern region is not subjected to the influence of the monsoon. Rainfall occurs on 152 days spread throughout the year and accumulates 2,285 mm. The temperature is constant; differences are due to altitude (19°C to 29°C). There is little wind and the humidity conditions the dense forest.

### C. Population

The Republic of Guinea has about 4 million inhabitants and its annual population growth is about 2.5 percent. The population is young: 45 percent is in the 0 to 16 age group. Ninety percent of the population is devoted to agro-pastoral activities. The density is 16 inhabitants per square kilometer. Density varies with the region and is established as follows:

Conakry Zone	200 inhabitants per square kilometer
Middle Guinea	20 " " " "
	(oscillates between 7 and 38)
Forest Guinea	16 inhabitants per square kilometer
Coastal Guinea	16 " " " "
Upper Guinea	7.3 " " " "
	(6.1 to 9.1)

Coastal Guinea comprises 45,000 sq km or 18 percent of the total surface area; it is divided into eight administrative regions and includes 900,000 inhabitants. Middle Guinea comprises 55,000 sq km or 21 percent of the surface area; it is divided into eight administrative regions and includes 1,110,000 inhabitants. Upper Guinea comprises 97,000,000 sq km or 39 percent of the surface area; it is divided into seven administrative regions and includes 750,000 inhabitants. Guinea's forest area comprises 55,000 square kilometers or 22 percent of the surface area; it is divided into six administrative regions and has 880,000 inhabitants. To these figures we must add a 10 percent floating population.

Salaries oscillate between the minimum monthly industrial wage of 10,000 FG and 120,000 FG per month. The average purchasing

power, which was 20,000 FG in 1958, has doubled in ten years. Eighty percent of the income is used for food.

#### D. Government Agricultural Policy

Upon accession to independence and full sovereignty, the Government of the Republic of Guinea, when the historical Kankan Conference was held in 1960, elaborated on and adopted its first plan (triennial) for social and economic development. Its purpose was to implement fundamental structures for industrialization and to stimulate socio-cultural promotion sectors.

The second phase of the efforts made by our Party and its Government is characterized essentially by the priority granted to changing the spirit and working methods in the agro-pastoral field in order to obtain better productivity and in order to integrate these activities into the industrial development plan.

If these propitious innovations are to result in global integration of the national economy, emphasis must be placed on inherent difficulties. Realizing this, the Government has undertaken to:

1. Educate, organize, and guide the rural population;
2. Arouse an interest in the use of adapted mechanized equipment (average and long-term payments, 40 to 60 percent down payment at purchase time);
3. Provide fertilizers, insecticides, and improved seeds;
4. Create an agricultural irrigation program (prospecting, research, achievement) with emphasis placed on rice fields;
5. Create modern, agricultural pilot centers (agricultural extension stations, State farms, Foulaya, etc.);
6. Encourage the country to produce strategic commodities (rice) and cash crops (vegetables, fruit, tobacco, tea, cotton, bush palm);
7. Encourage the creation of agricultural cooperatives;
8. Provide intensive training of staff personnel in the Rural Education Centers, to work jointly with the civic action services of the Armed Forces.

#### E. Foreign Aid Favoring Nutrition

In its bi- or multilateral international cooperation policy, the Republic of Guinea benefits from food commodities consisting of rice, corn, wheat flour, powdered eggs, milk, canned meat, fish, cold cuts, etc.

The realization of joint programs for the exploitation of tillable lands is more and more intense: irrigation, fertilization, bringing in improved seeds, and species improvement. Among its partners, we must mention: UNDP (United Nations Development Program), FAO, UNICEF, the USA, the People's Republic of China, and the USSR.

If a real homage must be rendered to the understanding countries which intensify their cooperation, then we must mention in all fairness, that it is infinitely better for a country to benefit from \$1 million to buy farm equipment than from \$15 million in food commodities.

## II. FOOD RESOURCES

### A. Means of Production

#### 1. Agricultural labor force

Ninety percent of the population is engaged in agriculture. The land is farmed either by families or by associate groups and, since independence, by pilot cooperatives.

#### 2. Farm implements

In its policy to modernize agriculture, the Government has created a state agency (AGRIMA) specializing in importation, judicious utilization, and post-sale service of the appropriate farm implements and machinery. Presently, there are about 1,200 wheel and crawler tractors compared to 20 in 1958. In addition, there are disc harrows, sowing machines, harvester combines, threshing machines, and rice threshers. Animal-drawn hoes and ploughs still remain the means within the range of the rural majority.

#### 3. Fertilizers

Another specialized organization (OFFIBANANE) provides for the importation and distribution of fertilizers and insures crop insecticide protection (export products have priority).

## B. Principal Food Crops

<u>Product</u>	<u>Production</u> (tons)	
	<u>1960 to 1961</u>	<u>1965 to 1966</u>
Cereals		
Rice	323,000 (1 T/Ha)	454,000
Corn	361,000 (1.5 T/Ha)	350,000
<u>Fonio</u>	43,000 (0.5 T/Ha)	122,000
Sorghum	7,000 (1 T/Ha)	8,000
Roots and Tubers		
Cassava	433,000	650,000
Sweet potatoes	55,000	95,000
Other crops		
Peanuts	8,000	13,000
Sesame	808	445
Palm kernels	26,000	28,000
Bananas	75,000	90,000
Pineapples	11,000	12,000
Citrus	3,000	5,000

## C. Livestock

There are 2 million cattle: they belong to either the N<sup>1</sup>Dama breed, which is very rustic and can weigh 500 kg but give little milk, or to the Krasnaya breed, imported from the USSR, and which have adapted very well to the State Farm at Ditinn.

Other livestock include:

Sheep	400,000
Goats	350,000
Horses	2,000
Pigs	8,000

Chickens are raised almost everywhere but modern chicken farms are operated at Conakry, Coya, Fria, Téliimélé, Kindia, and Mamou. A few families raise guinea fowl, ducks and turkeys.

## D. Fish

Marine fishing is much in practice and the rivers abound in fish. A specialized firm (OPEMA), and a few trawlers provide fresh fish stocked in refrigerators to some large, urban centers.

#### E. Seasonal Food Resources

With the exception of rice (basic staple) which is consumed all year round, the crops are seasonal: cereals are harvested from November to February; fruit harvests are staggered according to the desired variety.

#### F. Food Industries

The following industries are already in existence:

1. Cannery at Mamou (operational)
2. Cannery at Kankan " "
3. Oil mill at Kassa " "
4. Oil mill at Dabola (under construction)
5. Pineapple juice cannery at Conakry
6. Sugar mill (projected)

At this time, except for exported fruit juices, all canned foods are for domestic consumption.

### III. DIETS

The Guinean population presents a few peculiarities in its food habits:

1. The custom is to prepare two main meals daily, noon and evening, in some cases augmented by a substantial breakfast.

2. Each meal consists of a cereal-based dish (rice, fonio, corn, millet, sorghum) or starchy foods (cassava, yams, sweet potatoes, banana plantains).

3. The food supplement is in the sauce preparation which, according to the regional and economic possibilities, creates various nutrition levels.

4. Fruits are prevalent on the market, but their consumption is not limited to meal times, when they are seldom eaten; this is due to the abundance and diversity of fruits in our country.

#### A. Nutritional Levels

##### 1. In the cities

The individuals enjoying a comfortable purchasing power consume food rich in proteins regularly (meat, fish, poultry, eggs) and a variety of vegetables and oils. Those who have a low

purchasing power, including large families, consume protein foods at intervals, an exception being made for the workers in the food production and distribution sector. Nevertheless, an important variation in the quality of the food diet is observed for the majority of the city dwellers, as well as for the individuals enjoying similar or different purchasing powers. Besides a caloric deficiency, an unbalanced qualitative condition often exists.

## 2. In the rural sector

The rural diet is more uniform. The basic cereal depends on the production of the area. It is easier to complement the food supply. In this respect, milk is commonly used in the pastoral area. Meat, fish and poultry are eaten very often because they are part of small, domestic husbandry and because of a cheaper cost due to a less important demand for these products.

It is to be noted that:

a. The minds are more receptive to quantity and taste than to quality and balanced and diversified meals.

b. Due to specious considerations passed orally from generation to generation, protein foods are kept for adults who have the least need for them. Thus, it is a fact that the most expensive and least regularly consumed products must be given to the head of the household who is responsible for the support of his family. Such an attitude is being favorably and progressively modified, thanks to information, education, and demonstration efforts.

c. The adult, by virtue of priority, is served before the child who finds himself deprived quantitatively and qualitatively. This practice, which is more and more a thing of the past, must not be entirely either ignored or neglected if progress is desired.

d. In large families, the habit of a common and only meal is detrimental to the children, who are usually the weakest and who need it most. We must however, mention that the children eat all day long, in a fanciful manner, all kinds of between-meal snacks (fruits, cakes, doughnuts made with various cereals: it is a "nice little snack" all day long).

### B. Infant Nutrition

In the Republic of Guinea, infant feeding is based on maternal milk for several months (even after a year). Food diversification is slow and when used, it is with a cereal base only (rice, corn). Besides the quantitative deficiency, an unbalanced

qualitative condition exists and reaches a maximum during the weaning period when the same dietetic errors are repeated. At this time, we note some protein malnutrition characteristics and some vitamin deficiencies constituting the main child nutrition problems in our areas. For that reason, the implementation of programs is indispensable in order to prevent these disorders responsible for a high mortality rate and the health deficiency of those who should form the vital and active resources of the nation, thus resulting in the slow economic development of the country. These programs include:

1. An educational program for a better comprehension of food problems;
2. Creation of child-rearing centers, training of child-rearing experts, workers and teachers, and the construction of dietetic centers;
3. Incorporation of the nutritional problems into the regional and national economic development program which tends to raise the purchasing power in order to place the relatively high-priced protein foods within the range of the large majority of the population;
4. Vast utilization of local products which will be industrially processed and harmoniously mixed, so as to obtain the best balanced products at the lowest cost and to be stocked for a better distribution throughout the year, thus solving seasonal production problems;
5. Improvement of roads and means of transportation, as well as the creation of many small food industries in different regions to provide a more rational distribution.

From an educational aspect, these programs concern the entire population. As for the consumption of manufactured products, their low price and unquestionable nutritive quality cause them to be highly desired items. By preference, they will be offered to children under 16 years of age, who make up more than 45 percent of the population and, more particularly, to those in the critical weaning period.

Supplements will include mixed precooked and fortified flours, powdered milk, meats and fish processed and canned, powdered eggs or local fruits of all kinds. Immediate results can be judged only by a reduction in the prevalence of nutritional diseases in well-baby clinics and out-patient departments, by a reduction of the mortality rate from deficiency diseases in children's hospitals, by a weight increase checked during a well-defined period, and by a fact more emotional than rational--the enthusiasm of an increasing number of mothers for frequenting the centers to seek advice.

However, some problems arise: the lack of interest shown by a large part of the population not directly concerned with nutrition problems; the priority granted to certain problems of a national order in our developing countries; the State's limited economic means for the development of food industries; the limited purchasing power of the individuals in developing countries who must purchase at a very high price products often imported and who, therefore, only benefit from what can be given to them; regional taboos; certain religious precepts; ancestral foods and tastes which make it difficult to utilize certain foods, however nutritive.

#### IV. NUTRITION EDUCATION PROGRAMS

These programs concern the entire population, but particularly mothers, young girls, future mothers, and school age children. The basic principle is that any individual taught nutrition problems becomes a teacher.

In this respect, all representatives of the Health Corps can, at any time, give educational talks and offer explanations concerning certain nutrition problems. The teaching staff, through the training of other high school and college instructors and in the Rural Education Centers (CER), popularize the basis of nutrition health. At committee meetings and when general assemblies are held, some explicative and informative talks are presented. Also, the women, aware of the nutritional problems either by visiting the centers or by attending a seminar course, travel from place to place and disseminate their knowledge to other mothers.

Mothers who accompany their children to children's hospitals are given precise and practical information concerning food problems during their stay. After their departure, they are responsible for teaching other mothers in their neighborhood. At all levels, at health teaching classes, and at committee meetings, explanatory talks are mostly used; they are also presented in weekly radio programs conducted in the national languages. In the centers, schools, and hospitals, practical experimentation is carried out, audio-visual aids are utilized and an emphasis is placed on flannelgraphs.

Results are encouraging, and it is not uncommon to meet mothers sufficiently informed on the value of proper and early food diversification. Problems and obstacles are primarily of an economic nature. This results in the fact that the beneficiaries are more numerous in the urban centers than in the rural areas where difficult means of transportation limit the work of the health instructors.

It is hoped that:

because of a harmonious economic development that will give the right priority to nutrition problems, the satisfactory solution of which is the best safeguard of human resources and hence of human potential;

because of a fair utilization of local products, thanks to planned industrialization and a rather low cost;

because of a more and more complete comprehension of the fundamental nutrition problems, thanks to vast and continuous education;

the Republic of Guinea, through its food and pastoral resources, will, with the least delay, succeed in preventing food deficiencies due to ignorance and apathy rather than to genuine shortage of resources.

#### V. CONCLUSION

Sickness, ignorance and famine constitute a heavy tribute to our people. It is indispensable to convince ourselves about these problems and to face them with organized and planned work, with farm production efforts and other activities tending to improve feeding and nutrition conditions. International cooperation must be revised in a more efficient manner and the gap resulting from the deterioration of the exchange rates must be filled.

The supply of food products to famine regions by countries having a surplus does not constitute a fundamental solution to the problem and can eventually delay the development of the populations in need by accustoming them to easiness and laziness. What is needed is: implantation of viable agriculture in have-not countries; utilization of good seeds or more fertile lands (adequate preparation, fertilization necessitating large capital expense); continuous education and improvement spread out further among the rural populations of our countries. Above all, there must be exchanges of experience and re-evaluations, as well as an increase of opportunities of the type that this seminar is offering to us.

Honorable delegates, in thanking you for your attention, I would like to express our faith in the future of our continent which, if it is backward today, is not far from the day when it will render to humanity its debt to civilization and human promotion, if we know how to liquidate the discords and disturbances among our peoples. Thus, the effects of cooperation between partner countries and efficient organizations such as UNICEF, WHO, UNESCO and FAO, will assist in a better integrated economy at the state, regional and African continent levels.

The efforts to organize, inform, educate and lead our peoples to happiness must be the concern of all sectors at any time, always taking into consideration the important priorities in our undertakings. Permit me to recall this adage: "If you want to plan for a day, you must live from day to day. If you want to plan for one year, sow seeds. If you want to plan for ten years, plant trees. If you want to plan for eternity, educate the people." This is the choice of the people of Guinea, of its Party and of its Government.

## REPORT ON NUTRITION IN THE IVORY COAST

presented by the Ivory Coast Delegation

### I. BACKGROUND INFORMATION

#### A. Geography and Climate

The Ivory Coast has a surface of 322,000 km<sup>2</sup>. Like several other countries in the area, its climate is conditioned by the forest and the sea in the south, and by the savanna in the north.

#### B. Population

Its population has climbed successively from 3.3 million inhabitants in 1958 to 3.7 million in 1963, and to about 4 million in 1965. This population is unequally distributed over the whole territory and its density in the forest is twice that of the savanna area.

The prospective population growth leads us to think that in twenty years, from 1965 to 1985, the Ivory Coast will double in population to reach the level of 7.3 million inhabitants. This prospect is based on a natural growth rate which will be 2.5 percent in 1970. At that time Abidjan, which presently counts half a million inhabitants, including suburbs, will have more than 1 million inhabitants.

For a long time now, the prospective population growth, especially in the capital city, has drawn the Government's attention to developing methods for solving this problem. Besides the long-range food problem, there is an imbalance between the rural and urban areas.

#### C. Government Agricultural Policies

Feeding the population means agriculture and agricultural policies. Our Government's policy can be summed up under four headings:

1. Crop diversification;
2. Better feeding of the population;
3. Reduction of imports occasioning a drain on foreign exchange;
4. Aid to industrialization.

In order to implement this policy, some organizations have been created and those already in existence have been strengthened. Let us mention the following:

1. State agencies:
  - a. The SATMACI (Agency for Technical Assistance for the Modernization of Farming in the Ivory Coast);
  - b. The SODEPALM (State Agency for Cultivation of Palm Oil and Cocoa Trees);
  - c. The Fund for Stabilization and Support of Agricultural Commodity Prices;
  - d. Motoragri (State Agency for the Development of Agricultural Mechanization in the Ivory Coast).
2. Some credit organizations:
  - a. National Fund for Agricultural Credit;
  - b. National Agricultural Development Bank (planning stage);
  - c. Other organizations of similar nature.

The combined action of the Ministries of Agriculture and Animal Production enables us to mention the following production scale for the seven years since independence:

<u>Product</u>	<u>1960 Production</u>	<u>1967 Production</u>
Coffee	143,000 tons	257,000 tons
Cocoa	85,000 tons	154,000 tons
Bananas	72,000 tons	136,000 tons
Pineapples	22,500 tons	61,000 tons
Cotton	7,064 tons	26,000 tons

## II. FOOD RESOURCES

### A. Food Crops

Food production figures for 1967 are as follows:

<u>Product</u>	<u>Production</u>
Yams	1,864,000 tons
Plantains	1,014,000 tons
Cassava	1,044,000 tons
Rice	200,000 tons
Corn	194,000 tons
Millet	47,000 tons
Sorghum	32,000 tons
Taro	132,000 tons
Sweet potatoes	52,000 tons
Peanuts	25,000 tons

Comparison of food crop production figures with our present population count enables us to state that quantitative famine does not exist in the Ivory Coast.

#### B. Livestock Production

The sources of animal proteins presently available in the Ivory Coast are listed in order of importance: fish, livestock meat, game meat, and imported protein products.

Consumption of game meat, which occurred at a relatively high rate in the past, has become less important due to population growth and resettlement in many natural reserve areas which were uninhabited, or nearly so, in days gone by.

There has been a notable increase in livestock meat consumption. Despite efforts undertaken to develop livestock and augment the quantity of meat products (Ivoirian cattle plus meat imports from Mali, Upper Volta, and Niger), meat availability may not be able to satisfy demand in the days to come. Ivoirian consumption of meat and other livestock products was 61,560 tons for 1960 and 70,432 tons in 1966.

Fish consumption is still increasing from year to year. Commercial fishing tonnage, consumed locally in its entirety, was 5,000 tons in 1955 and reached 47,800 tons in 1967. Total consumption estimated for 1966 was 77,120 tons and for 1967 was 82,920 tons.

#### C. Food Industries

By attentively observing these two series of production figures (vegetable and animal) and the Ivory Coast's number of inhabitants, one can see the increase of problems in processing these products. Although we have a few processing plants such as SALCI (Société Alsacienne de la Côte d'Ivoire) and SAFCO (Société Africaine de Conserverie) for pineapples, AFRILAIT and IVOIRLAIT for dairy products, les Grands Moulins for grains, and SCODI (Société de Conserve de la Côte d'Ivoire) for fish canning, we still need many more processing facilities.

Therefore, the Government has created the Institute for Technology and Industrialization of Tropical Agricultural Products (ITIPAT) which is an applied research organization. This organization is attempting to start a movement in our country to industrialize agricultural products, those derived from food plants, in particular.

#### D. Problems Concerning the Utilization of Food Products

The figures just cited show the level on which problems of nutrition in general, and infantile nutrition in particular, are located. Indeed, the food problem in the Ivory Coast arises especially at the qualitative level, and more exactly, at the level of the balanced diet.

### III. NUTRITION EDUCATION PROGRAMS

The Government is aware of the need for nutrition education programs; therefore, most of the programs undertaken in that respect tend to sensitize and educate the population in general, and mothers in particular. This education program is implemented at several levels:

#### A. School Level

A course in nutrition is presented by nutritionists at the College of Agriculture, the Midwifery School, the School for Male and Female Nurses, the Center for Maternal and Infantile Protection and Health Education, the Institute to Train Social Workers, as well as to school principals and individuals employed in school lunch programs.

Since August 22, 1962, the Government has implemented a school feeding and nutrition education program in the primary schools with the assistance of the Food and Agriculture Organization (FAO), the World Health Organization (WHO), and the United Nations Children's Fund (UNICEF). This educational program is based on two activity groups: 1) gardens, hen yards, and school cooperatives; 2) school lunch programs.

The school gardens and hen yard educational program (fruit and vegetable gardens and small animal breeding) is directed at spreading farming and breeding methods among elementary pupils, as well as the consumption of the products resulting from these activities. These new practices will subsequently extend to the family circle and the entire Ivoirian population by the triple channel of family gardening, family animal breeding, and balanced nutrition education.

The school lunch programs enable us not only to initiate educational activities but also to provide an incentive, in certain regions, for regular school attendance.

#### B. Family Level

Educational activities for mothers are conducted by several public agencies:

1. The Department for Social Affairs (Ministry of Work and Social Affairs);
2. The Department of Popular Education (Ministry of Popular Education, Youth, and Sports);
3. The Department of Sanitation and Public Health.

These agencies' programs are essentially intended to teach women, of whatever class and in whatever region, how to improve, enrich, and balance the diet of each member of their families by using local resources.

#### IV. MAJOR PROBLEMS INHIBITING PROGRAMS TO COMBAT MALNUTRITION

Here at home, as elsewhere, certain obstacles endanger the complete achievement of programs to combat malnutrition. Outside of financial difficulties (which are common to all developing countries), the principal obstacles derive from food habits, ignorance, prejudice and taboos, economic or other factors, and finally, the fallacious belief on the part of many that foods rich in proteins -- milk, eggs, fish, and meat -- are adult foods and not suited for consumption by children.

It should also be noted that coordination of all these activities is becoming more and more necessary. With the Government's creation of the National Food Committee, whose precise purpose is to coordinate all programs at the national level, and with assistance from international organizations or friendly countries, we can hope for greater efficiency in our struggle against malnutrition.

## REPORT ON NUTRITION IN LIBERIA

presented by Mrs. Rachel Pearce-Marshall

### I. BACKGROUND

#### A. Geography and Climate

##### 1. Relief

Liberia is situated on the western coast of Africa between 4° 20' and 8° 35' north latitude and between 7° 30' and 11° 3' west longitude. It is bounded on the north by the Republic of Guinea, on the south by the Atlantic Ocean, and on the west by Sierra Leone. The country is broadest toward the western end where it extends to about 160 mi in width.

Liberia is 43,000 sq mi in area. Generally, the country is flat with low hills beginning about 20 mi inland, characterized by dense forest. The low coastal belt, which is nearly 50 mi wide, has tidal creeks, shallow lagoons, and mangrove marshes. Beyond the coast the land rises abruptly, forming a great belt of high forest with elevations of 600 to 1,000 ft. Further inland is a plateau 1,500-2,000 ft above sea level. The highest mountain ranges are found here, rising up to 4,500 ft. Mount Watesi is the highest mountain in the country.

The main rivers from west to east are the Mano, the Loffa, the St. Paul, the Farmington, the St. John Cestos, the Since, and the Cavalla. The Mano forms Liberia's western boundary with Sierra Leone and the Cavalla forms the eastern boundary with the Ivory Coast.

The capital city is Monrovia. The country is now divided into nine counties, five of which lie along the 40-mile southern Atlantic coastal belt. The other four counties are in the hinterland.

##### 2. Temperature

The climate is tropical and humid with little change in temperature throughout the year. The average mean temperature is about 82°F while the maximum never exceeds 100°F. Near the coast, a constant breeze tempers the heat. In the interior the temperature may drop to 60°F. It is cooler in the northern hilly region.

##### 3. Rainfall

There are two marked seasons in Liberia: a wet season from April to November, when most of the rain occurs; and a dry season beginning in December and ending April.

The rainfall rate is one of the highest in West Africa. In the coastal belt, the annual rainfall may vary from 140 in to 200 in, and in the interior, it may be as low as 70 in. The 1963 monthly rainfall record for a town in each of the nine counties is shown in Table I. It is noted that in some months in certain towns the rainfall has not been recorded. Unfortunately, these omissions are found throughout the years.

## B. Population

Liberia has a diverse population: one group consists of descendants of immigrants from the United States of America; a second group is composed of the descendants of tribes which immigrated from the Middle East; a third group is made up of people who have come from other parts of the world and have adopted Liberia as their home.

There are twenty-eight tribes, each with its own language or dialect. They inhabit mainly the hinterland and are believed to have migrated many centuries ago from the north and the east, bringing with them the ancient cultures of Egypt and Arabia, such as spinning, cotton weaving, and iron smelting. The tribes in northwestern Liberia, namely in Loffa, Bong, and Nimba counties, consist of Mandetan and Mande-fu groups who seem to have come originally from the ancient kingdom of Mali in Sudan.

English is the official language. Eleven of the 28 dialects can be written, namely, Vai, Bassa, Lorma, Gio, Mano, Krahn, Kpelle, Grebo, Kru, Chadi, and Gola.

Early settlers brought with them the Christian religion from the United States. They were mainly Protestants. Other religious organizations have introduced various christian denominations through missionaries. There are a few Moslems.

### 1. Size of population

The first comprehensive census of the population of the Republic taken in 1962, revealed the total population to be 1,016,443.

### 2. Growth rate

Since births and deaths are not fully registered, the respective rates cannot be calculated. However, the birth rate is determined by an indirect method. The number of births would depend on the number of families at the different stages of the child-bearing ages (15 - 49) and on the specific rate by which each age

gives birth. In general, the specific rates have a maximum around the age of 30. The specific birth rate of an African country which had a child-woman ratio similar to that of Liberia was applied to the different age groups of the female child-bearing population. By this method, after a series of adjustments, the crude birth rate was estimated to be 53.6 per 1,000. By using the specific death rate of yet another African country, the crude death rate was calculated to be 42.4 per 1,000. The rate of natural increase was 11.2 per 1,000.

### 3. Age and sex distribution

The population by age and sex is shown in Table II. The number of children under 1 year of age was 37,742, and the number in the age group 1 to 4 years was 127,640. The percentage of children under 5 years of age was 16.5 percent, from 5 to 9 years was 14.1 percent, and below the age of 10 was 29.6 percent. Males represent 50.5 percent of the population. In the hinterland counties, there were more females than males. This behavior is in conformity with the pattern of internal and external migration whereby males move toward the more industrial areas in search of employment.

### 4. Geographical distribution

There appears to be a greater concentration of the medium age groups in the coastal areas than in the hinterland. The 15 to 60 year old males constituted 77.3 percent of the total male population in the coastal areas and 47.7 percent in the hinterland. Women in this age group comprised 59.5 percent of the female population in the coastal areas and 51.2 percent in the hinterland.

### 5. Occupational distribution

In the census of 1962, the number of gainfully employed people over 10 years of age was 411,794. Of this number, 1,615 or 1.8 percent were engaged in professional, technical, and related types of work, 21,116 or 5 percent were engaged in administrative, executive, and managerial professions, 4,537 or 1.1 percent were engaged in clerical work, 319,205 or 77.5 percent were working in farms or as lumbermen. The balance was engaged in various other occupations.

The majority of the employed people are in farming. The work is seasonal and the whole family joins in the work. There is constant migration of men from the hinterland to the towns.

## 6. Income distribution

There is no reliable data in respect to wages and salaries according to skill, education, or industry in either the private or the public sector. However, there exists the familiar underdeveloped pattern of wages with a high ratio between the skilled and educated compared with the unskilled and uneducated. The majority of the people are engaged in agriculture and carry out traditional subsistence farming. Those employed in the money sector were estimated to be 82,000 in 1960 and 90,000 in 1963. Toward the end of 1964, there was a downward trend in employment due to one of the major employers having terminated the employment of 6,000 - 9,000 workers.

Present employment prospects appear to be promising. There are two new major projects which could take in labor: the Mount Coffee project and the highway construction works. In addition, there are other smaller projects.

In industry, the minimum wage is 15 cents per hour. In the agricultural sector, a change in the minimum wage legislation in 1963 brought a significant increase in wages to 64 cents per day and there is indication that salaries will continue to increase.

According to recent statistics of the Department of National Planning, it is estimated that in all developing countries expenditure on food is more than that which is spent on food in Liberia.

### C. Government Agricultural Policies

The trend in our economic development points more clearly than ever toward the need for coordinated planning in the future development of the agricultural sector of our economy. Agriculture is the world's largest primary industry and plays a vital role in the economic life of any nation. Unfortunately for us in Liberia, agriculture has been a way of life and, therefore, slow to respond to the needs of changing times. Most often this has meant subsistence farming and stagnation.

Today, the majority of our rural population lives in want and suffers from varying degrees of malnutrition, because agriculture is still more or less practiced in the traditional ways. Therefore, the most significant problem in Liberia is to bring about an agricultural revolution in which scientific agriculture can be introduced, with modern cultural practices, adequate infrastructure, essential credit and marketing facilities, and a just land tenure system.

The recent development plan for agriculture, called Agro-industry, is a plan in which the kind of foodstuff grown can determine the kind of industry built around the raw material.

The Liberian Produce Marketing Corporation was established in 1962 as a joint Government-private enterprise organization. The Corporation's operations are controlled by a joint Board of Directors which also acts as Produce Marketing Board for Government. There are 6 directors at present with equal representation. The Produce Marketing Board serves as a policy body of Government to stabilize the prices of coffee, cacao, palm oil, palm kernels and piassava by establishing a revolving fund from profits generated from operations of the Corporation. Prices to farmers are stabilized at as high a level as possible by cushioning the prices to farmers when the international market price is low and by drawing off profits from the funds when international prices are high. Prices to be paid to farmers are decided by the Produce Marketing Board.

1. Price supports

Quite often these plans are not always carried out because of the lack of logistic support.

2. Tariffs

The non-mechanization of any of the agricultural practices makes prices and tariffs very high.

3. Land reform

Land reforms are being experimented with in the G'Bedi land resettlement project where families are given several acres which they may own and care for, instead of practicing the traditional rotation farming.

4. Agricultural credit

The Agricultural Credit Corporation, which has been operating for three years, was established to make credit funds available to farmers who normally could not obtain credit from the commercial banks. This type of financing, it was envisioned, would raise the standard of agriculture from the subsistence level to diversification, as well as expand the small phase of agriculture that had already been developed.

With limited funds (\$42,647) inherited from the former Corporation, and funds generated under the United States Public Law 480, the Agricultural Credit Corporation was able to grant 31 loans for

the production of pineapples, vegetables, rice, poultry, kenaf and tobacco. Included also were loans for agriculture machinery, supplies, and seeds.

D. Foreign Aid Relevant to Food Production and Nutrition

1. Some of the foreign aid which has helped in food production and nutrition are:

- a. USAID - United States Public Law 480 which helped in contributing feed for livestock and poultry.
- b. UNICEF - Provision of financial and technical aid to Home Economics Extension Training Programs to teach women and girls practical home economics and nutrition.
- c. FAO - Provision of technical assistance in swamp rice cultivation, forestry, and assistance to the Agricultural College and the University of Liberia.
- d. German Forestry Mission - Assistance in training Liberian foresters.
- e. Care - Establishment of school lunch programs in Liberian schools.
- f. Catholic Relief Services - Provision of food to schools, hospitals and clinics.

II. FOOD SOURCES

A. Means of Production

Most agricultural production is carried out by traditional methods. Very recently a few of the more modern farmers have introduced mechanization in farm practices. Bulldozers and plows have been employed and two large poultry farms are highly mechanized.

1. Size and nature of agricultural labor force

The labor force has been one of agriculture's biggest handicaps. Several factors have contributed to the problem: (1) the small size of Liberia's population; (2) the decentralization of rural centers for concessions and urban areas (3) the breakdown of traditional African tribal life.

2. Type and number of farm implements and machinery

D6 caterpillar tractor  
Wheel tractors (45 B.H.P.)  
Two-bottom disk plow  
Disk harrows  
Rotavators  
Seed fertilizer drills  
Rotocutters  
Trailers  
Hole diggers  
Rice Dryer  
Set spraying and dusting equipment  
Mobile repair shop  
Mobile grease and lubricating unit  
Rice Mill

3. Type and amount of fertilizers and insecticides

a. Fertilizers

Animal manure  
Decayed vegetative matter  
Nitrogen - 1,285,424 lb imported in 1966  
Phosphate - 1,701,360 lb " " "  
Potash - 315,431 lb " " "  
Mixed Fertilizer - 662,667 lb " " "

b. Insecticides

DDT  
Parathion  
Lindene  
Methyl bromide  
Carbon disulfide  
Cyanide

B. Principal Food Crops

1. Cereals

Both corn and rice are grown. Corn is classified as field corn and sweet corn. The field corn usually has a higher yield and contains more starch. Rice is the staple food of Liberia. The increased production of both swamp and upland rice is the top priority

objective of the Department of Agriculture. With the technical aid of Chinese farmers many acres of swamp rice at G'Bedi are being used as a training center where farmers may come to learn improved methods in rice production.

In spite of the Department of Agriculture's emphasis on the production of rice and the increment in swamp rice production, a major portion of the rice requirements of the urban wage and salary earning population of Liberia is met from imports. Imports for 1963 amounted to 36,000 metric tons and retailed at approximately \$17,557,000 which was an all time high.

Production of upland and swamp rice during the 1964-65 harvest season is estimated to have increased by approximately 7,500 metric tons of unmilled rice which would be about 5,000 metric tons of milled rice. The increase was caused by the Government's efforts in the new program of "Operation Production" to promote rice output and by increased manpower available for farming because of unemployment in the construction field. Although it has not been possible to establish accurate figures for rice production in Liberia, it has been estimated that in crop year 1964-65 some 87,000 metric tons of unmilled rice was produced, yielding about 63,000 tons of milled rice. Most of this production is consumed on the farm and never reaches the coastal areas, although there is an expansion of paddy acreage under cultivation in two areas of the country project. However, the total is too small to be very significant in the overall economy of the country.

Production problems in rice cultivation are the limited labor force and the inability to protect rice farmers from the speculation of merchants who flood the market with the much preferred imported rice. Thus, in order to protect Liberian farmers, the Department of Agriculture is trying to find ways of developing marketing measures.

## 2. Roots and tubers

Cassava is the second staple carbohydrate in Liberia. It has been improved with better types which yield heavy crops. Cultivation was increased, however, to obtain the leaves or tops of the plant which are consumed as a leafy vegetable. Progressively less cassava is coming to the market because of the availability of more rice. Cassava is used to make products such as fufu and farina.

Sweet potatoes have also been in production but the improved varieties have been limited. This tuber is also produced for its leaves which are used as a leafy vegetable. There are a few agricultural centers where the superior variety - the Puerto Rican Real Skin - is being cultivated. The production is not significant to the economy nor to the diet of the population.

Cocoyams or eddoes play a much more important role in cultivation and the diet than yams. They could be considered as the third staple, for the tuber and the young tops are also used as leafy vegetables.

### 3. Legumes

Peanuts are consumed in fairly high quantities and have a significant place in agricultural production. Two types have given good results when cultivated - the Spanish and the Virginia runners. Both of these thrive in the dry season. However, destruction of plants by groundhogs, rats, and guinea fowl is the most significant production problem. In spite of this drawback, the use of peanuts has increased considerably. The need for peanuts for livestock, poultry, and human consumption has kept the price fairly stable.

Other sources of legumes are bush and pole beans which are cultivated in a pattern. Beniseed, sesame, keffiseed, and pigeon peas are grown in small quantities and are kept at a fairly high price. Storage in a warm moist climate is the biggest production problem. They become moldy and unfit for human consumption. Fresh beniseed and keffiseed are significant in the local diet, especially for weaning children.

### 4. Fruits and vegetables

Production of fruits and vegetables has had a steady increase since 1953. The increase in availability has also influenced an increase in consumption. The potential expansion of the production of these commodities with an organized processing and marketing system, is now being explored. Studies by the Department of Agriculture indicate that a good market exists in the United Kingdom for fresh pineapples, pepper, string beans, eddoes, and cocoyams. There is believed to be a potential market in Senegal for oranges. It is necessary to test the outlets with actual shipments.

Improved marketing to enable staggered production spread into the dry season and better distribution would expand the domestic market for fruits and vegetables by satisfying demands which are currently met by importing fruits and vegetables during the dry season. It is hoped that with the development of irrigation these possibilities can be increased.

The development of marketing organizations and processing and transportation industries must go along with production drives to

assure a smooth flow of products from the farmers to the markets, to assure a fair price to farmers as an incentive to produce.

### C. Livestock, Poultry, and Dairy Products

#### 1. Livestock

Even though the Liberian livestock industry has increased steadily, large amounts of meats are still imported. Most recent figures show that \$2,000,000 worth of meat and meat products are imported yearly. Although meat is considered a high priced item in the diet, there is always a scarcity of local production.

Two breeds of cattle are indigenous to Liberia: the West African Dwarf Longhorn and the West African Dwarf Shorthorn. Livestock production also includes sheep, goats, and swine.

#### 2. Poultry

Poultry raising for meat and eggs is one of the growing industries in Liberian agriculture. The present layer population has exceeded 100,000 birds with a replacement average of 5,000 birds monthly. Broiler production is increasing although there is still much competition with imported birds. Recently it was estimated that 270,000 broilers are produced annually. Eggs are estimated to have reached a high margin. There is, at present, no importation of eggs.

### D. Fish

The distribution and marketing of fish was a problem in the early stages of the fishing industry. Later, the establishment of cold storage and refrigerator trucks permitted the distribution and marketing of fish in the interior of the country. It is estimated that about 65-70 percent of the fish loaded and frozen is marketed in the interior. Data on marine fish landings are given in Table III.

The establishment of fish ponds for inland fisheries has become an accepted phase of fish production. These ponds were very important before refrigeration became prevalent.

### E. Production Problems

Production problems have been stated under each category, but in summarizing we can say that the biggest problems are inaccessible roads, unavailable markets, and inadequate storage facilities.

#### F. Seasonal Food Supply

Unstable prices are due to the variation of agricultural products at different seasons. Vegetables and fruits, for instance, are plentiful in the rainy season and become very scarce in the dry season.

#### G. Food Industries

Food industries in Liberia are limited to poultry, fish, and palm oil.

### III. DIETS

#### A. Levels of Nutrition (patterns of consumption)

There are three levels of nutrition - high, average, and low. The high level of nutrition is reached when the diet is composed of foods that have a high nutritional content. It is much easier for people in the high income bracket to maintain this level of nutrition because they can afford to purchase a variety of foods, especially the protein foods that are much more expensive than the other food groups but are so important to the diet. People of average income can only afford some of the foods that are necessary to provide an adequate diet.

People of low income have to concentrate mostly on the cheaper foods such as the carbohydrates and fats because of lack of funds. They usually suffer from malnutrition because of their financial inability to provide the type of foods necessary for an adequate diet. However, people in the hinterland do not suffer much because their diet is composed mostly of dried beans and peas, which are good sources of proteins, and green leafy vegetables.

It is estimated that not more than two-thirds of the food requirement of Liberia is produced in the country itself. With the scheme of Operation Production and the opening of the hinterland by new roads, it should be possible to make the country self-supporting. Harvesting and processing of palm oil and its distribution are to be materially improved with the recently developed palm oil concession. The lack of animal protein, including milk, is outstanding in the daily diets of the people. In the absence of animal protein, fish normally serves as a substitute but the supply is insufficient, especially in the hinterland. The production of fish should be increased and the transport facilities improved so that more fish will be available in the hinterland. The production of poultry

and eggs should be further intensified, and the price brought down. It is desirable to carry out a systematic study and an analysis of plants and foods grown in order to get a clearer picture of their mineral content. An analytical study of the soil condition has commenced as an FAO-assisted project. The free distribution of milk and other foods by the CARE organization and the Catholic Relief Services should be increased by at least 20 percent each year.

### 1. Food habits

In the FAO Nutrition Survey of Liberia, it was found that usually two meals are eaten every day; that is, at midday and in the evening. In many rural areas, only one meal is eaten, and this is usually in the evening.

Babies are normally weaned between the ages of 6 months and 24 months. Rice or cassava is usually introduced at the age of 4 to 6 months. Nevertheless, there are some children who are weaned on protective foods. Owing to social customs and taboos, the consumption of nutritious food is adversely affected. Girls and women abstain from eating eggs, as it is believed that eating eggs will cause precocity. Pregnant women do not eat eggs for fear that the child may be a girl. The fruits are usually given to girls as there is a belief that if the boys eat fruits they will become weaklings. Bananas and plantains are believed to cause eye disease and enlarged fontanelle, commonly called "open mole."

### 2. Food intake

Protein intake is very low. It is derived mainly from vegetables and, on the average, a man gets about 29 g and a woman 23 g daily. Local rice maintains all the available protein even after milling and hulling. High-quality protein with the essential amino acids required for growth and repair is consumed in small quantities. The intake of protein by children is especially low, particularly in the age group 1 to 5 years, with consequent development of signs of kwashiorkor. A survey in 1961 showed that in one area of the country children in this age group had 40 percent reddish skin pigment and a silky texture of the hair associated with protein malnutrition. The hemoglobin level during pregnancy was found to fall 4 g to 6 g per milliliter after the fourth month, partly due to malnutrition and partly due to an iron deficiency. It is estimated that over 80 percent of the population show clinical or sub-clinical signs of deficiency.

Iron intake is also low; among men it is 4 mg per day and among women 6 mg. The deficiencies have been shown in blood counts and by the high incidence of anemia. Iron deficiency is aggravated by widespread incidence of parasitic infections. By controlling intestinal parasites alone, blood hemoglobin levels can be raised by 30 percent.

Calcium intake is found to be low in the diet. Average intake for adults is about 0.3 g and for children about 0.25 g. Although intake is below the minimum required figures, there are no signs of calcium deficiency and rickets is a rare disease. In the cooking of food, many condiments rich in calcium and iron are used. Fish bones are used extensively in the preparation of soups, giving a considerable amount of calcium. The teeth of most of the people are well shaped and free from cavities.

There is evidence of inadequate intake of vitamins. Foods rich in vitamin A, such as red palm oil, butter, green hot peppers, potato greens, and peanuts, are found in abundance, but are not eaten in adequate quantity. However, clinical manifestations have been rare.

The deficiency of vitamin B is now observed in those regions where milled rice and cassava are the staple food. An outbreak of vitamin B deficiency occurred in an area where the people ate more of the imported milled rice. When this rice was treated with thiamine, riboflavin, and niacin, this deficiency disappeared. The diet of men contained one-half the thiamine that is necessary, and that of women only one-third, but food such as bananas, peanuts, soybeans, butter, and avocado contain a sufficient quantity. Riboflavin is deficient in terms of quantity. Its lack has been demonstrated by angular stomatitis. It is not present in a sufficient quantity in rice. Analysis of diets has shown a lack of niacin. The brown rice that is used has a fair amount of niacin while the polished rice has very little. The average person's consumption of niacin is 25 percent to 30 percent below normal. The average diet contains an inadequate quantity of ascorbic acid and the method of cooking tends to destroy a considerable amount of it. Citrus fruits and tomatoes are easily available sources. There are no signs of vitamin D deficiency manifested.

#### B. Child Feeding Programs

Liberia's child feeding program consists of breast feeding, complementary feeding (bottle feeding), and supplementary feeding. Emphasis is placed on breast feeding up to at least six months of age. Complementary feeding is encouraged whenever there is an indication that the breast milk supply is not sufficient for the baby. Complementary feeding is encouraged to be given after the breast feeding, never before it. Supplementary feeding, whenever possible, is encouraged to be given with a spoon.

Non-fat dry milk powder and baby foods received from CARE and Catholic Relief Services are distributed to approximately 5,320 children under 5 years of age attending 53 well-children clinics each month. The allocation of milk powder is based on a feeding rate of one-half pound (8 oz) for each child each week. This is about 1.1 oz per person per day. The baby food is given to mothers at the rate of two 7 1/2 oz jars per week for each of her children between 6 months and 3 years of age. Mothers are urged not to give baby food to children over 3 years of age.

In addition to the routine services offered in the 53 well children clinics located in strategic areas throughout the country, individual and group instructions are given to parents and guardians in relation to nutrition and discouragement of "forced feeding."

The following is taken from the section on "Well Children Clinics" in a guide put out by the Division of Maternal and Child Health for Prenatal and Well Children Clinics in Liberia.

"Teaching (health education)

A. Nutrition

1. Breast feeding -- best food for babies and insurance against diarrhea.
2. Boiled water between feedings.
3. Supplementary feeding, whenever possible, should be given with a spoon. After 6 months of age, the baby may take it from a small glass or cup.

At 1 month of age:

Orange juice, grapefruit juice, pineapple juice, lime juice, lemon juice. Approximately 12 tsp. daily.

At 3 months of age:

Ripe mashed bananas.

At 4 months of age:

Banana cereal, plantain cereal, eddoe cereal, and imported baby food.

At 6 months of age:

Green pawpaw soup, green banana soup, rice, beniseed, ground peas and dried fish mixture, pumpkin soup, ripe pawpaw, potato greens, kallis greens, platto leaves, green leaves, pigeon peas, fish, meat, butter peas, chicken, mashed eddoes and yam, eggs, hard biscuit, whole milk.

At 9 to 12 months of age:  
Dried skim milk.

Over 12 months of age:  
Continue milk, meat, fish, eggs, and juice in addition to the family's regular diet."

To aid nutrition, the present food supplies are supplemented by two free milk distribution schemes. One is by the CARE Organization which provides flour, corn, wheat, bulgar wheat, and oil chiefly for school children. Daily, 30,000 school children in 180 schools are fed under this program. The parents and the children prepare the food. In addition, these foods are issued to four leper colonies, ten hospitals, and seven clinics. About 1,000,000 lbs of foodstuffs are distributed annually. The expenditure incurred by the Liberia Government is \$79,000. The other is by the Catholic Relief Services which supply similar commodities as CARE including rolled wheat to mission schools, clinics, and other social institutions. Annually 2,500,000 lbs are distributed.

Major problems

1. Ignorance
2. Taboos
3. Use of bush doctors instead of physicians
4. Unsanitary condition of homes, person, equipment, etc.
5. Inaccessibility of medical facilities
6. Inadequate telecommunication facilities -- roads, transportation, telephones
7. Inadequate trained staff -- medical, paramedical and nutritionist
8. Economic problems (purchasing power)
9. Inadequate supply of animal protein, vitamins, and mineral supplements
10. Baby is breast-fed but milk is inadequate after 6 months of age; additional foods are mostly starchy - no meat, fish or eggs
11. Inadequate control of communicable disease, e.g. measles
12. Inadequate control of sanitation facilities
13. Low individual per capita income
14. Importation of polished rice
15. Limited clinic and nursing services
16. Limited or no information and experience in nutrition on the part of auxiliary nursing personnel.

#### IV. NUTRITION EDUCATION PROGRAMS

The nutrition education programs are centered around nutritional needs and the selection, preservation, and use of foods. The following are some of the points that are usually stressed:

1. The function of food in human growth and well-being;
2. The composition of foods;
3. The daily requirement for individuals according to sex and activity;
4. The selection, purchase and preparation of foods within the approved national dietary food groups in Liberia;
5. Planning menus for different occasions and economic levels;
6. The use of cooking methods which will retain the nutritive value, color, flavor, and texture of different foods;
7. Planning and preparation of food in the treatment of certain conditions such as diabetes and obesity;
8. Using new ways of preparing food and introducing some new foods that can be grown in Liberia for nutritional purposes.

Education in nutrition is of great importance. Not only should the people know the nutritive value of available foods but they should also be taught to spend the available money wisely in order to obtain a balanced diet. It is estimated that 90 percent of the people in Liberia live on a diet below the safety level. This can be improved to a considerable extent by educating the people in nutrition, encouraging local production of essential food, and the cultivation of leguminous vegetables.

Nutrition education should be carried out at various levels. It can be carried out in the prenatal and well-baby clinics to educate the expectant and nursing mothers to obtain proper nutrition during the periods of pregnancy and nursing. The nursing mother should be also educated in the proper nutrition of the child, especially during the period of weaning, when it is essential to introduce protein foods into the diet. Nutrition education should also be carried out in the schools, supplemented by practical means of producing nutritive foods in the school gardens.

##### A. The University Level

The number of people reached on the university level is approximately 2,000. This includes students and teachers who form a part of the cafeteria program. There is no other organized program on the university level at present, but plans are on the way for such to be added to the curriculum.

Courses in Home Economics, especially Food and Nutrition and Food Sanitation, are to be included in the curriculum for the Teacher Training Institutes.

B. The Vocational Level

A large number of persons who are actively engaged in producing food commodities are taught the value of adequate diets in relationship to health and nutrition. They are engaged in experiments that are geared towards improved production.

C. The Lay Level

People at the lay level produce food in relatively large quantities but they have to be taught how to prepare these in order to maintain the nutritive value. A colorful food chart has been prepared by the Division of Home Economics in the Department of Education. This chart contains three basic food groups most of which are Liberian foods. Copies of this chart are distributed and widely used. They are used in MCH clinics to teach mothers the importance of nutrition during the prenatal stage as well as during lactation. The importance of nutrition for growing children of all ages is also stressed. These charts are also used in schools where there are organized Home Economics programs. Families also have these charts in their homes. Food taboos are gradually being eliminated.

V. MAJOR PROBLEMS INHIBITING PROGRAMS TO COMBAT MALNUTRITION

Some of the major problems inhibiting programs to combat malnutrition are:

- A. Inadequate staff of trained personnel to operate such a program.
- B. Lack of proper facilities in order to expand the program to include a large number of people.
- C. Difficulty in getting people at the lay level to understand the importance of a balanced diet in relationship to malnutrition.
- D. Inadequate animal protein in the non-coastal areas.
- E. Expense of animal protein.
- F. Existence of 28 different dialects.
- G. Cultural feeding patterns: reliance on starchy foods, such as rice, cassava, eddoes, and so forth.
- H. Too frequent pregnancy resulting in early weaning.
- I. Inadequate road network for transport of supplies.
- J. Limited nutrition education materials.
- K. No food processing industry.
- L. No dairy cattle.
- M. Limited beef cattle.
- N. Difficulty of cattle breeding: the tsetse fly is suspected to be a major cause.

## VI. PLANS AND HOPES FOR THE FUTURE

### A. Health Education

The major difficulty in the development of health education, as in other fields, is the shortage of personnel. Staff training for all categories of personnel should be concentrated in one or two areas to start this program. Teaching materials should be developed in conjunction with this intensive training program as an integral part of the work and to assure a concentration of effort.

### B. Voluntary Organizations

Voluntary organizations should be used by training their members, who could then assist the health and nutrition education personnel in health education activities. Some of the voluntary organizations that could assist are:

#### 1. 4-H Clubs

There are 55 4-H Clubs with a membership of 1,700. The 4-H's stand for head, heart, hand and health, and the organization is aimed at the youths of Liberia who will be the future citizens of the country. Membership consists of both boys and girls. The clubs undertake group projects such as vegetable gardening, tree crop nurseries, and livestock and agricultural projects. The main aim is to train the youth in a national development program. These clubs consist of a very valuable group of voluntary workers whose services should be utilized to the fullest extent in the promotion of nutritional health of the people. Through them, the rural masses could be approached and nutrition education procedures could be carried out by determining the felt needs. These groups could be used for coordinated programs of health education and food production and to raise the economic standard.

#### 2. Red Cross

The Red Cross has a central body, as well as 17 chapters scattered throughout the country. Red Cross volunteers can be trained to carry health knowledge to the rural population. Similarly, the Junior Red Cross, which has a membership of 3,000, should be utilized.

#### 3. Other Organizations

The services of the religious and industrial organizations in the country, especially the missions and concessions, should be enlisted for propagating nutritional knowledge. It may be necessary

to organize special training courses for the members of these bodies, and the church can be made use of for propagating that knowledge. The paramount and tribal chiefs should be oriented towards preventive health work and their services could be utilized for the propagation of health knowledge. The Poro and Sande schools could be powerful instruments for instilling nutrition knowledge to boys and girls. The cooperation of these schools should be enlisted by winning their confidence.

The success of a program of health education would therefore depend on:

- a. Proper organization of work.
- b. Winning the confidence of the people and thereby their cooperation.

With these aims, health education work should be carried out with steady persistence in all areas associated with health programs. Health education should be the pivot on which all nutrition programs are initiated and carried out.

#### B. Interdepartmental Committee on Nutrition

It is essential to establish a coordinating committee to improve the production of food, to effect proper distribution, to make essential foods available at a reasonable price, and to carry out nutrition education. The committee should consist of representatives of the Departments of Health, Industry and Commerce, Education, Agriculture, and Information.

The harvesting and processing of palm oil should be improved. The distribution of fish in the hinterland, and the promotion of fish breeding should be intensified. The production of poultry and eggs should be further encouraged.

Provision of dried milk and other foodstuffs by CARE and the Catholic Relief Service should be extended each year, especially to meet the needs of preschool and school children, and expectant and nursing mothers.

Nutrition education should be promoted through all health staff, schools, and the Home Economics Division of the Agriculture and Education Departments.

A Nutrition Research Unit should be established at the Liberian Institute of Tropical Medicine. The main function of the unit should be to carry out basic and applied research which should include nutritional surveys. More school lunch programs should be established in all schools.

With the scheme of Operation Production, the opening of new roads, and the Government's plan for overall improvement, the problem of transportation and others mentioned should be solved.

TABLE I

LIBERIA: MONTHLY RAINFALL IN PRINCIPAL TOWNS - 1963  
(in inches)

Towns	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Loffa County Voinjama	1.67	4.84	3.47	-	-	14.43	10.50	-	9.46	15.03	9.07	0.67
Nimba County Tapita	1.31	-	2.44	-	-	-	14.37	9.59	8.49	-	2.49	0.70
Bong County Succoco	2.52	11.31	5.65	2.65	9.09	8.32	6.68	7.76	4.40	-	-	-
Grand Gedeh County Tchien	1.24	-	-	-	5.73	13.34	39.59	11.67	11.67	15.92	-	1.91
Montserrado Co. Monrovia	1.31	2.44	3.92	-	-	31.50	38.79	24.89	23.25	-	5.45	2.40
Sinoe County Greenville	4.16	3.23	1.15	9.15	7.58	-	51.56	18.66	25.58	12.29	8.00	5.85
Maryland County Bush	2.08	6.20	8.10	7.42	7.96	24.51	31.57	4.06	18.85	19.68	-	-
Cape Mount County Robertsport	2.29	1.28	1.67	2.72	9.35	21.21	30.34	38.10	27.02	4.10	10.23	1.21

TABLE II  
POPULATION BY AGE GROUP AND SEX

Age Group	Male	Female	Total	Percent of the Total
Under 1 year	18,694	19,045	37,739	-
1 - 4 years	62,931	64,709	127,640	16.5
1 - 9 "	68,809	64,953	133,762	13.1
10 - 14 "	43,483	35,112	78,595	7.7
15 - 19 "	39,248	44,049	83,297	8.2
20 - 24 "	34,751	49,601	84,352	8.3
25 - 29 "	40,220	55,072	95,292	9.4
30 - 34 "	36,750	45,241	81,991	8.0
35 - 39 "	34,459	34,979	69,438	6.8
40 - 44 "	31,367	27,244	58,611	5.8
45 - 49 "	24,715	19,547	44,262	4.3
50 - 54 "	19,746	14,547	34,293	3.4
55 - 59 "	13,296	9,481	22,777	2.2
60 - 64 "	13,130	10,751	23,881	2.3
65 - 69 "	8,808	7,298	16,106	1.6
70 - 74 "	4,963	4,358	9,321	0.9
74 and over	8,212	6,865	15,007	1.5
Percent	49.5	50.5	100	100

TABLE III

MARINE FISHERIES

Since 1953, commercial fish production has increased by seven-fold. Based on data collected by the Bureau of Fisheries and estimations of fish-landings in accessible areas, the fish landing for the years 1956-1964 and the first half of 1965 are as follows:

1956.....	941.5	metric tons	
1957.....	1,205.6	"	"
1958.....	1,350.5	"	"
1959.....	1,657.0	"	"
1960.....	1,180.0	"	"
1961.....	2,266.3	"	"
1962.....	2,572.0	"	"
1963.....	3,993.0	"	"
1964.....	7,944.0	"	"
1965.....January to June.....	3,972.0	"	"

The data clearly show that there has been a substantial increase in fish-landing since the introduction of mechanized fishing.

TABLE IV

LIST OF COMMODITIES AND SPECIFICATION  
FOR PRICE COLLECTION

<u>Commodity</u> <u>title</u>	<u>Unit of</u> <u>quantity</u>	<u>Weight</u>	<u>S P E C I F I C A T I O N</u>		
			<u>Unit</u> <u>value</u>	<u>Quality</u>	<u>Local or Imported</u>
<b>CEREALS</b>					
Rice	Cup	12 oz	\$ .9	Brown	Imported
Rice	Cup	12 oz	.9	White	Local
<b>TUBER &amp; ROOTS</b>					
Sweet potatoes	Pile	3 lbs 9 oz	.25		
Eddoes	Pile	2 lbs 8 oz	.25		
Cassava	Pile	5 lbs 7 oz	.20		
<b>OIL</b>					
Palm Oil	Bottle	12 oz	.20		
<b>VEGETABLES &amp; NUTS</b>					
Palm nut	Pile	2 oz	.1		
Cabbage	Pound	1 lb	.25		Local
Collard Greens	Bunch	2 oz	.5		
Potato Greens	Bunch	1 lb 7 oz	.5		
Bitter Balls	Pile	8 oz	.5		
Okra	Pile	3 oz	.5		
Pepper	Pile	6 oz	.5	Green	

<u>Commodity title</u>	<u>Unit of quantity</u>	<u>Weight</u>	<u>Unit value</u>	<u>Quality</u>	<u>Local or imported</u>
<b>FISH AND SEA FOOD</b>					
Bonies	Pile	8 oz	.20	Smoked	
Cassava fish	Pile	1 lb 2 oz	.25	Fresh	
Cavalla fish	Piece	1 lb 15 oz	.63		
Mackerel	Each	2 lbs 8 oz	.25		
Sole fish	Each	2 lbs	.25		
Snappers	Pile	2 lbs	.30		
Sardines	Tin	2 oz	.10		Imported
<b>MEAT &amp; MEAT PRODUCTS</b>					
Brisket	1 lb	1 lb	.60	Beef	
Beef steak	1 lb	1 lb	.75		
Pig feet	Each	1 lb 6 oz	.25	Salted	Imported
Chicken	Each	2 lbs 10 oz	2.75		
<b>OTHERS</b>					
Eggs (chicken)	Each		.10		Local
Bread (white)	Each	3 oz	.5	Round	
Orange	1 doz	Standard	.55		
Plantain	3 bunch	3 lbs 4 oz	.30	Green	
Tomato paste	Tin	2 1/2 oz	.5	Giraffe	
Onions	Pile	1 lb	.15		
Wood (cooking)	Pile		.25	Dry	
<b>DRINKS &amp; TOBACCO</b>					
Fanta	Bottle	Small	.10		Local
Beer (Club)	Bottle	Small	.25		Local
Beck's Beer	Bottle	Large	.65		Imported
Stout	Bottle	Small	.30	Guinness	Imported
Lucky Strike	Pack	20 cig.	.30		
Winston	Pack	20 cig.	.30		

## REPORT ON NUTRITION IN MALI

presented by Mr. Seydou Diakité

### I. BACKGROUND DATA

#### A. Geography and Climate

The Republic of Mali is completely continental and is located entirely within the tropical zone. The nearest ports are to be found at Dakar (1,270 km), Conakry (966 km), and Abidjan (1,086 km). Proceeding from south to north, three zones can be discerned:

1. A Sudanese zone where forested corridors are to be found together with high savannas (approximately 400,000 km<sup>2</sup>);
2. A Sahelian zone forming an arc to the north of the valleys of Senegal and Niger (400,000 km<sup>2</sup>);
3. A Saharan zone of 500,000 km<sup>2</sup> close to the Niger River.

The maximum altitudes are less than 900 m and are found in the Adrar of the Iforas in the northwestern part of the country.

In brief, the year includes three seasons: the period from March to May is characterized by drought and extreme heat; from June to October the rainy season prevails; from November to February the temperature is on the whole much lower. Rainfall measurements vary from 1,500 mm to the south of Sikasso to around zero in the heart of the Saharan region.

In the Republic of Mali, economic and demographic data are controlled to a great extent by the existence of two large rivers. The first is the Senegal River whose system creates a natural link with the Republics of Senegal, Guinea, and Mauritania to the west. The second is the Niger River which, taking its source in Guinea, reaches the Republic of Niger after having plotted an arc of more than 1,600 km in our country and forming, over hundreds of kilometers, an "inner delta," a zone more or less irrigated, depending on the season.

#### B. Population

With a total area of 1,204,000 km<sup>2</sup>, the Republic of Mali has only 4,740,800 inhabitants which amounts to a mean density of 3.8 per square kilometer. It is estimated that the annual gross birth rate is between 45 and 56 per thousand. The gross mortality rate, varying with the environment, is probably between 22 and 30 per thousand. The rate of 26 per thousand is the one more generally used.

According to a census made of 1,000 persons in 1963 in an urban environment, the age pyramid could be represented as follows, assuming an equilibrium between persons of male and female sex (data from the Ministry of Public Office and Labor):

<u>Age Group</u>	<u>Percent of Total Population</u>
less than 15 years	50
from 15 to 60 years	45
more than 60 years	5

The distribution by Region is as follows:

<u>Region</u>	<u>Inhabitants</u>
Bamako	883,200
Gao	586,000
Kayes	716,800
Mopti	954,300
Segou	729,100
Sikasso	871,400

Of the total inhabitants, 2,884,940 live from agriculture in an area which excludes the Region of Gao-Niafunké and that of the Niger Office.

It is well known that Mali has a whole range of activities relating to crafts of high quality. The statistic of 500 apprentices only represents those on record (tailors, jewelers, masons, smiths). This should, however, be less than in actual fact since apprenticeship is still carried out according to tradition, i.e., without full-time contract. Moreover, the enrollments of the National Institute of Social Welfare (Institut National de Prévoyance Sociale) (INPS), under the State Enterprises, show 6,949 persons. To this should be added some 12,000 persons of whom about 2,000 are enrolled under the Niger Office and approximately 10,000 day-laborers under the Administration.

The private sector has 6,511 enrolled with the INPS (428 Europeans are not included in this figure). As for officials carried on the lists, i.e., depending on the General Charter and not registered with the INPS, they numbered 6,155 in 1964/65 and 5,120 in 1965/66.

#### C. The Agricultural Policy of the Government

As far as the agricultural policy of the Government is concerned, financial subsidies for production do not exist. However,

assistance to production is found in the form of hydro-agricultural installations set up throughout the country whose 100 percent operation could probably be responsible for an increase by half of the present production of rice. The fact is that out of 62,270 ha so fitted out only 25,726 ha, i.e., less than 50 percent, are exploited.

Another form of assistance to production is the founding several years ago of seasonal schools where young farmers go during the winter period to learn modern crop cultivation methods. At the conclusion of their training, a plow and a yoke of oxen are given to each student. These schools have now been transformed into Centers for Rural Animation (Centres d'Animation Rurale) (CAR) of which there are about 100 throughout the territory. We should like to point out that tariff legislation exists which gives an exemption from customs duties on fertilizers, agricultural equipment and insecticides.

As far as agrarian reform is concerned, it is not yet governed by a code. The policy of the Government relating to this matter, however, is to leave ownership of land with the person who can profitably exploit it. This policy is in the process of progressively reducing, by means of apportioning lots, the extensive landed properties belonging to only a few owners living in the vicinity of populated centers. This policy tends at the same time to determine our agriculture and cause it to become intensive rather than extensive. The present policy of the Agricultural Bank (Crédit Agricole) is to allocate lots to cooperative groups, responsible for payments to the Credit Service of the Agricultural Bank and Rural Equipment (Service du Crédit Agricole et de l'Équipement Rural) (SCAER), rather than to individual persons.

There is a Malian service for crop protection called the Division for the Protection of Plants (Division de la Protection des Végétaux). Its role lies in its involvement in fields and orchards in matters concerning suitable treatments to be given to plants. In this respect, it is appropriate to point out that an interAfrican service for control of the quelea and grasshoppers, called the Joint Organization for Control of Crickets and Birds (Organisation Commune de Lutte Antiacridienne et le Lutte Antiaviaire) (OCLALAV), has its seat in Mali at Kara, Region of Diaforabe. A number of West African States belong to this organization.

#### D. Foreign Assistance in Behalf of Nutrition

The Republic of Mali has benefited and continues to benefit from assistance from the World Food Program (WFP) in millet, sugar, milk, sorghum, corn and beans. This took the form of gifts at the time of the drought in 1965-1966 and recently on the occasion of floods caused by overflowing of the Niger. In 1967, we received relief in the amount of \$90,000 from Canada. Through AID, the Republic received 10,000 tons of sorghum within the scope of the agricultural program. To this, 1,500 tons of corn should be added, bringing the total of the resources to 67,000 tons. On this same subject, the considerable assistance afforded by WFP in combating illiteracy in our country should be pointed out.

### II. FOOD RESOURCES

#### A. Means of Production

The ordinary tool of the peasant is still the daba. The use of the plow is increasing, especially in the Regions of Segou and Bamako.

The agricultural labor force is represented by the Malian farmers organized by the Government into village groups. These groups also constitute cooperatives for sale and supply of foodstuffs. Governmental efforts tend to make true production cooperatives of them as a result of the encouragement given to collective fields in the villages. The agricultural labor force comprises almost 90 percent of the population.

The minimum modern agricultural equipment (plow, multicultivator, seed drill) is not yet in common use. We possess 71,890 plows and 4,293 harrows and lack approximately 1,500,000 hoes and dabas. The use of tractors is confined to the State Farm level (regionally allocated) and organized bodies such as the Niger Office. A few private individuals possess them.

The allocations of fertilizer to the peasant are taken care of by the popularization service of the Ministry of Agriculture. The transactions are in cash.

#### B. Food Crops

Food crops include millet (fine and coarse), rice, corn, and fonio.

### 1. Millet

The two varieties of millet are cultivated practically everywhere and still form the basis for feeding the country. Total production varies between 700,000 tons and close to one million tons grown on about 1,200 ha. The average in the period 1961-1965 was 850,000 tons or approximately 700 kg per hectare. This production is almost entirely consumed on the domestic market with less than 7 percent of the total (approximately 60,000 tons) being reserved for commercialization.

### 2. Rice

The production of paddy rice, second Malian food crop in order of importance, reached an average of 185,000 tons per year during the period 1961-1964, of which approximately 75 percent was produced by traditional agricultural methods in the valleys of the watercourses, whether properly prepared for cultivation or not.

In 1965, the Niger Office alone produced close to 40,000 tons on a total area of 35,000 ha in the central Niger delta.

### 3. Corn

Except in the south, corn is found chiefly in small scale farming. Its cultivation is practiced mainly in the Region of Kayes, along the Senegal and Faleme Rivers. Production reaches 100,000 tons over an area of approximately 90,000 ha with a yield of 1,100 kg to the hectare.

### 4. Fonio

This less important cereal is cultivated on about 50,000 ha with production amounting to 20,000 tons in 1961-1963.

### 5. Roots and tubers

The area devoted to tubers (manioc, potatoes and yams) is small, amounting to less than 20,000 ha. Close to 150,000 tons of manioc are produced on 10,000 ha, 60,000 tons of potatoes on 10,000 ha, and 10,000 tons of yams on 22,000 ha.

### 6. Legumes

First in importance is the peanut. This is the chief commercial crop of Mali. It has been cultivated at an annual

rate of 110,000 tons since 1960, over an area of approximately 250,000 ha. The average yield, which amounted to 610 kg per hectare in 1960, dropped to 440 kg per hectare in 1965, owing to poor cultivation techniques, a drop in efficiency in the selection of seeds and their use.

#### 7. Fruits, nuts, vegetables

According to estimates, the total production of fruits in 1961-1963 was 30,000 tons. It is not possible to provide data on the type and number of hectares as well as yields. The production of vegetables is close to 100,000 tons. The 1961-65 plan envisages a rise in production to 200,000 tons.

The production of shea nuts is considerable in Mali. Producers can be counted on for close to 250,000 tons of fresh nuts representing 110,000 tons of dried kernels or approximately 44,000 tons of shea butter. If consideration is given to the fact that this is refined shea butter, without its well-known rancid odor, which can be commercialized just like peanut or palm oil, then the importance of this success of the Malian Firm for Cultivation of Oil Yielding Substances (Societe d'Exploitation des Produits Oleagineux du Mali) (SEPOM) in the refining of this shea butter can be fully understood.

#### C. Livestock, Fowl, Milk Products

##### 1. Livestock

According to the estimates of the Service for Stock Farming, the livestock population amounts to:

Cattle	4,200,000	annually producing	420,000 head
Sheep and goats	9,700,000	" "	2,300,000 head
Horses	130,000	" "	1,300 head
Donkeys	400,000	" "	40,000 head
Swine	27,000		

##### 2. Fowl

The estimate of the fowl population is 12,500,000.

#### D. Fish

The products of the fishing industry, carried out mainly in the Niger River, reach an annual rate of approximately 90,000 tons

of fresh fish, of which 20,000 tons are consumed fresh and 70,000 tons converted to smoked fish (10,000 tons) and dried fish (10,000 tons).

#### E. Production Problems

The problems of production in our country can be summarized as problems of collectivization of labor in the production and determination of crops (collective fields for farmers). Other problems concern livestock breeding and the protection and improvement of pasturages as well as fishing with measures taken to protect the fish catch against dermestids (insects commonly found in the flesh of fish).

#### F. Seasonal Food Resources

The seasonal food resources are: during the winter season, corn; after the winter season, tubers (manioc, potatoes, yams), truck products, fruits and fish. We find millet, rice and meat available in all seasons.

#### G. Food Industries

The Malian food industry is still young. Our Government has, however, established the following:

1. National Company for Operation of Slaughterhouses (SONEA) which has the export monopoly for meats and skins;
2. National Company for Operation of the Oil Works;
3. The Malian Canning Company (SOCOMA);
4. The Dougabougou Sugar Factory;
5. The refrigerated slaughterhouses of Gao and Kayes.

Cooperation with private companies may be found in the firms operating under contract. We refer in this instance to the Company of General Slaughterhouses of France (Societe des Grands Abattoirs de France) which shares with SEPCM (Development Company for Oil-Yielding Products) in the operations of the meat market.

### III. DIETS

With our present level of documentation it is difficult to prepare an exhaustive report on the situation regarding food and nutrition in Mali. Nevertheless, food and nutritional investigations carried out by the Anthropological Mission of the AOF

(report of L. Pales, 1954) and by the Socio-Economic Mission of the Sudan (1957-1958) were able to collect some information which, however, are far from covering the whole of the territory of our Republic.

The investigations of the Anthropological Mission of the AOF took place mainly in the urban environments of Bamako (Medina-Coura districts) and the Air Base and to a small extent in rural environments (Dialokoro). From these investigations it is evident that the great majority of urban families enjoy an adequate and relatively well-balanced food ration.

The quantitative mean daily ration per person is approximately 3,000 Calories. The protein content is relatively high, but this value is tempered by the fact that more than 80 percent of these proteins are of vegetable origin hence resulting in an inadequate supply of essential amino acids. The lipids are sufficient, essentially represented by shea butter and peanut butter. The rate of carbohydrate consumption is excessive. This food is made up in large part by millet or rice together with a sauce whose main components are: meat, gumbo, soumbala, onion, cherry tomato, peanuts, salt, etc.

The information gathered by the Socio-Economic Mission of the Sudan among the rural populations of the heart of the Niger Delta (traditional zone of cultivation) and the Niger Office appears to be perceptibly alike with a minimal, although adequate, caloric value (2,350 Calories per person per day) reported. There was noted a better distribution of proteins (25 percent of animal origin) and a relative deficiency of vitamin A, etc.

In conclusion, the nutrition survey in urban environments and large rural areas shows that there are no serious nutritional inadequacies or imbalances. The diet consists essentially of cereals (millet, sorghum, and rice), representing about 80 percent of the total caloric intake, and of oil seeds and nuts (peanuts and shea nuts) which, together with cereals, supply most of the protein, although there is some protein supplied through fish and meat. Vegetables and green leaves are used in the preparation of the sauce.

It is interesting to note that the food ration appears to be more adequate and more balanced in the families of Medina-Coura and in the zones of the heart of the Niger Delta than in those of the Air Base and of the Niger Office, not so much in quantity, but chiefly in quality owing to a greater diversification in foods consumed.

Much more delicate appears the food balance of the small rural centers which are exposed to the severe problems of the interseason gap and to a worrisome budget situation. Thus, it was that the investigations carried out in the village of Dialakoro in the month of August 1946 brought to light veritable starvation rations (802 Calories on the average) with a completely unbalanced food composition where even the carbohydrate ration was inadequate.

Such is the information gathered by the several investigations carried out in Mali. For purposes of completeness the following observations should be added. The food ration should be considered in urban environments as well as in rural environments with respect to three factors: social, seasonal and traditional.

#### A. Social Factor

The balance of the diet is dependent chiefly on the purchasing power, of the people, especially in the large urban centers where the tightness of the budget is rarely offset by home production and barter. The cost of livestock management, (even though low for a country where one head of cattle and two head of sheep or goats are available per inhabitant), the poor organization of the fishing industry, and the absence of a collection and distribution system for milk, are all problems which increase the price of animal proteins. Thus, meat, fish and milk are rarely consumed in low-income families.

#### B. Seasonal Factor

Although the food balance is adequate, both quantitatively and qualitatively, during the period of abundance (November to mid-February), the reserves are drawn on starting in the month of March and the food ration drops until it reaches a delicate equilibrium in mid-June when the difficulties inherent in this period make their appearance. The months of August and September are when the kwashiorkor curve (major protein malnutrition) reaches its maximum.

#### C. Traditional Factor

The products of the henyard are far from being fully utilized in Mali. It has been estimated that at least 40 percent of the production of eggs not consumed owing to traditional reasons is lost at the very moment when a very important component in the struggle against kwashiorkor could be found here. Eggs are considered as harmful. Fish or ground meat are given in such small quantities that they could in no way offset the protein deficiency of the mother's milk. At weaning time, the infant is entrusted to a grandmother and makes an abrupt transition from the milk diet to the food of the adult. You can recognize the consequences of this custom.

In conclusion, although the food ration appears inadequate with adults, allowing for seasonal factors and purchasing power, it is all the more certain that the most delicate and precious section of the population, i.e., infants, receives the poorest distribution from this viewpoint.

This brings us to the nutritional status of the Malian population. This nutritional status follows a curve parallel to the food balance and the same comments made on the subject of food are valid for nutrition. Although the nutritional status of the adult population is relatively satisfactory, it is not possible to be as affirmative with respect to the infant population. The partial investigations carried out at the central PMI of Bamako on about 100 infants from 0 to 1 year of age shows that the weight curve of these infants is deflected beginning from the sixth month of life. Beginning from 1 year, sometimes sooner, the symptoms of malnutrition make their appearance to reach their maximum intensity at the time of weaning, at which time it is possible to detect them.

Protein malnutrition forms the background for dystrophies. It can be stated that 50 percent of infants from 1 to 5 years of age show symptoms of protein deficiency which go from the simple loss of weight with digestive disorders to obvious symptoms of moderate or serious kwashiorkor. Our serious cases of kwashiorkor occur mainly in the little suburban villages and we have continuously observed in the families of these infants those numerous social problems which arise from poverty and ignorance.

In summary, the nutritional situation of our populations, especially the infant population, presents serious problems and malnutrition can even be considered as problem number one of infantile pathology. This situation may also be attributed to economic contingencies, but ignorance and certain harmful traditions play an important role in the majority of cases. Any food program should, on this account, include not only the establishment of consumer goals as a function of the theoretical needs of the population, but also a health education program carried forth with the assistance of the Party executives (creation of medico-social committees and PMI brigades in each city, village or quarter) and paramedical cadres (nurses, welfare workers) who will be recruited in increasing numbers and better trained.

#### IV. EDUCATIONAL PROGRAM IN NUTRITION

Education in nutrition does not constitute an individual subject for instruction. The intermediate level program in the basic and secondary schools is incorporated with the natural sciences.

The number of child recipients to be found at the school canteen level is 7,000 boarders, all grouped in the Regions of Bamako and Gao. Presently being utilized at the nursing-mother level (infants 1 to 5 years of age) are about 40 tons of powdered skim milk, CSM food mixes, vitamin A and D tablets kindly supplied by UNICEF. The evaluation of the findings in the school canteens may be considered from two points of view: the physical and health aspect of the child, and the educational aspect which primarily involves the comparative results obtained in class (on a long-term basis).

V. MAIN OBSTACLES

- A. The lack of nutritional experts.
- B. The few means available to our country.
- C. The inadequacy of the means of transport and travel make up generally the difficulties to which the majority of our States are exposed.

VI. PLANS AND HOPES FOR THE FUTURE

- A. The feasible and continuous development of the Niger basin.
- B. The large-scale interstate works contemplated for the Senegal River basin.
- C. The expansion of the pilot zones of intensive soil cultivation (agricultural land developments) mainly in the southern part of our country.
- D. The installation of industries both for milk and for fish at Mopti.
- E. The expansion of the Koulikoro oil-works.
- F. The sugar refinery center at Dougabougou as well as the intense struggle carried on by our country against illiteracy are encouraging perspectives which will be favorable factors in the raising of the nutritional level of our population.

## REPORT ON NUTRITION IN NIGER

presented by Mr. Moroh Diakité

### I. BACKGROUND INFORMATION

#### A. Geography and Climate

The Republic of Niger has a surface area of 1,267,000 km<sup>2</sup>. It is bordered by Mali and Upper Volta on the west, by Dahomey and Nigeria on the south, by the Republic of Chad on the east, and finally, by the Algerian Sahara and Libya on the north.

The country includes three distinct climatic and vegetation regions:

##### 1. Sahara

In its northern part, where the Sahara desert lies, the weather is very warm; the temperature rises above 40°C and it almost never rains. However, we find a few oases -- the most important one being Rihna -- that shelter human lives. In this region, the landscape is dominated by a part of Mount Tibesti and its range of plateaus and hills which reach an elevation of over 1,000 m.

##### 2. Sahelian zone

Some meager vegetation grows in this zone which is located south of the Sahara Desert. The temperature is somewhat more moderate and oscillates around 36°C. The rain accumulation varies between 150 mm and 300 mm and enables animals to graze on the pastures of the vast plains or on the mountains. The highest peak is the Air which has an elevation of over 2,000 m. This zone is limited to livestock raising.

##### 3. Sudanian zone

Further south the sudanian zone commences, with slight indications of savanna characteristics. It already includes a rainy season (four months) and a dry season. The temperature, although still high for foreigners, is sufficiently bearable; the rainfall oscillates between 350 mm and 600 mm and reaches up to 800 mm in the southwestern part of the zone. Almost all the Niger population resides in this area where it is committed to work the land.

Besides a few rivers which flow during the rainy season, the only waterway is the Niger River which traverses only 550 km of the far western area of the country. The portion of Lake Chad belonging to the Republic of Niger is relatively shallow, covered with marshes which make access into the area difficult.

#### B. Population

The Republic of Niger has 3,500,000 inhabitants of which 90 percent are sedentary farmers. The population includes numerous ethnic groups: Hausas (1,160,000), Djerma (420,000), Tuaregs (360,000), Toubous and Arabs (50,000). The Hausas and Djerma make up the main farming group; the Peuls, Tuaregs, Toubous and Arabs are mostly nomads, mainly raising livestock.

According to the 1967 statistics, the increase of the Niger population is 90,000 annually. Its purchasing power varies on the average between 5,000 and 17,000 francs.

#### C. Agricultural Policies

Since its accession to independence, the Government of Niger has deployed all its endeavors to quantitative and qualitative development of agriculture and livestock raising which, at this time, are its two main resources. Thus, it is within the framework of achievements that we anticipate extending the farm irrigation system from 1,000 to 1,500 ha annually. The acquired land is distributed to the population who, under the guidance of national and international experts, must farm it. This guidance is provided to the farmers from the initial agricultural steps to the marketing of the harvested products; thus, Niger farmers benefit from assiduous assistance.

The Niger Credit and Commerce Union (UNCC) furnishes to the individuals who have been successful, various farm implements and work animals in order to improve crop output. Within the framework of popularization, improved seeds are placed at the farmers' disposal each year. Twenty-three bush tree national nurseries and 25 national nurseries are equally responsible for furnishing more than 40,000 fruit plants and vegetable seeds to the peasants under very reasonable financial terms. In 1966 and 1967, we succeeded in providing 1,900 lb of market gardening seeds to the farmers.

Vegetable protection (fight against crickets and millet eating birds) is the principal preoccupation of the Organization for the Common Struggle Against Locusts and Birds (OCLALAV).

As concerns crops and reserves, the peasants already recognize the importance of fungicide, lindagrain and other types of insecticides. The use of modern fertilizer, previously unknown, gains the confidence of the population more and more: 600 tons of fertilizers were sold in 1967 while not a single purchase had been reported in 1962.

## II. FOOD RESOURCES

### A. Main Food Crops

As a whole, productivity is always increasing except when rainy conditions are unfavorable. The 1966 statistic reports indicated the following figures for main crops:

<u>Crop</u>	<u>Production (tons)</u>
Millet and sorghum	1,130,000
Rice	20,500
Peanuts	311,000
Cowpeas and <u>Voandzou</u>	103,140
Cassava and sweet potatoes	155,100

It is to be noted that fruit and vegetable production is still in its initial stage. The small home garden located around huts and water points produces condiments; this is the work of the Niger woman.

At the school level, we have succeeded in starting school gardens so as to give the children a taste of this activity and also to enable them to consume more vegetables.

### B. Animal Production

Livestock, the second resource in Niger, includes more than 3.5 million cattle, more than 2 million sheep and about 500,000 camels. The traditional breeding habits still constitute an obstacle to race and species rationalization. Dairy products are especially intended for local consumption. However, let us note the existence of two centers (Niamey and Filingue) where recent ranch experiments have been conducted to select bovine races capable of greater milk and meat production.

Even though the livestock breeder is still strongly subjected to tradition and superstitions, he has, nevertheless, become aware of the value of the campaign against bovine pestilence which remains his sworn enemy. At the first sight of sickness, he reports it to the authorities.

### C. Fish

Fishing is especially active on the Niger River and in Lake Chad. Production fluctuates between 6,000 and 10,000 tons. The largest share (dried or smoked fish) is destined for exportation to Ghana, Nigeria, Upper Volta and Dahomey. Local consumption is confined to the riverside population.

### D. Food Industries

Properly speaking, our traditional food industries are those processing food commodities intended for local consumption. However, let us mention the existence of a few national plants located in the main production centers and intended for local needs: peanut oil (plants at Matadi and Malaneye), millet flour (at Zinder), rice husking and polishing (at Tillaberi).

## III. NUTRITION PROGRAMS

Even though Niger is disinherited, when compared with certain of its neighbors who are privileged by nature, the country does not suffer from undernourishment. Inquiries have revealed rare cases of protein deficiencies, as well as deficiencies in vitamins A and C and calcium. These were observed all over the country but particularly in the north. Climate and scarcity of water are the two principal factors inconsistent with good progress. Lack of knowledge concerning the nutritional value of certain products and traditional food habits are also obstacles to the development of a nutrition program. Within our societies, pregnant women, nursing mothers and weaning children are the groups which are affected by forbidden foods.

### A. Programs for Preschool Age Children

Nutrition problems of preschool age children are the responsibility of social centers and of the Maternal and Infantile Protection (PMI) Centers. These organizations, at the service of the women who are competent in maternal educational matters, are in direct contact with this society strata. Every week, mothers and future mothers are exposed to practical food sanitation demonstrations, radio broadcasts in vernacular language, concrete demonstrations (meal preparation for mother and child) and pertinent motion pictures. In the important rural agglomeration sectors, mothers are chosen to attend a short period of training to prepare them to become leaders of their group. The appropriate nutrition service constantly collaborates

with the services responsible for applied education for mothers. Thanks to assistance from AID, we distribute a considerable quantity of supplementary food commodities to mothers in need and their children. It is in this manner that 3,250 women benefited from supplementary aid during at least a 3-month period in 1966 to 1967, as follows:

Per mother per day  
150 g of bulgur wheat (crushed and precooked wheat)  
150 g of corn flour  
40 g of powdered skimmed milk  
7 g of soybean oil

Above all, our difficulties lie in the lack of adequate staff personnel to permit contact with the majority of the rural masses. Villages are remote from each other and our means do not enable us to have frequent and direct contacts with these rural communities where the low purchasing power remains the main obstacle to good nutrition.

#### B. Nutrition Program at First Degree School Level

In this domain, our general objectives are the following:

1. To improve the feeding of the school age population, keeping in mind the fundamental principles of good nutrition and taking into account the food available locally, according to the regions and seasons;
2. To use the child as an intermediary to promote the family diet's improvement;
3. To augment the production and consumption of green vegetables and fruit at the school level (lunch programs) and subsequently at the family level;
4. To obtain a more rational utilization of food products aimed at avoiding waste, deterioration and losses;
5. To popularize farming by explaining to the pupils the importance and significance of working the land (gardens are started in all schools).

Briefly, our policy is to promote an ever increasing productivity so as to cover our nutritional needs without necessary obligatory recourse to foreign aid.

The nutrition service, from its inception in 1962 to this date, supervises the efficient operation of 138 school lunch facilities affecting about 15,000 children of the 77,500 pupils. The children receive only the noon meal (except in the nomad zone where the students are granted scholarships, including board, and benefit from three meals per day, clothing and lodging).

The typical meal that we offer has been established with the collaboration of nutrition experts from FAO and is given to children between 7 and 12 years old. The ingredients are as follows:

<u>Group</u>	<u>Ingredients</u>	<u>Grams</u>
I	Millet, or sorghum or rice	150
II	Fresh or dried meat	100 or 30 according to the case
III	Oil or butter	7 to 10
IV	Leafy vegetables, onions, tomatoes, carrots, or fruit (pawpaw or citrus)	100 provided by the school garden
V,VI	Peppers, gumbos, peanut paste, kitchen salt	5 " "
		5 " "

Additionally, we give, in the form of a snack during morning recess period, a glass of skimmed milk and a capsule of vitamin A and D to enable the child to recover some strength and to end the day without being over-tired.

Vegetable and fruit production in the schools is controlled by the School Garden Section which cooperates with the School Lunch Section. This Section advises the schoolteachers and pupils on modern agriculture techniques and recommends varieties of kitchen gardening plants to be grown according to the season. School gardening tasks are performed by the pupils themselves who, in this manner, become farmers and consumers.

### C. Evaluation

The school childrens' lunch programs have apparently produced good results. We have noticed with satisfaction that our children have gained in height and weight, have sensibly improved their health and have obtained very encouraging results in their primary school examinations.

In considering the development of the school lunch programs, we cannot omit mentioning the material and technical assistance provided by FAO, UNICEF, and USAID. Since the creation of the Nutrition Service, these organizations have not ceased to offer us seeds,

kitchen utensils, garden tools, food product commodities, and have especially enabled us to bring variety to our menus diverting now and then, from the monotonous millet meals.

#### IV. MAJOR PROBLEMS

Concerning good nutrition, our big problem is budgetary. Therefore, in spite of frequent unfavorable climatic conditions and in order to resolve problems in regard to good nutrition, our absolute goal is to promote and achieve a rapid increase in agriculture, livestock, industrial and commercial production; an increase which should be ahead of the population growth which is already more than 2.5 percent.

Insufficient means have caused us to abandon the program for small scale chicken and goat raising that we had planned to start in our schools. Three nomad schools of the 138 school lunch facilities accounted for were allocated goats. This undertaking has had the advantage of offering the children the opportunity to consume eggs on one hand, and, on the other hand, to increase milk and meat consumption. But once again, our insufficient means precluded us from pursuing this program which, under the circumstances, necessitates a large expenditure.

## REPORT ON NUTRITION IN NIGERIA

presented by Dr. B. A. Johnson

### I. BACKGROUND

#### A. Geography and Climate

##### 1. Relief

Nigeria is about four times the size of Great Britain and Ireland together. It stretches from the Atlantic Ocean in the south to Niger in the north, near the Sahara Desert. The shortest distance between the sea in the south and the boundary in the north is over 700 miles. The seacoast of Nigeria stretches over 500 miles. The total area of the country exceeds 350,000 square miles.

Nigeria is bounded on the west by Dahomey, on the north by Niger, on the northeast by Lake Chad, on the east by Cameroon, and on the south by the Gulf of Guinea. A belt of mangrove lines the seacoast. North of this is a region of tropical rain forest and oil palm bush some 50-100 miles wide. Farther inland the country rises and vegetation changes to open woodland and savannah. In the extreme north the country is almost a desert. There are few mountains except along the eastern boundary and on the northern plateau where peaks of over 5,000 feet occur. The Niger, Benue, and Cross are the main rivers.

##### 2. Climate

The climate is mainly tropical as Nigeria lies wholly within the tropics. Temperatures are high; those of over 100°F are common in the north, whereas coastal temperatures are seldom over 90°F. Humidity, however, is much higher in the south.

##### 3. Rainfall

Most of the rain falls between April and September in the north and between March and November in the south. Rainfall varies from under 25 in per year to 150 in. During the dry season, the harmattan wind, laden with fine particles of dust, blows from the northeast, bringing cold and dryness to the south.

#### B. Population

The population of Nigeria is increasing daily. In 1953 it totaled 30 million and in 1963 it was 55 million. If these

census figures were accurate it means that there was an 83 percent increase in population within 10 years, or an 8.3 percent increase annually.

The 1963 population figures and density of population in the various geographical units of Nigeria were as follows:

<u>Region</u>	<u>Population 1963</u>	<u>Area</u>	<u>Persons per sq mile</u>
Northern	29,808,659	281,782	106
Eastern	12,394,462	29,484	420
Western	10,265,486	30,454	337
Mid-Western	2,535,839	14,922	170
Lagos	655,246	27	24,639
<hr/>			
Nigeria	55,659,692	356,669	156

Lagos, the Federal Capital, is the most thickly populated region. It has an area of 27 sq mi and a density of 24,639 persons per mile.

The 1953 age distribution population figures were as follows:

<u>Age Groups</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
Under 2	1,629,000	1,674,000	3,303,000
2 - 6	2,678,000	2,599,000	5,277,000
7 - 14	2,587,000	2,193,000	4,780,000
15 - 49	6,704,000	7,635,000	14,339,000
50+	1,120,000	1,316,000	2,436,000

From the figures, the population within each functional age group, that is 0-14 years (preschool and school children) and 15 years and over (working class), is as follows:

<u>Age-groups</u>	<u>Number</u>	<u>Percentage of total population</u>
0 - 14	13,360,000	44.3
15+	16,775,000	55.7

According to the 1953 census about 11 percent of the population was under 2 years of age, 17 percent was 2-6 years old, 15 percent was 7-14 years old, 47 percent was 15-49 years old, and about 8 percent was over 50 years of age. Not less than 50 percent of the population is in the working age group.

### C. Government Agriculture Policies

Agriculture is undoubtedly the basic strength of the Nigerian economy. Paradoxically, it is also an area of real weakness and lack of development which may retard the march toward industrialization. Since agriculture contributes over 60 percent of the gross domestic product (GDP) and it is the main foreign exchange earner, the Federal Government realizes that there is ample room for its development in relation to its potential, especially in such areas as livestock and mechanized farming. Unfortunately, this is an area which hardly attracts foreign capital. Hence the Federal Government is being forced to fall back on already slender resources or to cut back on worthwhile programs.

The fact that primary commodity prices have generally remained low in the world market has been a major retarding factor in the process of economic development of the primary producing countries. It is regrettable that there is still no sign that the industrialized countries are prepared to take any positive steps to assist primary producers to obtain more satisfactory prices for their exports. Better prices for Nigerian export commodities will reduce her dependence on foreign aid for industrial growth. Recognizing this, the Government has spared no effort in negotiating for concessions with the European Economic Community, and in participating with individual countries on a bilateral basis. All this is directed toward expanding Nigeria's export markets and enhancing her terms of trade.

There are experimental farms, owned by the Government, where modern methods and tools are used. One such farm is at Agege, on the outskirts of Lagos. The Federal Government is doing everything possible to improve agriculture, and it is one of the priorities in the six year Development Plan (1962-68).

Nigeria is rich in agricultural resources. A wide variety of food crops is cultivated. The food crops include rice (Oryza sativa) yams, beans, maize (Zea mays), cassava (Manihot utilisima), oranges (Citrus orantium), grapefruits, bananas, pineapples, vegetables, and so forth. The cash crops include groundnuts (Arachis hypogea), cotton, cocoa, palm produce and rubber. There is also abundant timber.

## II. FOOD RESOURCES

### A. Means of Production

About 70 percent of the entire population works on the land. Farmers employ indigenous farming tools and the shifting cultivation system, as there is plenty of farming land.

The modern methods of land improvement are not known to many farmers, and the use of modern machinery is far beyond their means. However, some farmers do receive fertilizers and insecticides from the various Ministries of Agriculture. Some also receive loans or grants for improving their farming methods and yields.

### B. Principal Food Crops

The principal food crops of an area determine the traditional staple diets of the area and depend on climatic conditions, soil and annual rainfall. Among the principal food crops grown in Nigeria are the following:

#### 1. Cereals

The two most widely grown grain crops are guinea corn and millet (sorghum). In the 1950-51 season about 4 million acres of land were planted, giving a yield of about 2 million tons of grain. About 98 percent of the guinea corn is produced in the north, principally in Kano Province. Millet grains are grown largely in the northern states and have a higher protein level than other cereal grains.

Maize is the predominant cereal crop of the south and is the third most widely cultivated cereal crop in Nigeria. In 1950-51 about 2 million acres of land were planted with maize which produced a crop of about 744,000 tons. It is a dietary staple of the southerners.

Rice cultivation on a very large scale commenced only during World War II. The provinces of Niger and Sokoto in the north, Benue, Bauchi and Ilorin in the middle belt, Ogoja in the east, and Abeokuta and Ijebu in the west are the main producing areas.

Nigerian wheat is produced in the plateau area of Jos. It is cultivated only on small pieces of land.

## 2. Roots and tubers

Yams, cassava, cocoyams, sweet potatoes and potatoes are grown. Roots and tubers play an enormous role in supplying carbohydrate for human consumption in the humid tropics where cereal grains often deteriorate. Yam is a staple tuber crop of the people of the middle belt of Nigeria, while cassava and yam are staple tuber crops of the people of southern Nigeria. Cocoyams are of minor importance and sweet potatoes have never achieved significance.

Yams give a yield of about 3 tons per acre, whereas cassava gives just 2.5 tons per acre, but the latter is a modest plant in its environmental requirements and grows even in the poorest soil. It can remain for a year or more in the soil without any deterioration.

## 3. Legumes

Cowpeas, lima beans, locust beans, pigeon peas and soybeans are cultivated in Nigeria. Groundnuts, also known as peanuts and monkey nuts, are the seeds of a leguminous plant which grow in large quantities in the north. Beans are grown in the middle belt. In 1950-51 an area of 1,331,000 acres was cultivated for cowpeas with a production of 237,000 tons.

## 4. Fruits, nuts and vegetables

Fruit includes citrus (e.g. oranges, grapefruits, lemons, tangerines and limes), mangoes, avocado pears, bananas pawpaw, pineapples, and guava. Different species of green vegetables are grown for consumption. Nuts include coconuts, cashew nuts, and kolanuts.

## C. Livestock, Poultry, and Dairy Products

The Republic has at least 10.6 million head of cattle, 4 million sheep, 21 million goats and 500,000 pigs. The poultry industry is producing eggs and table chickens for local consumption to offset imports. The cattle industry provides the raw materials for the meat canning factories and tanneries in the country.

About 1 million head of cattle and 6 million sheep and goats are slaughtered annually. Poultry keeping is practiced on a large scale throughout the southern areas. The Western State Ministry of Agriculture has a large poultry farm at Agege and small poultry

farmers are encouraged. Dairy products in the form of pasteurized milk, butter, and sour milk are in production in the northern region.

#### D. Fish

Fishing industries are being carried out along the coastal areas and along the banks of large rivers (the Niger, the Benue, and the Cross) and Lake Chad. Big fishing trawlers are used in the south. These trawlers contain refrigerators and fish are refrigerated and sold as iced fish. The Federal Government is interested in establishing a fishing industry in the Lagos area. The number of fish farming ponds is growing.

#### E. Food Industries

Food industries in Nigeria are still few and in the process of development. The oldest indigenous food industry is Lisabi Mill which was established in the middle 1930's. Lisabi Mill produces canned cooked food, canned fruits, cereal foods, canned yam flour, canned corn flour, beans, groundnuts and various vegetables. It also produces Pawa, a mixture of Nigerian wheat, maize, and guinea corn. The sugar industry is established near Jebba.

There are foreign firms engaged in food industries. Nestle produces many products. West African Cold Storage is engaged in the chilled meat industry. In Vom there is a butter industry and the byproduct, which is skim-milk powder, is mixed with groundnut flour to produce Arlac.

Margarine is being produced at Apapa by U.A.C. The Federal Institute of Industrial Research at Oshodi near Lagos carries out production of many high protein foods.

### III. DIETS

#### A. Levels of Nutrition

Nigeria has a heterogeneous population and, consequently, varied food habits, food patterns, methods of food preparation and levels of food consumption. In the north, the main diets constitute rice, guinea corn, and millets, meat, and dried fish. Fresh cow's milk is also consumed by many people as well as sour milk known as mono.

In the middle belt area, people tend to consume more tubers than grains, whereas in the west, where the main tubers are yams and cassava, this tendency is greater still. Grains such as rice, maize and beans are also eaten in large quantities, as well as fresh fish and meat. Dietary patterns in Lagos and the midwest are closely similar to those in the West.

In the east, plenty of fresh fish is eaten, especially in towns on the Niger Delta. Cassava and yam are main foods. Grains such as rice and maize are consumed to some extent.

On the whole, dietary habits in the various geographical units of Nigeria depend largely on the type of food produced in the area. In the south (i.e. Western Region, Lagos, Mid-Western Region, and Eastern Region) where palm trees abound, red palm oil forms a major source of vitamin A and carotene in the diets. In the Northern Region, where palm trees are virtually absent and the vegetation is mainly open woodland and grassland, vitamin A deficiency is not uncommon. In the southern region, where there are trees and fruits of various kinds, particularly oranges and green vegetables, vitamin C deficiency or scurvy is rare. Generally, protein deficiency is common throughout the country, either due to poverty or due to ignorance of foods with protein contents.

#### B. Child Feeding Programs

In Nigeria the infant mortality rate is still high. In Lagos, where the figure is about the lowest, it is 46 per 1,000 live births. Furthermore, large numbers of preschool children die every year from symptoms of malnutrition. Even a large proportion of the school age children suffer from both qualitative and quantitative dietary defects.

In order to correct these defects as far as practicable, child feeding programs are being carried out through supplementary feeding of school and preschool children with foods to supply nutrients which are lacking in major diets, i.e. protein and vitamins. Free dried milk, as well as other forms of food, is distributed by the Catholic Relief Services. Children and mothers are given protein rich foods like "Arlac," and taught how to use them. The mothers are taught best methods of food preparation by Nutrition Officers so as to preserve the nutrients and therefore derive full benefits from the foods. The Federal Ministry of Education has embarked on provision of mid-day meals for school children in a number of primary schools in Lagos to meet at least one-third of their daily requirements in calories and protein.

#### IV. NUTRITION EDUCATION PROGRAMS

Nutrition education programs in Nigeria consist of Nutrition Training and Nutrition Health Education.

##### A. University Level

The Nutrition Training Program includes Health Education at the university level. At Ibadan University a diploma course on Food Science and Applied Nutrition has been initiated. It is an 8-month, multidisciplinary course involving the departments of Biochemistry, Agriculture, Chemical Pathology, Medicine, Pediatrics, Education and Social Study. It used to be under the joint guidance of the Universities of London and Ibadan. It is still sponsored by UNICEF. About 24 fellows from various parts of Africa are taking part in the course this year.

At the University of Nigeria, Nsukka, a Home Economics degree with a major in Nutrition is being given.

##### B. Vocational Level

At this level departmental in-service training in nutrition is given in the Ministry of Agriculture in the Western State of Nigeria for the Agricultural Extension Scheme workers who teach the farmers and their families basic principles of nutrition and agriculture. In-service training in nutrition is given in the Federal Ministry of Health to nurses, midwives, community nurses and health workers who work at Health Centers and in close contact with the masses.

##### C. Lay Level

Nutrition health education is given to voluntary organizations and girls clubs in their areas in Lagos. Mothers are also given lessons in food demonstration classes and in 1967 about 1,500 mothers were reached.

#### V. MAJOR PROBLEMS INHIBITING PROGRAMS TO COMBAT MALNUTRITION

In a developing country where the emphasis on malnutrition is mild or severe undernutrition as opposed to overnutrition in the developed countries, one should have a quick bird's eye view of the major causes of malnutrition in order to appreciate the major problems inhibiting programs to combat it. Foremost among these causes of malnutrition are the following:

A. Poverty - primary or secondary. Many of the lower classes live below the subsistence level with low purchasing power.

B. Inadequate food production due to poor soil fertility in some parts, poor irrigation in the savannah areas, poor application of fertilizers by the farmers, attacks of the insects and pests on both humans and cattle, more emphasis on cash crops than on food crops of good quality, the migration of young men and women of working age from the rural areas to the urban centers in search of jobs and better living standards.

C. Poor storage and preservation facilities leading to great losses of food crops in the fields, markets and homes.

D. Inadequate food intake by individuals due to market price fluctuations, seasonal food production, and extended families.

E. Wrong choice of food, e.g. stomach-filling energy food in the form of starch is often preferred to a good quality protein food because the former satisfies hunger and is less expensive. Weaning of children on starchy gruels is a major cause of kwashiorkor.

F. Wrong preparation of food. This is a major cause of malnutrition in many parts of Nigeria. Most of the water-soluble vitamins, particularly thiamine and ascorbic acid, are lost through soaking and washing in large quantities of water. Many families prefer fried stew which has been heated to 120°C or more because it keeps longer and can be reheated three or four times. Most of the nutrients in the stew have been destroyed by over-heating. Most of the water-soluble vitamins are heat labile and even the heat stable vitamins will be easily destroyed. The protein of the meat will also become denatured and there is considerable evidence to show that denatured protein will never promote growth or support life.

G. Uneven distribution of food in the family when children are not given their adequate shares of family food. Other problems are taboos, prejudices, and ignorance.

## VI. PLANS AND HOPES FOR THE FUTURE

All the governments of the Republic of Nigeria fully realize the importance of agriculture, food production and preservation as a means of providing subsistence for the ever-increasing population. Therefore, these governments plan to boost agriculture

and food production by sponsoring research and giving aid and encouragement to farmers and other food producers as far as possible. Plans are in progress for establishing an Institute of Nutrition in Lagos within the next few years in order to provide training in Nutrition and Health Education to personnel from various parts of the country. The Federal Nutrition Service, an arm of the Federal Ministry of Health, hopes to expand its services beyond its present sphere. Thus it is envisaged that within the next decade an appreciable proportion of the population will have had considerable training on food values and dietary needs of the family (and the rudiments of sanitation) with a view to reducing cases of malnutrition.

It is also hoped that within the next decade, mechanized farming will have found a firm grip on the country's agricultural life, and food industries will have expanded, with emphasis on production of foods which supply high protein and vitamins--the main food elements lacking in most family diets, which causes the main symptoms of malnutrition. Thus, with the passage of time, the way will have been fully paved for a healthy and wealthy generation.

## REPORT ON NUTRITION IN SENEGAL

presented by Dr. Thianar N'Doye

### I. BACKGROUND INFORMATION

Senegal, with an area of 210,000 km<sup>2</sup>, has a population of 3,487,000, of which 47,000 are nonnatives. One-third of the population is under 15 years of age, and it shows a 2.5 percent growth rate. The total growth rate for the capital city is 6 percent.

Since 1946, we have made progress in understanding our nutritional situation because of numerous monographs and statistical surveys made at the zone, regional, and national levels, and which we continue to make.

### II. FOOD RESOURCES

Since we have no accurate balance sheet for available food products, we can only give you certain essential data on production and imports.

#### A. Food Crops

<u>Crops</u>	<u>Production</u> <u>1966/67</u>	<u>Imports</u> <u>1965/66</u>	<u>Imports</u> <u>1967</u> <u>1st Quarter</u>	<u>Objectives</u> <u>1969/1970</u>
		( T O N S )		
Cereals				
Millet	977,500	22,000		600,000
Rice	125,416	179,220	11,851	132,500
Corn	16,614		8,432	50,000
Legumes				
Beans, <u>Niébé</u> ( <u>Vigna sinensis</u> )	31,932			35,000
Peanuts	1,978,981			1,275,000
Fresh vegetables	66,831	9,044	3,692	50,000
Vegetable Oils				
Palm oil		101	48	
Fruits		13,972	6,300	
Sugar		66,041	94,897	

## B. Livestock and Dairy Products

Estimates of tonnage slaughtered, and of fresh milk produced. The milk import figures are for various types of products: fresh, powdered, condensed, and concentrated.

	<u>Production (tons)</u>		<u>Imports (tons)</u>	
	<u>1965</u>	<u>1966</u>	<u>1965</u>	<u>1966</u>
<u>Meat</u>				
Beef and veal	23,258	25,935)	246	221
Sheep and lamb	5,616	6,006)		
Pork	950	1,027	58	95
Poultry	3,000	4,000	46	65
<u>Milk</u>	84,000	90,000	8,800	10,000
<u>Eggs</u>	3,000	3,500	--	--

## C. Fish

	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>
Local	81,573	82,524	86,638	96,713
Commercial	16,340	16,571	14,305	19,265
Total	97,913	99,095	100,943	115,978

Note, in particular, the steady growth in local fishing.

## III. DIET

Consumption rates for production and imports are as follows:

Total Calories	2,500
Total protein	67 g 70
Animal protein	18 g 30
Lipids	52 g 60
Calcium	462 mg
Iron	15 mg
Vitamin A	6290 (IU)
Vitamin B <sub>1</sub>	1 mg 50
Vitamin B <sub>2</sub>	0 mg 58
Niacin	8 mg
Vitamin C	41 mg

When compared with the theoretical needs of the average Senegalese, these rates reflect only a slight calcium deficiency, about a 50 percent deficiency in vitamin B<sub>2</sub> and PP, and about a 25 percent deficiency in vitamin C. Only the total protein/animal protein ratio of 3.1 is large enough to cause concern. These figures show that Senegal does not suffer from overall quantitative hunger, but rather from a specific, well-known, and deplorable lack of animal protein.

In addition to the marked deficiencies caused by a seasonal drop in production, or the cyclical hazards of drought and the well-known deficiencies observed in vulnerable groups such as children, pregnant women and nursing infants, it is appropriate to point out the food inequalities included in the reported consumption rates. In Senegal, there can be said to be a certain typology which has emerged, and is related to, the degree to which the population's social and economic levels have evolved. Carbohydrates dominate the rural diet and represent 75 percent of the total caloric intake. The diet in the semi-rural areas, in our small country towns, causes us the least concern, while that of the para-city dweller is characterized by a progressive increase in lipids, which comprise 35 to 40 percent of the total caloric intake. The diet of the long-established city dweller is bound to cause balance problems. Purchasing power does not make consumption, it contributes to it. The low income bracket makes the most sacrifices to buy food.

This fact leads to feeding and consumption trends. Characteristic of Senegal are trends such as: the decline in millet consumption in favor of rice; the increase in fat consumption, supported by a preference for fats; however wrong, the increasing success of products in demand because of their stimulative effect, like coffee, tea, cola, and alcohol (Coca-Cola could be the ruin of some of our States). The decline in consumption of oils and unprocessed butter is linked with producers' efforts in favor of clear, commercial lipids. However, we are pleased with the recent trend toward fresh vegetables, compatible with the increased promotion of market-gardening.

Let us not forget to mention taboos. They are no longer a major obstacle in Senegal, since they are often largely offset by compensatory habits when one moves from one region to another. Besides, they are based more often than we think on reasons of hygiene, precognition, even prescience.

The clinical nutrition data which follow are the result of many extensive cross-sectional surveys, and corroborate quite well the results of food consumption studies conducted at the same time,

even if it appears a priori that the African feels better than he eats. Sound proof of this relationship is furnished to us by other clinical data based on longitudinal surveys in depth, guided by observation of eating trends. Thus, we register a serious 3 percent kwashiorkor rate, a 25 percent pre-kwashiorkor rate, and an overall 30 percent mortality before age 1, increasing with age, and peaking at 2 years.

We are just as concerned with weaning foods. It seems to us that endemic vitamin deficiencies cannot persist. However, anemias, a disturbing incidence of obesity, cardiovascular diseases, and diabetes with no relation to the food trends observed in urban areas, attract more and more of our attention and efforts. If we cannot go it alone then we will certainly rely on Professor May and on his great country's experience, whose concerns in this field we are beginning to share.

To meet this situation, we have at our means available from ORANA, the Institute of Social Pediatrics of the School of Medicine, the Institute of Food Technology, the School Food Service, the Office of Food and Applied Nutrition, an infrastructure of seven primary and 80 secondary P.M.I. centers supported by a growing network operated by the Rural and Urban and Expansion Services. In 1960, our activities affected barely 25 percent of our children under age 14, compared with over 75 percent today.

Our institutions concerned with matters in line with our efforts are so well-known that we need only mention them here: the Commercialization Office, the Development and Price Stabilization Funds, the Granary Provision Cooperative, Promotion of Food Industries, medium and long-range, crop diversification, mechanization of agriculture, soil enrichment, etc. So far as fluctuations and declines in exchange rates are concerned, at one time in Senegal a quintal of peanuts could be exchanged for a quintal of rice, then for one-half quintal, then one-third. It is undoubtedly the same with coffee, cocoa, and palm oil exchanged for foods other than rice. This situation prevents us from making projections and studies of flexible constants other than by undertaking to train future organizers without further delay.

#### IV. NUTRITION EDUCATION PROGRAMS

Since 1964, and within the framework of a project aided by the World Health Organization, we have annually allocated nearly 200 hours of classes for approximately 500 students at the School of Medicine, the State Teachers' College for midwives, the Institute of Social Pediatrics, the School for Social Assistants, the National

School of Applied Economics, the Centers for Teacher Training, the State School for Men and Women Nurses, the School for Sanitation Workers, and the School for Rural Cadres. Another teaching project, aided by the International Labor Organization, ensures the training of rural principals and advisers, from whom we are already starting to receive excellent results.

Finally, thanks to UNESCO, we have been experimenting with Television in Public Information and Education for two years. It is part of an overall assistance program for which Senegal is indebted to, among other agencies, the FAO, WHO, UNICEF, Centre International de l'Enfance, United Nations Special Fund (which sponsors our Institute of Food Technology), as well as USAID.

In conclusion, we would like to submit for your consideration a project which we call "Preschool Feeding in Rural Communities" concerning our youth, half of whom die before school age, and for whom we have never done enough in Africa.

This then is what Senegal's delegation would like to bring to your attention.

## REPORT ON NUTRITION IN SIERRA LEONE

presented by Dr. Evelyn Cummings

### I. BACKGROUND

#### A. Geography and Climate

##### 1. Relief

Sierra Leone lies on the West Coast of Africa and is bounded on the northwest and the northeast by the Republic of Guinea, on the southeast by Liberia and on the southwest by the Atlantic Ocean. The coastline, which extends from the boundary with Guinea to that with Liberia, is about 212 mi long. Sierra Leone has an area of 27,854 sq mi.

The country may be divided into two regions, fairly equal in size, by a line running from north/northwest to south/southeast. North and east of this line the country consists of a series of plateaus broken by hills and mountains which reach altitudes of 6,000 ft on the northeastern border. With the exception of the largely mountainous peninsula, the southern and western parts of the country are flat and low-lying, covered with dense mangrove swamps and intersected by estuaries and bays.

Sierra Leone is divided into four administrative provinces, namely the Western, Southern, Eastern and Northern. The Northern Province is the largest and covers almost one-half of the country. The capital city is Freetown.

##### 2. Climate

The climate is tropical with heavy rainfall and high atmospheric humidity during the greater part of the year. There are two distinct seasons: the dry season, lasting from November to April, and a single rainy season, lasting from May to October with a peak in July and August. Violent thunderstorms and tornadoes are frequently experienced at the beginning and end of the rains. During the rainless season, the dry, dust-laden northeast harmattan wind blows intermittently. The dry season is particularly intense in the northern and eastern areas because of this wind from the Sahara.

The temperature in Freetown fluctuates between a maximum of from 85° to 87°F and a minimum of about 75°F. The daily range is

somewhat greater in the interior and the largest daily variation is experienced during the harmattan season.

The average monthly rainfall in Freetown is about 40 in. It decreases inland and may be as low as 16 in in certain areas. The highest mean figures are observed in July on the coast and in August inland. During the rainy season the humidity reaches 90-95 percent in the coastal areas.

### 3. Water resources

As regards water resources, six main rivers (Great Scarries, Little Scarries, Rokel, Jong, Sewa and Moa) and their tributaries traverse the country in a general northeast/southwest direction.

#### B. Population Profile

The population of Sierra Leone is composed of indigenous Africans, non-native Africans, commonly called "Creoles," Asiatics, and Europeans. The indigenous Africans are divided into some 15 to 20 tribes, each with its own language or dialect.

The last population census was completed in April, 1963 and the figure for the size of the total population was given as 2,180,355 and that for the capital, Freetown, was 127,917. The population shown in the census report of 1921 was 1,540,554, of 1931 was 1,768,480, and of 1948 was 1,858,275. The annual growth rate has been assumed to be 1.5 percent for the whole country.

The age and sex distribution of the total population (1963) is given in Table I which, with other tables, is at the end of this report. Eighty-five percent of the total population was under 50 years of age.

The geographical distribution of the population is given in Table II. About 45 percent of the total population lives in the Northern Province.

The occupational distribution of the population shows that farmers, fishermen, and related workers constitute 77 percent of the working population (see Table III). The income distribution, which is available only for the Western Province, indicates that 85 percent of the rural population belongs to the low income group (Table IV).

## C. Government Agricultural Policies

### 1. Price supports

The Sierra Leone Produce Marketing Board, which buys and subsequently exports agricultural products from the country, maintains a price stabilization fund which safeguards the price paid to the farmers for their commodities, irrespective of fluctuations in world prices.

### 2. Tariffs

A few products may benefit from protective tariffs but this is not a widespread policy.

### 3. Land reform

Except in the Western Province, land in Sierra Leone is not individually owned. Title to land is implicitly vested in the community as a whole through the paramount chief or certain large family groups acting as custodians. These groups or their members may allow others to occupy and use the land under their control.

Right to use the land may be obtained without cost or by payment of a token fee, by payment of a fairly large fee or through pledging or leasing. Pledging is a form of pawning under which a landholder surrenders his right to the use of his land to someone (the pledgee) from whom he has received money or credit or other goods, with the understanding that such a right will be restored on repayment of the debt. The land thus serves as a security to the pledgee that the loan will be repaid by the pledger (the landholder).

Leasing is a means by which those who are not members of the community may obtain the use of land for various purposes by payment of rent.

Special rights are vested in individuals who plant economic tree crops or erect structures. They are considered to be owners of the trees or structures as long as they do not dispose of them, irrespective of whether or not they hold the land on which they stand.

Over 90 percent of all holdings were operated under chieftancy and family tenure (communally owned) involving no (or only token) payment. Family tenure accounted for nearly 80 percent of all holdings.

#### 4. Agricultural credit

Loans for agriculture are available to farmers through the Agricultural Loan Scheme and Co-operative Societies. The former is operated by the Agriculture Department and gives loans for the purchase of seeds and equipment. The marketing co-operatives give loans to enable their members to buy produce, build stores and purchase tractors and other farm equipment.

#### 5. Crop protection and storage

The Department of Agriculture has a Pest Control Section with operators trained in the use of insecticides and methods of destroying rodents and so forth. Monkey drives are held periodically to reduce the monkey population in the area.

The storage facilities in general use include the houses, huts, and so forth, in the villages where the people live. Cribs (mats and baskets), pots, bags, drums and wooden bins are used as containers for products kept within 'stores' and farm houses (Table V).

#### D. Foreign Aid Relevant to Food Production and Nutrition

Sierra Leone has benefited from the United States Government's PL 480 program whereby the United States has sent surplus agricultural products to Sierra Leone since 1965. The proceeds realized from the local sale of these products have been retained in the country and regarded as a soft loan from the United States to be used for specified purposes. WHO, FAO, and UNICEF assistance has also been received.

The setting up of Njala University College with an agricultural bias is a joint United States-Sierra Leone venture. A Department of Home Economics is attached to the College and emphasis is placed on food production and nutrition.

There are also Rural Training Institutes in the Eastern and Northern Provinces which have been opened and are being operated with the help of the United States of America. There are also two farm schools in the Southern Province.

CARE and the Catholic Relief Services make a valuable contribution to nutrition.

## II. FOOD RESOURCES

### A. Means of Production

The type and number of farm implements and machinery used is reflected in Table VI. Table VII, giving the type of power used on holdings, may also be useful. Practically all mechanical cultivation by wheel tractors was done by the Department of Agriculture or Co-operative Societies. These agencies plow and harrow fields at a set fee per acre. Thus the number of holders reporting the use of mechanically powered implements generally refers to holders employing the service of these agencies for cultivation of their land. Tools such as hoes, cutlasses (machetes) and knives were the most widely used and these items were normally owned by all holders. Over 98 percent of the holders reported human power as the sole source of power used on their holdings.

Sierra Leone farmers make very little use of either commercial (inorganic) fertilizers or organic manures from animal and vegetable substance. Most of the fertilizer reported was applied to tobacco with the assistance of a tobacco manufacturing company (Table VIII).

### B. Principal Food Crops

A considerable diversification of crop production is practiced by individual farm operators in all regions of the country. The cultivation of approximately 70 different crops was reported in a survey held in 1965/66 and almost one-third of all holders grew 15 or more crops. Only about 5 percent grew only one crop. Rice, cassava, okra, corn, and bananas were important crops grown in all areas of the country. Cocoa, coffee, ginger, tobacco, millet, and piassava were important only in certain areas. About 61 percent of the holders reported selling crops with a total value of 5,380,700 leones. (Le1 = 10 s Sterling).

Below is given the acreage, yield, and production of paddy rice and groundnuts:

<u>Crop</u>	<u>Total acres</u> (000)	<u>Acreage yield</u> per acre (lbs)	<u>Total</u> <u>Production</u> (tons 000)
Upland Paddy Rice	591.0	1008	265.4
Swampland Paddy Rice	152.2	1891	128.2
Groundnuts (unshelled)	49.7	979	2.10

### C. Livestock, Poultry and Dairy Products

Only about 9 percent of all small holders sold livestock, livestock products, poultry, poultry products, and related products as compared with approximately 60 percent selling crops. The survey did not, however, include people keeping only cattle and having no other agricultural operations. Livestock included cattle, goats, sheep and pigs.

### D. Fish

Fish production covers a wide range, from the individual fisherman through fishing co-operatives to large fish industries involving deep-sea fishing for tuna by French, Japanese and Korean trawling companies. Fish is supplied to many parts of the interior either dried or frozen.

### E. Food Industries

The Department of Social Services prepares a Baby Food known as the "Benniseed Mix" and mothers are taught how to use it. This food is a mixture of benniseed, parboiled rice, ground-nuts, palm oil, and powdered fish. The only reason it is not widely known and used is because it involves a tedious preparation. In order to encourage use of this important baby food, the Department of Social Services has established, with the assistance of FAO/FFHC funds, a small production unit in Bo, in the Southern Province.

## III. CHILD FEEDING PROGRAMS

### A. Types

#### 1. Under Five's Clinics

At the Under Five's Clinics mothers are advised to breast feed their babies up to the age of 6 months then begin mixed feeding with rice pap (parboiled) and milk. They are told to include the following food groups in baby's diet:

- a. Body building foods - protein (animal or vegetable). The child must be given one of these three times a day: bonga (fish), chicken, eggs, meat, ground-nuts, egusi, beans or milk.
- b. Protective foods - one of the following should be given three times a day: cassava leaves, spinach, potato leaves, oranges, mangoes, pawpaw, pineapple, tomatoes, palm oil, and palm fruit.

- c. Energy foods - these foods should never be given alone but always with body building foods. They include rice, bread, cassava, corn, banana, plantains.

2. Preschool feeding program

Catholic Relief Services operates 4 mobile health units for food distribution and demonstrations. In 1962, CARE established a program to assist with school lunches in Sierra Leone. At present over 200 schools benefit.

- B. Number of Children Reached

1. At the Under Five's Clinics:

1964 - 64,435  
1965 - 68,026  
1966 - 92,454  
1967 - 94,256

2. In the preschool feeding programs

Each Catholic Relief Services mobile unit reaches about 2,500 children per month.

In the CARE School Lunch Programs over 35,000 children benefit per year.

- C. Kind of Supplement Given

1. UNICEF gives dried skimmed milk.
2. Catholic Relief Services and CARE give milk, corn meal, cooking oil, and so forth.

- D. Major Problems

1. Reaching the smaller villages in the provinces.
2. Educating mothers to use the local foodstuffs and prepare food in a hygienic manner.
3. Counteracting high pressure baby food advertising so that mothers are not misled.
4. Providing mass immunization schemes against measles, whooping cough, tuberculosis, and smallpox.
5. Providing good water supply and better sanitation.
6. Giving instructions on how to grow more food.

#### IV. NUTRITION EDUCATION PROGRAMS

##### A. Domestic Science

1. Nutrition, Child Care and Health Education form part of the program for girls' secondary schools, women's teacher training colleges, and for girls in the upper classes in primary schools. These senior girls attend Nutrition and Child Care Sessions at a Domestic Science Center situated in Freetown in the Western Province.

2. On a pilot scheme basis, the Department of Education employs a number of visiting teachers whose duties are to visit schools in the urban areas of the Western Province, to carry out Nutrition and Child Care Programs.

3. In-service courses in nutrition are organized periodically by the Organizers of Domestic Science; but because of the lack of accommodations, staff, and equipment, there has been very little follow up.

##### B. Practical Nutrition

With the help of the CARE feeding programs, practical nutrition is introduced in schools. The preparation of school meals is supervised daily by the Provincial Organizer of Domestic Science. From time to time, on-the-spot demonstrations of the preparation of nutritious school meals are given to teachers and school cooks by the CARE nutritionist. At the district level, such demonstrations are given by the Provincial Organizer of Domestic Science.

##### C. Voluntary Leaders Training Course for Home Development Programs

These are sponsored by the Department of Social Services and supported by FAO and UNICEF. The courses are held in 10 Centers throughout the country from May to July. Each course lasts 2 weeks.

The purpose of this course is to train leaders of both sexes to work with staff of the Department of Social Services and Local Government bodies (District Council) in order to extend the knowledge of improved child care and nutrition.

The course stresses the importance of a balanced diet for the growth of the child. Lectures include the different food groups and the causes of kwashiorkor and marasmus in the young child. Village Maternity Assistants often participate in these courses. Lectures are delivered by doctors, nursing sisters or midwives. The aim is to minimize mistrust and fear of hospitals among the villagers. Hospital staff in this case meet the women as friends. Lectures are supported by films and posters.

Sometimes, mothers of children suffering from kwashiorkor and mild marasmus are given the opportunity to prepare foods for their children each morning, under the supervision of a worker. They are shown how to make use of local foods such as beans, palm oil, green leafy vegetables, nuts, rice, and fish.

#### V. MAJOR PROBLEMS INHIBITING PROGRAMS TO COMBAT MALNUTRITION

A. In the Maternal and Child Health Field: ignorance, poverty, and disease.

B. In the Domestic Science Field:

1. There is an acute shortage of qualified domestic science personnel to help expand and improve nutrition and child feeding programs in education.
2. The very grave lack of facilities makes it impossible for this all important subject to be taught in individual schools.
3. The importance of nutrition has not been widely propagated.
4. There is a lack of the knowledge of the use of local foodstuffs.
5. There are not enough books on nutrition.

#### VI. PLANS AND HOPES FOR THE FUTURE

A. National Council for Health Education

The Government is in the process of setting up a National Council for Health Education and Nutrition on which all bodies with special responsibility for and interest in nutrition in all its aspects will be represented. Its terms of reference will be as follows:

1. To coordinate the work of health education and nutrition at both governmental and non-governmental levels with the current public health policies of the Department of Health.

2. To study and supervise the content of health education and nutrition programs. To examine and approve any audio-visual aids or literature to be used in the programs. To initiate design, advise on production of such media and materials for use in Sierra Leone and to issue those materials.

3. To initiate, where necessary, and organize health education and to collaborate with the Nutrition Unit of Njala University College in nutrition research.

4. To advise on and arrange for the training of personnel in the field of health education and nutrition.

5. To advise agencies engaged in the field of public health in the rural areas other than those controlled by the Department of Health, on the public health aspect of community development programs.

6. To make recommendations for the initiation of programs, review the progress of such programs, and report on them.

B. Nutrition Unit at Njala University

A Nutrition Unit is to be set up at Njala University College (to which reference has already been made) with the assistance of FAO.

C. District Domestic Science Centers

The Government is also making plans for setting up District Domestic Science Centers for primary schools throughout the country, where all Domestic Science subjects, including Child Care and Nutrition, will be taught. These Centers can also be utilized by women's organizations. It is hoped that if Agriculture or Rural Science becomes an integral part of all school syllabuses, the teaching of Nutrition will be more readily accepted. Life will be made easier when immediate necessities can be obtained cheaply. The Rural Training Institutes and Farm Schools will play an important role in this regard.

D. Suggestions for the Future

1. A West African Audio-Visual Center should be established where nutrition and child feeding charts, film strips, and work cards could be produced for use in schools and colleges.

2. A graded Nutrition Certificate Course should be introduced throughout schools in West Africa. This Certificate should be made a qualification for entering a girls secondary school, a women's teachers college, or a catering establishment.

3. A nutrition "Flag Day" could be introduced and the proceeds allocated to nutrition projects.

4. More scholarships should be awarded to school graduates and other interested persons for training in nutrition.

5. Nutrition Centers should be set up in each District Headquarters town.

6. There should be a closer link between vocational and non-vocational programs.

7. Agriculture should be given a high priority in all national development programs so that more food can be produced.

TABLE I

SIERRA LEONE - POPULATION BY AGE AND SEX - 1963

Area and Age	Total	Male	Female
<u>Years</u>			
Under 5	377,335	187,317	190,018
5 to 9	280,649	145,589	135,060
10 to 14	142,420	76,009	66,411
15 to 19	194,378	82,867	111,511
20 to 24	190,784	75,528	115,256
25 to 29	207,753	93,550	114,203
30 to 34	172,183	81,772	90,411
35 to 39	136,384	72,455	63,929
40 to 44	114,758	62,981	51,777
45 to 49	85,531	49,905	35,626
50 to 54	69,957	39,687	30,270
55 to 59	41,760	24,158	17,602
60 to 64	55,954	30,136	25,818
65 years and over	110,509	59,169	51,340
All ages	2,180,355	1,081,123	1,099,232

TABLE II

## SIERRA LEONE - TOTAL POPULATION AND PERCENTAGE DISTRIBUTION BY SEX - 1963

Area	Total		Male		Female	
	Number	Percent	Number	Percent	Number	Percent
Southern Province	542,187	24.9	266,953	24.7	275,234	25.0
<u>District</u>						
Bo	209,754	9.6	106,847	9.9	102,907	9.4
Bonthe	73,245	3.4	35,513	3.3	37,732	3.4
Moyamba	167,425	7.7	81,187	7.5	86,238	7.8
Pujehun	84,869	3.9	39,925	3.7	44,917	4.1
Sherbro Urban	6,894	.3	3,454	.3	3,440	.3
Eastern Province	545,579	25.0	283,789	26.2	261,790	23.8
Kailahun	150,236	6.9	70,026	6.5	80,210	7.3
Kenema	227,428	10.4	122,845	11.4	104,583	9.5
Kono	167,915	7.7	90,918	8.4	76,997	7.0
Northern Province	897,566	41.2	427,598	39.6	469,968	42.8
Bomabli	198,776	9.1	91,470	8.5	107,306	9.8
Kambia	137,806	6.3	66,139	6.1	71,667	6.5
Koinadugu	129,061	5.9	62,266	5.8	66,795	6.1
Port Loko	247,463	11.3	120,721	11.2	126,742	11.5
Tonkolili	184,460	8.5	87,002	8.0	97,458	8.9
Western Province	195,023	8.9	102,783	9.5	92,240	8.4
Freetown	127,917	5.9	67,251	6.2	60,666	5.5
Western rural area	67,106	3.1	35,532	3.3	31,574	2.9
<b>Total Sierra Leone</b>	<b>2,180,355</b>	<b>100.0</b>	<b>1,081,123</b>	<b>100.0</b>	<b>1,099,232</b>	<b>100.0</b>

TABLE III

SIERRA LEONE - PERCENT DISTRIBUTION OF MAJOR OCCUPATION GROUPS  
AMONG WORKING POPULATION, 10 YEARS OF AGE AND OVER, BY SEX - 1963

Area and Occupation Group	Total		Male		Female	
	Number	Percent	Number	Percent	Number	Percent
Prof. Tech. & Related	11,066	1.2	8,121	1.4	2,945	.9
Managerial, Admin., & Exec.	2,384	.3	2,172	.4	212	.1
Clerical	6,953	.8	5,842	1.0	1,111	.3
Sales	47,243	5.2	25,210	4.4	22,033	6.7
Farmers, Fishermen & Related	700,174	77.0	443,123	69.8	297,051	89.6
Miners, Quarrymen & Related	42,891	4.7	42,612	7.4	279	.1
Transport & Communications	13,319	1.5	13,051	2.3	268	.1
Craftsmen, Laborers, and so forth	69,971	7.7	63,563	11.0	6,408	1.9
Service, Sport, & Related	14,146	1.6	13,231	2.3	915	.3
<b>Total Sierra Leone</b>	<b>908,147</b>	<b>100.0</b>	<b>576,925</b>	<b>100.0</b>	<b>331,222</b>	<b>100.0</b>

TABLE IV

SIERRA LEONE - PERCENTAGE DISTRIBUTION OF HOUSEHOLDS BY ECONOMIC LEVEL AND LOCATION

Economic Level	L O C A T I O N			
	Freetown	Urban Area	Rural Area	Total Western Province
High	10.0	8.4	-	9.6
With Income over Le100	6.6	6.0	-	6.1
With Income Le40 - 100	4.3	2.4	-	3.5
Medium	51.1	36.4	13.2	44.8
With Income Le40 - 100	33.3	25.7	5.9	29.5
With Income below Le40	7.8	10.7	7.3	15.3
Low with Income below Le40	36.8	52.4	85.8	44.0
Not classified	1.2	2.8	1.0	1.6
All Households	100.0	100.0	100.0	100.0

Economic Level (general description)

- High: High or medium income, ownership of several major durables, electric light, and good toilet facilities.
- Medium: Medium or low income, ownership of some durables, electric light, and adequate toilet facilities.
- Low: Low income, generally no durables, lamp or candle light, and poor or no toilet facilities.

TABLE V  
SIERRA LEONE - TYPE OF FACILITIES USED FOR STORAGE OF FARM PRODUCTS BY SIZE OF HOLDING

Size of Holding	Type of Storage Facilities (1,000)					
	Barns (Farm House)	Cribs (Mats and baskets)	Pots	Wooden bins (boxes)	Stores	Other <sup>1/</sup>
Holdings under 1 acre	19.8	11.5	1.1	4.4	10.4	0.5
1 acre and under 5 acres	91.2	36.4	4.7	25.4	39.6	1.6
5 acres and under 10 acres	35.2	13.0	1.8	8.7	17.8	.7
10 acres and under 15 acres	6.3	2.1	0.4	0.9	3.0	0.1
15 acres and over	2.1	0.8	-	0.5	1.4	0.1
Acreage not reported	18.6	6.5	1.0	3.9	7.8	0.5
<b>Total All Holdings</b>	<b>173.2</b>	<b>70.3</b>	<b>9.0</b>	<b>43.8</b>	<b>80.0</b>	<b>3.5</b>

<sup>1/</sup> Consists of 67 bags and the remainder was divided among drums, pans, tins, soil pits and unspecified containers.

TABLE VI

## SIERRA LEONE - TOOLS AND IMPLEMENTS USED FOR CULTIVATING LAND BY SIZE OF HOLDING - 1965/66

Size of Holding	Total All Holders	Percent of holders reporting use of:							
		Hoe	Cutlass	Falling Axe	Pick	Plough	Harrow	Knives	Other*
Holdings under 1 acre	32,700	95.7	97.9	66.5	2.7	2.2	0.8	93.3	3.0
1 acre and under 5 acres	131,400	97.0	95.4	67.8	4.7	1.4	1.4	96.4	2.0
5 acres and under 10 acres	48,600	100.0	99.4	69.0	4.7	0.9	0.7	97.3	0.8
10 acres and under 15 acres	9,000	96.7	96.7	82.2	1.1	0.4	0.9	95.6	1.1
15 acres and over	3,300	90.9	93.9	60.6	9.1	1.2	2.5	100.0	1.2
Acreage not reported	25,800	94.6	91.5	66.0	1.2	2.0	0.6	91.1	1.2
Total All Holdings	250,700	97.1	90.6	68.1	4.0	1.4	1.1	95.6	1.8

\*Includes dibble, sickle, tapping chisel, and spade.

TABLE VII

SIERRA LEONE - NUMBER OF HOLDINGS BY TYPE OF POWER REPORTED USED ON HOLDINGS,  
BY SIZE OF HOLDINGS - 1965/66

Size of Holding	Total Number Holdings	Holdings reporting use of: <u>1/</u>					
		Human power only		Human and Mechanical Power		Mechanical power only	
		Number	Percent	Number	Percent	Number	Percent
Holdings under 1 acre	32,700	32,000	97.3	900	2.7	-	-
1 acre and under 5 acres	131,400	129,200	98.4	2,000	1.5	200	0.1
5 acres and under 10 acres	48,600	48,000	98.6	700	1.4		
10 acres and under 15 acres	9,000	8,900	98.6	100	1.4		
15 acres and over	3,300	3,200	97.5	100	2.5		
	25,800	25,300	97.8	600	2.2		
<b>Total All Holdings</b>	<b>250,700</b>	<b>246,400</b>	<b>98.2</b>	<b>4,300</b>	<b>1.7</b>	<b>200</b>	<b>0.1</b>

1/ All totals are not additive due to rounding of numbers. Percentage based on absolute numbers.

TABLE VIII

SIERRA LEONE - NUMBER OF HOLDINGS REPORTING USE OF FERTILIZERS AND AMOUNT APPLIED - 1965/66

Kind of Fertilizer	Number of holders reporting	Area treated (acres)	Amount applied (tons)	Average amount per acre (pounds)
Super phosphate	1,250	2,820	145.4	115
Nitrogen-phosphorus-potassium	3,700	610	88.4	324
Nitrogen	40	70	1.4	45
Farm yard manure	100	290	2.0	15
<b>Total</b>	<b>5,090</b>	<b>3,790</b>	<b>237.2</b>	

## REPORT ON NUTRITION IN TOGO

presented by Dr. E. Z. Gadagbe

### I. BACKGROUND DATA

#### A. Geography and Climate

Togo has an area of 58,000 km<sup>2</sup>. It is 600 km long from north to south with a maximum width of less than 200 km. The coastline amounts to barely 50 km. Togo is located on the Gulf of Benin between Dahomey to the east and Ghana to the west. It is bordered on the north by Upper Volta.

Togo has fertile plains in the south and southeast. The coast is sandy and planted with palm trees (Palm Coast). A mountainous axis 500 km long cuts the country according to a northeast/south diagonal defining two river basins: the Oti basin, tributary of the Volta in the northwest; and the Mono basin, acting as a boundary with Dahomey in the southeast. The latter river is broken up by rapids over more than 100 km. The Haho and the Sio flow into Lake Togo.

The climate is varied owing to the north-south elongation of Togo. Three zones can be characterized:

##### 1. Southern zone

Subjected to equatorial severity, this zone includes two rainy and two dry seasons, thus allowing two annual harvests. At Lome, the rainy seasons extend from the month of March to the beginning of July and from the end of September to the beginning of November.

##### 2. Northern zone

Subject to tropical conditions, this zone includes only one rainy season which extends from the end of April to mid-October.

##### 3. Mountainous zone

The rainy season extends from April to the end of October.

## B. Population

The total population estimated as of January 1, 1966 amounts to 1,700,000 with an annual increase of 2.6 percent. The persons of working age (15 to 55 years) represent 42 percent of the total population whereas those less than 15 years old represent 50 percent.

The following tables provide the distributions by regions and by professions.

### DISTRIBUTION BY REGIONS (1961)

<u>Region</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
Maritime	192,900	227,730	420,630
Plateau	196,120	216,810	412,930
Central	178,370	196,460	374,830
Savanna	112,320	116,520	228,840
<hr/>			
Country Total	679,710	757,520	1,437,230

### DISTRIBUTION BY PROFESSIONS

<u>Professions</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
Liberal professions	4,635	905	5,540
Mgt., supervision, admin.	430	5	435
Office employees	3,030	450	3,480
Merchants, sales employees	6,110	49,840	55,950
Agric., fisheries, forestry	312,300	189,665	501,965
Transportation and comm.	8,355	15	8,370
Skilled, nonskilled workers	37,225	15,795	53,020
Employees of the services	1,810	1,830	3,640
Armed Forces and var.	1,485	-	1,485
Others (figures for 1961)	354,920	554,780	1,009,700
<hr/>			
Total (1964)	730,300	813,285	1,643,585

### ANNUAL PER CAPITA INCOME

in 1963-----	18,030 L
in 1964-----	20,177 L
in 1965-----	21,636 L

## C. Agricultural Policy of the Government

### 1. Production subsidies

The Togo Government does not usually directly subsidize any given product. It considers the indirect subsidy to be preferable. The latter is carried out in two stages and derives from two essential sources.

a. Improving the means of production by: waiving taxes on fertilizers, pesticides, and farming equipment; providing breeding stock (especially cattle) for sale or loan with deferred payment; waiving taxes, partially or totally, on outboard motors and providing convenient payment plans in order to motorize maritime fishing (which presently uses canoes along the coasts); establishing revolving stocks of fertilizers and pesticides with the Rural Companies for Animation and Development (SORAD's)\* and the Treasury for delivery at minimum cost to the farmers, with payment postponed to harvest time; establishing seed stocks used for seasonal loans repayable with the harvest.

b. Encouraging commercialization by: providing medium-term loans to partnership groups of producers for commercialization (initiated by sales cooperatives); supporting of market prices; improving conditions for sale and slaughtering of livestock (regional markets, slaughtering areas, slaughterhouses, mixed cold rooms for meat and fish); improving the system for commercialization of fish in the interior of the country and its preservation (such as smoking and salting); storing surpluses at time of harvest and subsequent reselling during inter-season gaps by the appropriate SORAD.

### 2. Agrarian reform

The principle of land charter reform is accepted. But it has not been possible to put this into effect for various reasons, chiefly the lack of means in personnel and equipment in the appropriate services.

The reform of the rural structures, on the other hand, has been undertaken on a large-scale and in depth by the creation of SORAD's which are the pivotal and driving structures of development. These are para-administrative companies under autonomous management, and of the type in force in the private sector, integrating to an increasing degree, the rural populations into the conduct of regional

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\*Sociétés Rurales pour l'Animation et le Développement

affairs. These companies have an essentially polyvalent character forming the link between the government and the population. They contain in reality the four elements of development: encouragement, popularization, credit, and commercialization.

These reforms are supplemented by the development of structures for production and commercialization in the collective, pre-cooperative and cooperative form, suitable for confronting the various evolutionary levels of local farmer mentalities.

3. Creation of agricultural credit

4. Protection of harvests and warehousing

Since 1963, a campaign of experimentation, then demonstration and popularization, has taken place involving the protection of crops for farmers concerned with corn, millets, sorghum and beans. Completed by the end of 1967, it is being continued within the scope of transfers of products (DDT and products with lindane or tetrachloride base) by the SORAD's.

A project for construction of storage warehouses at the different stages of commercialization through the agency of the SORAD's has been proposed to the European Development Fund (EDF).

D. Foreign Assistance Favoring Nutrition

1. Assistance on behalf of nutrition

World Food Program (WFP).  
French Catholic Relief.  
American Catholic Relief.

2. Assistance on behalf of production of foodstuffs

a. Research and experimentation on food crops by the Institute for Agricultural Research in Togo (IRAT) and the Fund for Aid and Cooperation (FAC) within the scope of regional crop rotations including food and industrial crops.

b. Assistance for improvement of agricultural production of peanuts (EDF), cocoa nut palm (EDF), oil palm (EDF), rice (FAC) and manioc (FAC).

c. Assistance for the development of fisheries (Federal German Republic and the Peace Corps of the USA).

3. Assistance for the improvement of animal products

a. Control of endemic and epidemic disease, especially through vaccination campaigns, health regulations, and border quarantines.

b. Creation of groups for collective management of flocks and improvement of grazing grounds.

c. Introduction of pure breeding stock for crossbreeding of cattle, sheep, goats, and swine as well as the introduction of fowl.

4. Assistance to fish production

a. Development of ocean fishery.

b. Progressive buildup of a fleet of trawlers (two in operation).

c. Motorization of fishing canoes (pirogues) with 150 outboard motors.

d. Investigation of the ocean bottom of the continental shelf (trawling zones, animal life, productivity).

e. Development of lagoon fishery.

f. Laying of acadja.

g. Clearing of marine growth.

h. Development of river fishing.

i. Training of fishermen.

j. Improvement of equipment.

k. Progressive development of pisciculture.

5. Assistance in development of truck crops

6. Assistance in development of agricultural industries

a. Existing: starch factory at Ganavé; oil works at Alokoégbé (annual processing capacity from 12,000 to 15,000 tons); rice mills at Mission-Tové and Dapango.

b. Planned: oil works to be constructed with extension of palm plantations; manufacture of drying boxes for manioc; construction of a sugar mill; construction of a fertilizer plant.

7. Assistance for development of production in general

a. Development of animal-powered cultivation

b. Campaign to demonstrate utilization of fertilizers

c. Investigation of zones for development

- Lower Mono (rice, sugarcane, corn)
- East Mono (yams, corn, peanuts, rice, cotton)
- North Oti (rice, sugarcane, cereals)
- Kara (general investigation)
- Mò Fazao (general investigation)
- Akposso and Adélé (stock farming)

II. FOOD RESOURCES

A. Means of Production

1. Agricultural labor force

Out of approximately 1,700,000 inhabitants, approximately 1,500,000 are in a rural environment and dedicated to agriculture, livestock breeding, and fishing.

2. Agricultural equipment

In general, equipment consists of rudimentary tools (machete, daba). For the last four years, an effort has been made, especially in the North Region (savannas), for the development of a "plow" culture. Its base is formed on a yoke of oxen (or zebus) and the omnicultivator which is deemed preferable to the purchase of the various implements which it can carry on its single chassis (plow, hoe, ridging plow, ridger, sowing drill). Although the cost is higher, it is for one thing less than that of the first four implements mentioned when purchased separately. In addition, the small size of the areas prepared per unit of crop plowed, even within

the scope of small groups for common utilization, enables this machine to save considerable time, especially during plowing and ridging, with respect to the same tasks performed manually.

At the present time, it is estimated that 800 or 900 of these agricultural implements have been imported into Togo. The projected program should be carried on over several more years and involve several hundred units. This is not meant to exclude, but on the contrary, to encourage imports consequent to orders made on the basis of private financing or loan from the Agricultural Credit Fund (Caisse du Crédit Agricole).

At the same time and in the same places, an attempt has been made to popularize the ox cart in order to reduce transportation problems with a view toward considerable savings of time consequent to its use and resulting convenience in various sectors. The ox cart, indeed, will simplify individual consolidations of individual yields, the sale within associated groups of producers, and will increase the chances for success in setting up of fodder reserves and utilization of organic fertilizers. A program for several hundred of these carts is under way.

There has also been an experiment going on for the last few years involving the creation, self-financing, and self-management of mutuels for motorized agricultural production in East Mono. At the present time, 20 of these mutuels have been progressively established and consolidated into a union. The very positive results obtained have led to a request, with foreign assistance, for expansion of this formula to include a second zone of 35,000 ha in the vicinity of the first one east of the Mono River.

An operation involving the motorization of plowing with equipment belonging to the SORAD is being carried out in the eastern part of the Maritime Region. It has as its basis the signature of production and purchase contracts for manioc, intended for the Ganavé starch factory. These individual contracts allow the SORAD, with reduced risks, to allow advances in the form of works, products, and cash to contracting farmers. In this case, too, the results have proven to be extremely positive in the space of three years. In addition, this operation is not limited to the manioc production sector alone. It is only the economic pivot of a multidisciplinary action, the two other components of which are the increase in productivity of basic food crops, especially corn, and the restoration or maintenance of soil fertility.

### 3. Fertilizers

An extensive popularization campaign regarding use of fertilizers is part of the EDF Five Year Plan and the FAO program for fertilization of soils. Fertilizers are supplied by the EDF for use in the cultivation of the peanut, coconut, palm and cotton. However, the orientation of agricultural experimentation and the dual purpose of the popularization operations of the SORAD tend to bring the concept of their use within the scope of crop rotation rather than for a single crop.

The operation within the scope of the FAO program is conducted along the same lines, in such a way that it is the entire yield of a lot which is to be given a value by the calculated selection of a fertilizer during the succession of crops on this lot.

In 1966, the import of fertilizers for these various operations rose to approximately 500 - 600 tons. It doubled in 1967 and will be increased by 50 percent in 1968 and 1969. The use of pesticides for the protection of crops and preservation of harvests follows the same rising curve, passing from approximately 15 tons in 1966 to more than 30 tons in 1967.

#### B. Food Crops

<u>Crop</u>	<u>1966 estimate (tons)</u>
Cereals	
Millets and sorghum	178,000
Rice (paddy)	23,000
Corn	100,000
Roots and tubers	
Manioc	100,000
Yams	100,000
Potatoes	8,000
Legumes	
Beans ( <u>voandzou</u> )	20,000
Peanuts	17,000
Oil yielding crops	
Copra	2,750
Palm oil	3,500
Palm kernel	18,200
Shea butter	825

C. Livestock, Fowl, Milk Products

	<u>Head</u>
Cattle	160,000
Sheep and goats	900,000
Swine	200,000
Fowl	not counted
Milk products	not estimated
Eggs	3,750,000 (approx.)

D. Fish

Total annual production	6,300 tons (approx.)
Imports	4,000 tons
Consumption	10,300 tons

E. Production Problems

1. Inadequacies arising from untrained minds which give first priority to subsistence (this is still quite understandable, given the present day socio-economic context of Togo).

2. Archaic social and family structure working against individual initiative and investment, penalizing the entrepreneur, and leading to the loss or apathy of the most dynamic human elements.

3. Ritual and traditional expenditures, together with external displays of wealth which are unproductive and excessive, and which are harmful to productive investment.

4. Very high birth and population increase rates which lead to heavy food burdens, thus reducing the availability of food products for sale and limiting capabilities for industrial production.

5. Limited cash value of agricultural and animal products.

6. Abusive commercial practices and the lack of rational artisan or industrial processing which would increase the value of the raw product at the first level of commercialization.

7. Landcharter and property tenure impeding profitable improvements of land.

8. A deeply ingrained system of tenant farming, together with severe absenteeism.

9. Dissociation of agriculture from stock farming (cattle).

10. Size of family type operations, too small to justify equipment or its profitable employment.

11. Inadequacy and excessive cost of agricultural credit (until very recently), because of the absence of specialized, organized bodies and the excessive risk run by this credit.

12. Insufficiency of technical services and inadequate direction given these services owing to concepts ill-adapted to the requirements of a truly evolutionary development.

13. Considerable arrears in applied agricultural experimentation.

14. Insufficiency of professional and regional structuration. Insufficiency of dialogue between the private sector of production and the public sector of administration from which the authority is derived, allowing the confidence and driving force required for a well-designed and planned rational development.

15. Conceptual inadaptability, quantitative excess and qualitative insufficiency of general instruction. Almost complete lack of practical professional training in agriculture. All this leads to a considerable loss of quantitative and qualitative human material for the rural environment and a large exodus towards the cities, with creation of a parasitic sub-proletariat and a serious underutilization of the intellectual elites.

#### F. Food Industries

1. Ganave starch factory.

2. Palm oil works (approximately 800 tons of oil) at Alkoégbe.

### III. DIETS

#### A. Nutrition Levels

In normal times, there is no hunger problem in Togo. However, shortages can occur whenever there is a lack of sufficient rain or when the population has been improvident. The existence of caloric, protein, and other deficiencies have, moreover, been recognized ever since the investigations of Perisse.

#### B. Child Feeding Programs

There are about twenty child feeding programs maintained through the WFP and local resources. They may be found here and there in the kindergartens and the farmyards and provide nutrition for schools supplying supplementary foods. The parents contribute up to 20 CFA per month.

About 50 children take advantage of these meals which consist of milk in the morning and semolina cake at noon. These programs appear to improve their health, as well as scholastic results. The problems consist in maintaining the financing and continuity after the termination of foreign assistance programs such as WFP, Hinaf, and Cathwel.

#### IV. EDUCATIONAL PROGRAMS

Mothers' councils are formed in the maternity hospitals by midwives and matrons. Nutrition, lactation of the mother, malnutrition and disease, vitamins, and feeding of the students are subjects taught, using audio-visual aids. At an intermediate level, courses in applied nutrition are introduced into the scholastic programs of the 1st, 2nd and 3rd classes of secondary instruction (equivalent to "high school" grades 10, 11, 12).

#### V. OBSTACLES TO THE ESTABLISHMENT OF PROGRAMS FOR COMBATING MALNUTRITION

In addition to ignorance, the principal obstacles are insufficiency in organization, suitable administrative personnel, health education and nutrition experts, equipment, and availability of food.

The recent founding of the Division of Applied Nutrition in the Ministry of Health and the Ministry of Rural Economy comes in time to solve an organizational deficiency in the struggle against malnutrition and the application of food technology.

A budget has been planned by the Government for the start of the nutrition program on the order of 7 million CFA in a special chapter of the budget of the Ministry for Rural Economy. The Ministry of Health will appropriate a special budget for the operation of its own Division of Nutrition.

#### VI. PLANS AND HOPES FOR THE FUTURE PRODUCTION PLAN

In the Five Year Plan for the economic and social development of Togo, a large section is devoted to the development of basic food products. In the sector for plant products, the goals are:

A. Peanuts - 14,000 tons in 1965, 24,000 tons in 1970.

B. Oil Palm - preparation of 5,300 ha of plantation in five years, improvement of technological conditions for extraction of the oil in factories and by skilled laborers. Results to be seen between 1976 and 1980 are 42,000 tons from normal operations with about a 20 percent extraction rate.

C. Coconut Palms - progressive reclaiming of 150 ha of coconut plantations destroyed by the kainkope disease, increase in the use of fertilizer, control of Orcyctes rhynoceros. Results hoped for are an additional 250 tons of copra per year.

D. Cereals - increase in the production of millet and sorghum from 7,000 to 10,000 tons in five years and an increase of 5,000 tons in paddy (rice) production.

With regard to animal production, the goals are: creation of an optional sale/loan system (see above); development of commercial maritime fishing to reach an annual production of 5,000 tons within 5 years; development of artisan fishing to increase production from 4,000 tons to 5,800 tons per year; development of lagoon fishing from 1,500 tons to 2,500 tons per year. This would allow national consumption to increase from 10,300 tons per year to 16,300 tons, or from 6 kg to 8 gk per capita per year.

## REPORT ON NUTRITION IN THE UNITED STATES

presented by Mrs. Jean Pinder

The United States is a vast territory of the North American continent, and in addition, includes two other states which are separated from the mainland: Alaska and Hawaii. The mainland U. S. covers an area of 3,615,211 sq mi, Alaska 586,400 sq mi, and the Hawaiian Island 6,424 sq mi. The total population of the U. S. in 1967 was 200 million, composed of various ethnic groups. Approximately 25 percent of the 1967 population was under the age of 15 years and 9 percent was 65 years or over. The birth rate in 1965 was 19.4 per thousand and the death rate was 9.4. The natural rate of population increase was approximately 1.5 percent per year between 1960 and 1965.

Life expectancy in the U. S. in 1964 was 70.2 years. This, however, ranged from 73.7 for white female to 61.1 for non-white males. The ten leading causes of death in the U. S. in order of magnitude for 1964 were:

1. Diseases of the heart
2. Malignant neoplasms
3. Vascular lesions affecting the central nervous system
4. Accidents
5. Certain diseases of early infancy
6. Influenza and pneumonia
7. General arteriosclerosis
8. Diabetes mellitus
9. Other diseases of the circulatory system
10. Other bronchopneumonic diseases

### FOOD PRODUCTION

Of the 200 million people in the U. S., less than 5 percent are engaged in farm employment. In 1954, 60.8 percent of the total land area was farm land. This figure had dropped to 58.9 percent in 1959. These figures do not include Hawaii and Alaska. In the total 50 states, 358,456,000 acres were used for crops and in 1961 farm output was 67 percent above the 1939 farm output level.

Although food production in the U. S. is in the hands of a very small percentage of the population, extensive mechanization and use of fertilizers make it possible to produce enough food for the total population and still allow a surplus for export. For example, exports of a few commodities in 1965 were as follows:

Meat	315.6 million pounds
Dairy products	599.4 " "
Corn	520.0 " bushels
Wheat	634.8 " "
Wheat flour	79.9 " "
Rice	2.5 " pounds

#### NUTRITION PROBLEMS IN THE U. S. AND MEASURES TO SOLVE THEM

With the enormous production indicated from the above figures, one might assume that the U. S. would be completely free from problems related to nutrition. Unfortunately, this is not the case. We have many of the same problems which occur in Africa. The principal difference is in the degree of the problems, and to some extent in the age distribution of the population.

For the most part, nutrition problems in the developing countries are associated with scarcity of foods which is reflected in deficiency disorders. We, on the other hand, suffer to a greater degree from disorders associated with abundance, although we do still have some nutrient deficiency disorders.

Because of the nutrition problems present in the U. S., our Government has recently created (August, 1967) a Nutrition Program within the Public Health Service. This Program is divided into two sections - one dealing with international activities and the other with domestic activities. The International Unit studies problems of countries other than the U. S. and assists these countries with planning to solve their nutrition problems. The Domestic Unit is presently engaged in conducting nutrition surveys in five states in the U. S., and will continue to make these surveys until all 50 states have been covered. The states in which surveys are now being conducted include Texas, Louisiana, New York, and West Virginia. It is likely that the next group of states to be surveyed will include Mississippi and Alabama.

Although the number of states studied so far is quite small, certain information is beginning to emerge. For example, it has been found that in the U. S. as in other countries there appear to be certain groups of the population which are more vulnerable to nutritional disorders - namely pregnant women, the aged and the less privileged groups. In addition to the above findings, specific nutritional problems of importance have been identified and measures are being instituted to deal with these problems. The principal problems are:

1. Nutritional anemias
2. Obesity
3. Inborn errors of metabolism, such as phenylketonuria and diabetes mellitus
4. Coronary heart disease
5. Goiter
6. Kwashiorkor - a problem resulting from scarcity and found in some of the less privileged areas of the country.

From the above discussion, it is obvious that problems of nutrition are not limited to any one part of the world. If this conference were being held in Europe, Asia or any other part of the world, it is quite likely that similar problems to those which we are discussing here would emerge. By thinking and planning together, we can share experiences and be of mutual help in working toward solutions to these problems which may be of benefit to us all.

## REPORT ON NUTRITION IN THE REPUBLIC OF UPPER VOLTA

presented by Mr. Sory Sie

Although previously declared a Republic on December 11, 1958, Upper Volta was granted independence on August 5, 1960. As a result of the proclamation of January 3, 1966, the country is at present under a military regime headed by General Lamizana.

We have synthesized the nutritional problems of this country with the related data necessary for the working out of solutions.

### I. BACKGROUND DATA

#### A. Geography and Climate

In this respect, Upper Volta can be subdivided into four regions:

##### 1. A Sudano-Sahelian region

This region is characterized by a rainfall of less than 650 mm. The predominant activity is stock farming and agriculture is based on millet and peanuts.

##### 2. The Mossi plateau

In this region, the rainfall increases, going from north to south, from 600 mm to more than 1,000 mm. The area has unleached soils of the tropical, ferruginous type with average potential. This zone accounts for a third of the surface area of Upper Volta and is occupied by 55 percent of the population. The situation is especially critical in the north (Yatenga) where the average densities are on the order of 30 to 40 inhabitants per km<sup>2</sup> and exceed 100 inhabitants per km<sup>2</sup> in the vicinity of Ouahigouya.

##### 3. The southwest and southeast

The two regions to the southwest and southeast show very different characteristics from the ethnic point of view. The southwest region is predominantly Bobo and the southeast, Gourmantché. In the southeast, the density does not exceed one inhabitant per square kilometer, except in some small areas. In the southwest, the density varies from four to 15 inhabitants per square kilometer. Generally, more favored from the standpoint of rainfall than the Mossi Plateau, these two zones represent an indisputable potential for growth owing to the favorable life of the

country. In the short run, the southwest could develop its production of rice, peanuts and possibly sugar. Covering 12 percent of the total surface of Upper Volta, this zone possesses among the best of soils and a relatively energetic farming populations. The southwest, accounting for 25 percent of the total surface, is the land reservoir for the long run but the problem of development of the Mossi Plateau in this region presents social and political problems.

#### 4. Southern region

In the southern part of the country, there is a relatively narrow, densely-populated strip which follows along the boundary of Ghana. The soils there are generally favorable (materials of granitic composition) with a rainfall marking the transition between the two rainy seasons. The densities are always great here but the physical potential could easily allow an increase in production.

#### B. Irrigation

From the standpoint of irrigation, it is generally considered that Upper Volta has at its disposal a potential on the order of about 100,000 ha. As far as concerns, the controlled irrigation of some thousands of hectares made ready for use in the course of the last 15 years, only some hundreds are being exploited at the present time. The capabilities for development appear to be in the region of Banfora (Umoé, Yannon) where it is planned to install a sugar factory. Sourou, in the northwest, shows a potential on the order of 4,000 to 5,000 ha which are irrigable by pumping, and on the order of 5,000 to several tens of thousands of hectares which are irrigable by gravity, pumping and flooding, according to the different development concepts. Finally, the valleys of the three Voltas contain a certain number of plains with fertile soils which could be developed, but would be expensive to drain. In the remainder of the country, isolated installations of the FAO and FEP type could allow the fitting out of several thousand additional hectares at a relatively high cost involving rather small surface areas. The capabilities for rice cultivation by more or less controlled flooding appear to be advantageous in the southwest (near the boundary of Mali), in the northwest (Sourou 20,000 to 25,000 ha) and in the southeast (survey not carried out).

On the whole, these prospects for irrigation, although limited when they are compared with the future needs of Upper Volta, are at the present time beyond the country's range of means in personnel and financing between now and 1980.

## II. SUMMARY OF DEMOGRAPHIC DATA

### A. Demographic Situation in 1966

<u>Population</u>	<u>Inhabitants</u>
Urban	173,273
Rural	4,624,203
Rural absent abroad	348,457
Rural present	4,275,746
Total present	4,449,019
Total population	4,797,476

### B. Demographic Situation in 1970, 1975, 1980, 1985

<u>Population</u>	<u>1970</u>	<u>1975</u>	<u>1980</u>	<u>1985</u>
Urban	225,050	313,100	424,700	582,000
Rural	4,900,174	5,338,794	5,906,948	6,554,787
Absent abroad	372,661	400,742	460,714	519,935
Rural present	4,527,513	4,938,052	5,446,234	6,034,852
Total present	4,752,563	5,257,152	5,870,934	6,616,852
Total population	5,125,224	5,651,894	6,331,648	7,136,787

## III. FOOD RESOURCES-FORECASTS BY PRODUCT

### A. Cereals

#### 1. Rice

The arable potential very greatly exceeds what can be placed under cultivation in the course of the next 20 years, taking into account the almost total lack of rural management personnel. To the extent that efforts could be concentrated in the west and southwest, an increase in yield as of 1970 could be contemplated. This increase could be linked to a better control of water and to the introduction of improved varieties of crops now available. It is assumed that the surfaces would be increased beginning from 1975 at a slow tempo, on the order of 1,000 ha per year. This also assumes the installation of about ten management personnel, properly monitored each year.

#### 2. Millet

The demand for millet should not increase quite as swiftly as the demand for sorghum. The surface would increase with the rural

population, and the yields will hardly improve before 1975. The introduction of crop varieties better adapted from the standpoint of the plant cycle and the treatment of seeds, allows hope for an average, long-range increase in yield on the order of 1 percent per year. In the near future, a certain stress should be seen in production costs.

### 3. Corn

A good share of the corn is cultivated on fertile alluvial soils with agricultural techniques relatively more advanced than those used for high-ground corn. It is assumed that demand will be maintained during the whole planning period and that prices will be stable or rise slightly. Under these conditions, it is possible to assume an increase in yield, beginning from 1970: a) in zones where development and production of cotton can have a certain carry-over effect; and b) in the regions capable of supplying food to the major urban markets. The main point of the intensification process should be based on improvement in crop varieties, treatment of seeds and, in heavily commercialized zones, on the encouragement of use of fertilizers during the second ten-year period.

### 4. Sorghum

Sorghum is, and will remain, the main agricultural food crop. This product has been neglected too long and should keep an absolute priority in the Upper Volta rural development program. The increase in surface area planned in our forecasts results from the following hypotheses: until 1975, increases in yield will be essentially based on the treatment of seed stocks and improvement of varieties; as of 1975, in zones where cash crops will have been developed (cotton, peanuts, corn, and so forth), a yield on the order of 900 kg/ha can be assumed with application of approximately 40 to 50 kg of ammonium sulphate per hectare. This could involve about one-third of the producers by 1985.

The yield potential is on the order of 1,500 to 2,000 kg/ha when using 125 kg of superphosphate (\$10/ha) and early ripening varieties, already selected in Upper Volta. The problems to be solved are essentially those of organizing the distribution of seeds and, if necessary, of mechanizing ground clearing operations, using animal traction. The Research Institute for Oils and Oil Producing Plants (IRHO) presently administers 5,000 farmers at Banfora who, by using 75 kg of superphosphate per hectare and cultivating 0.4 ha per family,

produce average yields on the order of 1,300 kg. It is accepted in our plan that all the new surface areas planted with peanuts should form the goal of an intensive enclosure program with an annual rate on the order of 2,000 to 3,000 ha, i.e., five to eight enclosure farmers set up each year. The increase of average yield is directly connected to this intensive enclosure program.

#### B. Industrial Crops

Cotton is, and will remain, the main industrial crop. Its introduction and intensification within the scope of a cereal rotation scheme is an almost indispensable condition for the modernization of Mossi agriculture. It is possible to look forward to average surface areas, per inhabitant, on the order of 5 ares and average yields on the order of 800 kg/ha with four treatments given, costing 3,500 CFA (\$14) per hectare. Beginning from 1975, the intensification process should take precedence over expansion of surface areas. The goals specified in our plans correspond to a production potential coherent with the goals specified for intensification of food products.

### IV. FACTORS OF AGRICULTURAL POLICY

The supplying of food to urban centers where per capita incomes will probably not increase inter-regional balancing of surpluses as well as food deficits, require that Upper Volta award absolute priority to a program of operations which would include:

#### A. A Policy of Intensification of Food Production

This policy is aimed at heavily populated zones with introduction of simple, although highly effective, low-cost techniques as long as incomes remain low (disinfection of seed stocks, improvement of varieties). Then will follow intensification of crop rotation and increase of cash crop yields.

#### B. An Increase in Production and Commercialization of Food Products

This policy is aimed at low density regions and the zones located in the vicinity of axes of communication which are capable of supplying the urban markets. In this respect, an industry for transformation of sorghums would allow reduction of transportation costs, as well as the better stabilization of prices through establishment of storage means along the axes and in the vicinity of the urban and temporary markets. The food situation would also be improved for the low-income classes. In the event that this industry

is established before 1975, the possible development of a rural market for these products could even be considered. This would be associated with an increasing specialization of those farmers engaged in industrial production in the zones with high population density.

The total surface area brought under cultivation should increase by a little less than 2 percent per year between now and 1975, with a long term increase of 1 percent per year from then on. This increase in surface area is unavoidable and should be accomplished for over half of the population at the expense of fallow land. This means that in the zones where agriculture is predominant, it is out of the question that the surface areas made available for stock farming be increased. It is reasonable to assume that between now and 1985, the pasture lands will have decreased on the average of 30 percent. This is valid for the whole of the Mossi Plateau and for some densely populated zones in the west.

Furthermore, the expansion of cultivated surface areas has only a negligible effect on the availability of land for stock farming. This is especially true in the regions to the north and east, which have been rid of the tsetse fly. In the southwest and southeast, it is doubtful whether between now and 1985 agriculture can justify a transformation of the rural landscape capable of offering disinfected pasture areas for stock farming.

The integration of the French Textile and Fiber Company (CFDT) and IRHO programs with the food production intensification programs is the necessary condition for rural development in the densely populated zones. The example of the CFDT programs in Dahomey and of those developed in northern Cameroon is instructive in this respect.

One other condition, likewise required, is the maintenance and even the concentration of foreign financial assistance on such programs which essentially involve covering costs and supply of land experts for at least the next ten years.

Between now and 1975, it is clear that the flow of emigration towards the Ivory Coast, be it seasonal or throughout the year, should be maintained. It is only after 1975, and dependent on the success of projected operations, that Upper Volta will be able to use a portion of the laboring force which it presently exports.

## V. ANALYSIS OF PRESENT CONSUMPTION

### A. Calories

The average Volta ration indicates a slight caloric deficit (2,025 versus 2,240). It should, however, be noted that this contribution comes from carbohydrate foods in the proportion of 75 percent.

### B. Proteins

The total protein contribution amounts to approximately 70 g per person and per day. It would almost seem that the needs are satisfied, whereas, in reality, this figure conceals a rather severe qualitative imbalance. Indeed, the proteins of animal origin (5 g) represent barely 8 percent of the total contribution, whereas it should have been 30 percent (approximately 20 g) at the minimum.

### C. Fats

The daily average consumption is approximately 34 g per person with only 2 g of fats of animal origin. The deficit is, therefore, more than 50 percent with respect to needs.

### D. Inorganic Salts

The needs in iron are largely satisfied, and this is the probable explanation as to why anemia resulting from iron deficiency does not constitute a serious problem in spite of a very high rate of parasitosis (ancylostomiasis, amebiasis, and others). Unfortunately, the same is not true for calcium whose contribution reveals a rather large deficit.

### E. Vitamins

The ration is very deficient in vitamin A. This may be easily understood, for the Volta population is, for the most part, a savanna people. The foods rich in vitamin A are available for only a short period each year (this, of course, concerns foods of plant origin, such as green leaves and fruits).

As far as hydrosoluble vitamins are concerned: B<sub>1</sub>, B<sub>2</sub>, B<sub>6</sub>, B<sub>12</sub>, PP, C, they are apparently present in sufficient quantities provided that the methods of food preparation do not destroy them. The following table summarizes this data:

### Daily Consumption per Inhabitant

	<u>Animal Products</u>	<u>Plant Products</u>	<u>Total</u>
Daily ration	61 g	631 g	692 g
Calories	74	951	2,025
Proteins	5 g	65 g	70 g
Fats	2 g	32 g	34 g
Calcium	43 g	234 g	277 g
Iron	-	22 g	22 g
Vitamin A	58 IU	739 IU	797 IU
Vitamin B <sub>1</sub>	-	2 mg	2 mg
Vitamin B <sub>2</sub>	-	0.5 mg	0.5 mg
Vitamin PP	0.2 mg	17 mg	17.2 mg
Vitamin C	-	14 mg	14 mg

### VI. OPERATIONS AND PROJECTS CONTAINED IN THE FOUR YEAR PLAN 1967 TO 1970

A. There is an Interministerial Committee for Nutrition, and plans are being considered for the establishment of a technical Nutrition Section in the Ministry of Public Health in the course of 1968. This section will be under the direction of an Upper Voltaian physician, expert in nutrition, whose training has just been completed.

B. It would be suitable to request foreign assistance for the financing of an investigation of the nutritional situation, with representative samples from the principal ethnic groups. The cost would be approximately 15 to 20 million CFA. This investigation could be carried out at the same time as the clinical investigation projected in the Health Plan, and could be used as a point of departure for work of the new Nutrition Section of the Interministerial Committee.

C. The American Catholic Relief Service established in 1967 a program of food distribution (powdered milk and cornmeal) intended for school children and health groups. This program, part of the U.S. Food for Peace program, will be carried on over a 5-year period and will have a total value of 612.5 million CFA in supplies (i.e., 122.5 million CFA per year).

D. The World Food Program of the FAO, furthermore, is committed to supply foods to secondary schools over a period of four years for a total sum of 390 million CFA.

E. Another collection program has been started to request supplies of foodstuffs, on behalf of hospital groups, for a total sum of 145 million CFA over a period of four years.

F. The Industrial Plan has included, in its long-range prospects, the installation of a mill complex for millet and sorghum for the manufacture of flour and semolinas. A study will also be made on the capability for manufacture of cereal flours, enriched with peanuts or other local products.

G. Finally, we should like to emphasize the presence of a private French organization, "Brother of Mankind" (FRERE DES HOMMES), which has been at Ouagadougou for the last few months and supplies each day a balanced meal to 1,500 children distributed over seven schools.

## VII. CONCLUSIONS AND RECOMMENDATIONS

In addition to sporadic periods of scarcity which affect some regions of the country, and during which serious cases of undernourishment are recorded, it can be stated that the Upper Volta farmer suffers from multiple nutritional deficiencies. The most serious of the latter are the deficiencies in protein, especially animal proteins, and deficiencies in vitamin A.

Kwashiorkor occurs frequently with very young children. The very widespread non-severe anemias are most often aggravated by other diseases, such as malaria, schistosomiasis, ancylostomiasis, etc. There are probably a great number of light cases of vitamin A deficiency.

### A. Special Problems

The problem of the especially vulnerable groups (children from 2 to 5 years old, adolescents, pregnant as well as nursing women) has a rather spectacular appearance:

1. Malnutrition selects as its special target, children from 2 to 5 years old, and in this age group many show clear symptoms of kwashiorkor.

2. The children examined generally have a weight clearly subnormal for their age.

3. The mixed deficiency in Calories and proteins is the form of malnutrition most frequently encountered with small children.

4. Pregnant women, likewise, form an exposed group. Anemias are frequent during pregnancy and the weight of the newborn infants is, on the average, rather low.

5. Finally, it can be said that malnutrition occupies a place in the first rank among the most important causes of infantile mortality.

#### B. Recommendations

The following is recommended:

1. The establishment of the administrative structures required for giving proper attention to the problem of malnutrition in the country. Sections for nutrition could be set up within the Ministries of Public Health, National Education, and Agriculture.

2. The training of required personnel through nutritional scholarships (FAO, WHO, UNICEF) and through the setting up of re-training sessions for male and female nurses, agricultural instructors, educators, welfare workers, and other such workers.

3. Giving consideration to the launching of a working program with the following goals:

a. Increasing production and consumption of foods rich in proteins and especially animal proteins (milk, eggs, meat, fish, peanuts, beans, sesame, etc.). The resources of pisciculture, for example, should be exploited in a more rational manner.

b. Stepping up the number of small husbandry enterprises involving raising of chickens, swine, sheep and goats, especially in the rural education centers.

c. Increasing production of basic foodstuffs such as sorghum, millet, corn, peanuts, cowpeas, etc., by the improvement of agricultural techniques, use of improved seed stock, fertilizer, and so forth.

d. Increasing production of leguminous plants such as voandzou (source of vegetable proteins) and green legumes (source of minerals and vitamins).

- e. Stimulation of fruit orchard culture.
- f. Education of family mothers.
- g. Organization of education in nutrition at all levels and in all interested sectors.

TABLE I  
UPPER VOLTA - STATUS OF PRESENT CONSUMPTION  
(SUMMARY)

Foods	Total Consumption (tons/year)	Ration inhab./day (g/day)	Calories	Proteins (g)	Fats (g)	Calcium (mg)	Iron (mg)	Vitamins				
								A (I.U.)	B <sub>1</sub> (mg)	B <sub>2</sub> (mg)	PP (mg)	C (mg)
Cereals	718,872	427.8	1.483	44.6	16.0	135.1	16.5	-	1.5	0.5	12.9	-
Leguminous plants	120,216	71.6	253	14.7	2.9	53.3	4.7	25	0.4	-	1.4	-
Roots and tubers	79,417	47.3	47	0.6	-	11.4	0.2	-	-	-	-	-
Various fruits	26,863	16.0	8	-	-	2.1	-	58	-	-	-	3.7
Various legumes	57,590	34.3	8	0.5	0.1	17.5	0.3	652	-	-	0.2	10.3
Peanuts	37,106	22.1	86	4.0	6.8	8.2	0.3	4	0.1	-	2.5	-
Sesame	672	0.4	2	0.1	0.2	4.8	-	-	-	-	-	-
Sugar	9,275	5.5	21	-	-	-	-	-	-	-	-	-
Soumbala	840	0.5	2	0.2	0.2	1.0	-	-	-	-	-	-
Vegetable oils	9,234	5.5	41	-	5.5	-	-	-	-	-	-	-
Butter	1,007	0.6	5	-	0.6	-	-	15	-	-	-	-
Meat and offal	39,792	23.7	44	3.5	0.5	1.9	0.1	-	-	-	0.2	-
Fresh fish	8,227	4.9	3	0.7	-	1.0	-	-	-	-	-	-
Milk	51,041	30.4	20	1.0	0.8	39.8	-	32	-	-	-	-
Eggs	2,015	1.2	2	0.1	0.1	0.5	-	11	-	-	-	-
<b>Total</b>		<b>691.8</b>	<b>2.025</b>	<b>70.0</b>	<b>33.7</b>	<b>276.6</b>	<b>22.1</b>	<b>797</b>	<b>2.0</b>	<b>0.5</b>	<b>17.2</b>	<b>14.0</b>

TABLE II  
 UPPER VOLTA - ESTIMATE OF TONNAGES REQUIRED FOR CONSUMPTION  
 IN 1970

Products	Quantity (tons)
Sorghum	400,000
Wheat flour	5,200
Millet	236,000
Corn	74,000
Rice (paddy)	22,600
Fonio	7,000
Voandzou	65,000
<u>Niébé</u>	62,000
Potatoes	2,650
Yams	15,600
Manioc	35,000
Sweet potatoes	33,000
Banana	2,000
Citrus fruit	1,500
Others	30,000
Various legumes	61,000
Peanuts	40,000
Sesame	860
Beef	8,700
Mutton	3,500
Goat meat	6,950
Pork	4,200
Fowl	2,650
Game	13,000
Cattle offal	2,600
Sheep offal	1,100
Goat offal	1,050
Fresh fish	9,000
Cow's milk	17,350
Goat's milk	16,000
Skimmed cow's milk	20,000
Condensed cow's milk	1,400
Eggs	3,000
Butter	1,200
Sugar	10,500
Soumbala	870
Peanut oil	1,045
Sesame oil	1,400
Cottonseed oil	350
Shea butter	7,000
Millet beer (for the record)	102,500
Kolanut (for the record)	14,750

TABLE III

UPPER VOLTA - STATUS OF PRODUCTION 1965 - 1966 SEASON

Products	Quantity (tons)
Sorghum	687,000
Millet	410,000
Corn	171,000
Paddy rice	38,000
Fonio .	7,000
Voandzou	39,000
Niébé	106,800
Potatoes	
Yams	33,400
Manioc	6,500
Sweet potatoes	26,500
Peanuts (with shells)	131,000
Sesame	12,000
Shea butter	5,000
Cottonseed	9,500

## THEMATIC PRESENTATIONS

### NUTRITION AND HEALTH

by Dr. Bénitiéni Fofana

Errors in diet, disparity between food availability and demographic growth, protein shortage, and food additives are the main factors which have always made up the relationships between nutrition and health and still remain current problems.

Jacquot (1) quotes McCallum as follows: "The people who have developed, who have become strong, who have been organized for work, who have an appreciation for arts and literature, who make progress in science, these people are the great consumers of milk." Then there is Professor Trémolières(2) who heads a chapter of his elementary textbook on human food, "Food as Preventive Medicine."

On the other hand, Dean (3) states: "Current fashion expects malnutrition to be blamed for everything disagreeable that happens to the African and it is naturally believed that good sustenance will lead to a new African world. Now, we shall never perfectly understand the role of malnutrition for food is not improved by itself."

These different ideas reveal the importance and complexity of the problem. The correlations between nutrition and health, although positive, require a delicate and discreet interpretation. Indeed, outside of obvious cases of deficiency diseases, it is not always easy to establish the relationship of cause and effect between the nutritional state and the state of health. However, a series of observations and studies lead to the opinion that nutrition and health are two closely related states. These interrelationships are most easily shown with the infant. This is what we are going to endeavor to examine together.

#### A. EFFECT OF THE NUTRITIONAL STATE ON GESTATION

Some experimentally proven observations tend to show that a poor nutritional state on the part of the mother can affect the infant soon to be born. The deficiencies, however, must be serious and prolonged, especially in the course of the last three months, in order to have an effect on the fetus. Thus, hemorrhages of the newborn infant owing to vitamin K deficiency, and infantile beriberi

in infants born of mothers in a state of vitamin deficiency are standard matters of record.

Therese Terroine (4) shows that different vitamin deficiencies (deficiencies of folic acid, B<sub>12</sub>, pantothenic acid) determine an array of common gross disorders in the proteic and nucleic metabolism of the brain and liver of the embryo, including a slow-down of the metabolism and reduction of the ADN, ARN and the protein nitrogen. These conditions are eventually expressed by various malformations. Platt and Stewart (4) have noted various disorders of gestation and embryogenesis in the case of a dog bitch placed on a protein deficient diet. Observations made in Holland, Germany, and France have shown that infants born during the periods of deprivation of the last war had a sub-standard birth weight. It is estimated (without substantial proof) that in Africa many cases of neonatal deaths, abortions, or premature deliveries, as well as birth weights generally less than 3 kg, can partially be explained by the nutritional deficiencies of the mothers.

#### B. NUTRITION AND THE MENTAL AND PHYSICAL DEVELOPMENT OF THE INFANT

Like weight at birth, the mental and physical development of the infant is a function of many mesomorphic, neuroendocrine and genetic factors, among which food holds an important place.

Food deprivations of the last war were expressed in France by a reduction in size of infants of from 4 cm to 6 cm and a deficit by weight from 3.5 kg to 6 kg (Trémolières) (5).

From the comparative study made on the growth of the African infant (Dakar) and the European infant (Holland) it is clear that the African infant born with a slightly lower birth weight than the European baby's, but nourished by mother's milk, does not delay in catching up and even overtakes the European infant until the age of 6 months\*. It knows very early how to hold its head, follow a glance, recognize a family member, crawl, play -- advantages linked to the mother's nursing and the mother's constant presence.

However, beginning from the sixth month, its growth slows down and its curve deflects to become lower than that of the little European. Then at 2 years of age it shows a deficit by weight of from approximately 1 to 2 kg with a fair general state of health,

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\*According to Dr. Martineaud, recent research has shown a marked improvement in the growth of the European infant, which from 0 to 6 months has a curve identical to, if not better, than that of the African infant. This is owing to progress made in the infant's diet.

reduced trophic state, protuberant belly, and loss of liveliness. These are all signs pointing to latent malnutrition. In case of the advent of an intercurrent inflammation at the critical period of weaning, the infant risks declining into kwashiorkor or marasmus.

The fact is that at 6 months and well before this period, for some substances such as iron, ascorbic acid, and vitamin D, the mother's milk, although irreplaceable, is not sufficient by itself to take care of all the infant's needs. Owing to tradition or out of ignorance, in a number of regions the African systematically introduces supplementary foods into the diet only at a late date or not at all before weaning. In fact, if supplementary feeding is begun, it is limited to some light gruels which mask the real situation.

Latent or apparent malnutrition leads to a lag in height and weight, as well as a lag in bone structure formation. Walking can likewise be delayed. The infant is more delicate with respect to infectious or parasitic diseases.

The incidence of malnutrition is poorly understood in Africa. Some people see it everywhere and others deny its existence. The reality is that it does exist. Professor Senecal finds, in the course of a systematic investigation, that there are nutritional disorders in 25 percent of the Senegalese infants investigated. Professor Satge observed that in 1965 there was a background of nutritional pathology in the case of 50 to 55 percent of infants hospitalized at Dakar. At Bamako from 1964 to 1967 we found in the pediatric clinic 415 cases of kwashiorkor and 1,050 cases of malnutrition out of 13,079 infants hospitalized. In Nigeria, clinical investigations revealed that 2 percent of the infants from the savanna regions and 9 percent in the forested region showed signs of kwashiorkor.

Mazer points out that in the Bobo Fings country in 1959 to 1960, among 1,146 persons, or 113 families, 46.8 percent of the infants from 0 to 12 months and 25.5 percent from 1 to 9 years, had a mediocre general state of health.

Malnutrition imparts a dramatic character to the most commonplace diseases. Indeed, the fact that infantile diseases such as measles have such a murderous effect in our country is undoubtedly owing to lack of care and sanitation. However, the effect may also be attributed to the fact that these diseases develop on grounds which are frail and precarious owing to malnutrition.

As an indirect consequence, the infant mortality rate in Africa is estimated as follows:

from 1 to 12 months - 150 and more per thousand as against 20 to 30 per thousand in Europe;  
from 1 to 4 years - 50 to 80 per thousand as against two to three per thousand in Europe.

Keep in mind that according to the statistics of Senecal and Dupin, as well as those of Dean, 85 percent of the cases of kwashiorkor are found in children between 2 and 3 years of age (when weaned).

### C. NUTRITION AND INTELLECTUAL DEVELOPMENT

As for the relationships between intellectual development and food, they are rather poorly understood, although much research is being devoted to this area at the present time. The problem is to find out if severe malnutrition in the first months of life can lead to a reduction of intellectual development. It is quite a complex problem when consideration is given to all the associated factors: genetic, socio-economic, cultural, environmental factors, etc. Moreover, the techniques for determining the mental age or I.Q. are far from being perfect.

Nevertheless, the following facts could be used: certain in-born errors of metabolism are accompanied, among other symptoms, by an intellectual retardation or even mental backwardness. These are chiefly disorders of the metabolism of lysine, methionine and the excretion of dihydroxyphenylalanine. It is, indeed, a matter here of congenital or hereditary anomalies. But, is the overall or specific food deficiency capable alone -- that is, to the exclusion of any congenital defect -- of having an effect on the intellectual development? At the very best, it can be said that once weaning has been accomplished, that is, beginning from about 4 years of age, the infants suffering from malnutrition more or less rapidly make up for their lag with respect to height and weight. The fact is that, a priori, nothing authorizes the statement that they will be more or less endowed than the others -- assuming that all things are otherwise equal. It would, therefore, appear necessary to carry the investigations forward to establish what becomes of those suffering from malnutrition before being able to arrive at a conclusion.

D. ETIOPATHOGENIC REVIEW OF COMMONLY OBSERVED NUTRITION DISORDERS

1. Protein-Calorie deficiency -- caloric deficiency or overall deficiency

This causes marasmus -- the lot of poor families -- occasionally worsened by ignorance or twin births. The disorders which arise are the consequences of autophagia consequent to inanition. As shown by the school of Tremolieres, the individual tends to spontaneously adjust caloric ingestions as a function of the protein rate of the ration.

2. Protein deficiency -- especially as concerns animal proteins

The principal form in which protein malnutrition occurs is kwashiorkor. Protein malnutrition is the most widespread deficiency.

Bearing in mind that proteins make up the basic constituent of our tissues, enzymes, and hormones, it is easy to imagine all the consequences proceeding from a hypo-protein or protein deficient diet of long duration: digestive disorders; disorders of intermediate metabolic functions; slowing down of the biosyntheses, from which arise macrocytic or megaloblastic anemia leading to hypoxia. The lack of immunoglobulin opens the door to infections and enzymopenia occurs at all levels with more or less specific disorders.

All these disorders are a consequence of the lack of raw materials and more generally, of essential amino acids. Thus, the lack of sulfonated amino acids could explain disorders of organs responsible for growth of hair, nails, and teeth. Lysine is necessary for the growth process, and others.

3. Vitamin A deficiency

This is found in the savanna and sahelian zones and above all, during the long periods of drought when fresh vegetables and fruits are scarce. The disorders observed arise from the multiple functions of vitamin A: protection and trophic state of the epithelial tissue; osteogenesis; biosynthesis of progesterone; and, above all, night vision, according to the following chemical reactions:

retinol-----=retinene;

+

reductase (DPN)

retinene + opsine-----=rhodopsin or visual purple  
impregnating the rods;

rhodopsin + light-----=nerve-impulse.

In order to restore the visual purple there must be a new addition of vitamin A which is stored up in the liver which can contain up to 20 mg/kg of newly added vitamin. In the absence of a vitamin reserve, there will therefore occur amblyopia or night blindness (improperly still called nyctalopia or hemeralopia).

#### 4. Rickets

It is not uncommon to find rickets in one's practice latent in the costal ribs or appearing as a craniotabes. Bear in mind that rickets is not the consequence of a simple vitamin deficiency but also results from a deep-seated phosphocalcium imbalance which, under normal conditions, can only be corrected by calciferol within specific limitations. Rickets even appears with an appreciable vitamin D rate on either side of these limitations.

It is possible that the disease is assisted or caused among our people owing to use of clothing which remove the infant from the effect of ultraviolet rays.

#### 5. Vitamin B<sub>2</sub> deficiency

Ariboflavinosis occurs frequently with infants and is characterized by various mucous lesions, as well as perilimbic hypervascularization, cheilosis, and tongue with poorly developed papillae.

#### 6. Vitamin C deficiency

Scurvy is rather common with children of preschool age and its symptomatology proceeds from the trophic effect of ascorbic acid on mesenchyme tissue.

#### 7. Deficiency of trace elements

The disorders arising from deficiencies of some trace elements are well-known: iodine deficiency in the genesis of endemic goiter; iron deficiency in the genesis of hypochromic anemia; magnesium deficiency in the genesis of neuro-muscular disorders. Disorders resulting from deficiencies of other trace elements are being increasingly specified.

Schaefer (6) (Nutrition Program, U.S. Public Health Service) reports that some cases of dwarfism and infantilism have their

origin in zinc deficiency. According to the same author, selenium probably has an effect on the macrocytic anemia incident to kwashiorkor as do chromic salts on hypoglycemia.

#### 8. Nutritional pathology owing to overeating

Contrary to the pathology of deficiency, there is a pathology of overeating whose most common manifestations are: obesity; some cardio-vascular infirmities (hypertension, coronary inflammations); some diabetes, etc. This pathology is the lot of developed countries. Many of these infirmities are the result of excessive consumption of empty Calories (excess fats, sugar, and alcohol) leading to imbalances and secondary deficiencies (chiefly those involving vitamins). The plethora is therefore just as harmful as chronic underfeeding.

#### 9. Nutritional disorders resulting from enzymopathy

We shall only make reference to this kind of disorder. This does not detract the slightest from the fact that concerned here is a subject whose scope continues to grow and whose study will someday explain a whole series of infirmities which have been a mystery until only recently -- whether it concerns the inability to tolerate lactose or gluten, or a matter of cystinopathy, or dysmetabolism of tryptophan or tyrosin. This new pathology (as for the discovery of its physiopathology) opens up new diagnostic and therapeutic perspectives.

#### E. FOOD STANDARDS

Special mention should be granted to this aspect of nutrition-health interrelationships. The phenomenal development of food technology, as well as processing and preserving methods has not taken place without danger. Can residual quantities of insecticides, additives of all types (dyes, anti-oxidizing agents, antibiotics, hormones) as well as ionizing irradiations be stood any longer without danger to our organism? Will the racemic compounds of synthetic amino acids and proteins of bacterial origin proposed for our consumption tomorrow be assimilable without harm?

It is the dawning consciousness of these different risks that led to the formation of the joint FAO/WHO committee to deal with food codes. This committee has for several years made efforts to define standards for processing and quality control of foods in order to guarantee their safety. Let us hope, therefore, that more and more States adhere to the food codes and that everyone will endeavor to respect the standard as fixed. This is to the advantage of all of us since we are all consumers.

## F. SOCIO-ECONOMIC FACTORS OF NUTRITION

In the same way that man's level of health is conditioned by his nutritional state so is his level of activity. Many writers, e.g., Lohman, Kraut, Keys (7), have studied the relationships between working efficiency and food intake. A reduction of the protein ration by 50 percent leads to a drop in muscular strength by 25 to 30 percent, a reduction of resistance to fatigue, and disturbances of psycho-technical tests. Hunger favors accidents at work and absenteeism.

In the opinion of Albert Sarraut, "The native does not work enough because he does not eat enough. He does not eat enough because he does not work enough." This is the well-known vicious circle of underdevelopment which has been discussed by many writers.

As we have said above, nutritional problems are not seen by all those in authority in the same way. Some of them recognize the problem as real, others accept it without great conviction, either out of snobbery or to bring pleasure to such and such an expert. Others systematically deny the problem's existence. However it may be, nutrition makes up a dynamic factor of social and economic development. Two sets of facts will be used to illustrate this.

### 1. Nutrition as a factor for development of human resources

The improvement of the nutritional status resulting in an improvement of general health contributes to the drop in morbidity and mortality, especially among the most vulnerable age groups, that is, the infants who have, up until now, paid the heaviest tribute to malnutrition and who make up the future of the nation. Consequently there will be more mouths to feed and more young people to take care of and educate.

In compensation, at the end of 15 or 20 years, this age class, fit for service, will be added to the human capital and join in production. Moreover, all things being equal, the operation then proves to be profitable on a long-term basis.

Professor Cepede recently stated at Hamburg that 25 percent of India's revenues is spent to nourish and maintain children who die before the age of 16 before they have been able to contribute to production. The reduction of this infant mortality rate, he continues, would increase the revenues of this immense country more than any effort towards industrialization.

## 2. Repercussions of nutritional problems on the economies of the developing countries

It is a fact that all of our States are resolutely engaged in the struggle against underdevelopment. It is also quite clear that Africa is not the continent of dramatic hunger in spite of some conjunctural difficulty here and there. Here, the nutritional problems are generally on the order of quality and take their source much more from ignorance than the lack of resources.

But will this remain true much longer? The studies of long-range forecasts made by the FAO are hardly optimistic. Indeed, our demographic growth, designated explosive, exceeds our productivity which has remained stationary these last few years. However, the economy of our States is essentially agriculture-based with more than 90 percent of the population living in the rural zone of agricultural activity.

Until recent years, the tendency was to grant priority to industrial crops (coffee, cocoa, peanuts) to the detriment of food crops. The consequences were not long in making themselves felt. Indeed, during these last few years, we have witnessed an increase in imports of food products which, according to the investigations carried out by Perisse (FAO), have progressed at the rate of 9.5 percent per year, or 12 percent of total consumption, 16 percent of total imports and 24 percent of exports. In this way, imports of wheat, wine and beer have more than doubled that of rice and more than tripled that of sugar. Parallel to this, the market price of our exports of raw materials was falling, owing to deterioration of exchange rates. If this tendency should continue, exports would no longer be adequate to ensure consumer goods, or more critically, to procure the absolutely necessary producer goods. As a result of this, economic development would become paralyzed.

It is to be noted that imports of food products are not always carried out as a function of actual needs, but in accordance with the tastes of the day -- with the risk of introducing new food habits to the detriment of traditional, and sometimes better balanced, diets. The flight from the country is favored by this and urbanization problems becomes more severe.

But our Heads of State appear to have become aware of the danger and the word of the day everywhere is now: diversification of crops to ensure a balanced and adequate food supply for the population.

With this in view, and taking our demographic evolution and availabilities into account, if we wish to produce an improvement in our nutritional state, our agricultural production will have to more than triple. With doubling, the production would merely suffice to maintain the status quo.

All programs currently in progress, national as well as international, are aimed at solving these problems whose solution depends upon global economic development, with every sector involved. The fact is that the role of health is not one of the least important.

G. ROLE OF THE PUBLIC HEALTH SERVICE IN THE STRUGGLE AGAINST MALNUTRITION

Although nutritional pathology has occupied the attention of physicians for a long time, the priority rests no longer with curative medicine but rather with the prevention of nutritional disorders by educating the populations to utilize available resources to the best advantage, on the basis that better production leads to better nourishment. In many regions, medical and paramedical personnel receive in the course of training those concepts of nutrition or food sanitation necessary for this educational task.

1. Education of mothers

The education of mothers is ensured by the Maternal and Child Care Centers (PMI), social centers, rehabilitation centers, and pediatric services. The mothers receive concise and basic ideas as to the needs of the infant, the infant's diet schedule, and the conditions for rational weaning. They participate in meetings for demonstration of culinary techniques and receive for their infants a dietary supplement in the form of milk or weaning foods of the CSM-INCAPARINA type. The UNICEF milk is known universally. These centers have been highly successful and continue to attract crowds of mothers.

However, for an effect in greater depth, the educational program should include:

2. Education of teachers

This is to introduce concepts of nutrition into student programs. The kindergartens and school canteens should put into practice the concepts acquired while at the same time improving the nutritional state of the children.

3. Education of farmers and instructors in agriculture and animal husbandry

This should be done so as to orient the production as a function of the actual needs of the population. Granted the lack of proteins, a special emphasis should be given to conventional resources: vegetable growing, raising of livestock, small family

plots, fishing, pisciculture. The popularization of truck gardening will contribute the absolutely necessary vitamin supplement.

4. Education of the different collective enterprises and those in political and administrative authority

This should be done through the agency of all influential groups or persons in order to correct faulty habits and modify states of mind.

In order to successfully carry out this program, it is desirable that the Public Health Service form a section for Health and Nutrition Education. An interministerial committee made up of representatives from different ministries should prepare the details of the programs to be undertaken and should ensure the necessary coordination.

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## GENERAL DISCUSSION

Chairman: Dr. Baba Kourouma

Mr. Batiebo (Upper Volta): Dr. Fofana discussed in magistral terms the relationship between nutrition and health; but it seems to me that we started with the end. Before discussing deficiencies or giving clinical symptoms for malnutrition, it is important to emphasize undernourishment, therefore, underproduction. After having studied the organizing of inter-African agencies whose purpose it is to resolve this first problem, then we can leave it to the physician to treat, to explain, and to recommend. In order to treat a patient, he must first of all exist.

Dr. May (Convener): The question raised by our colleague Mr. Batiebo is a formal rather than a basic question. The production problem that he rightfully desires to see discussed was already introduced in the inaugural address and more specifically by Mr. Ben Mady Cissé, Director of Rural Animation. These questions will be discussed again during the course of the themes which follow. If I am correct, the question of production will even be discussed this morning and, therefore, I feel able to assure Mr. Batiebo that he will be satisfied before departing this conference. Now, we desire to encourage the delegates to ask questions of Dr. Fofana about the nutrition and health problem.

Dr. N'Doye (Senegal): I have nothing but congratulations to extend to my friend, Dr. Fofana. Today, the individual views that we have concerning nutrition appear to arise from three conceptions: empiricism and man's adaptation to his environment; ideas of scientific feeding; the physician who experiments and applies his results to discover the physiological dimension of his subject. But Dr. Fofana has viewed the nutrition problem as a true scientist and also as a physician. For the empiricist, nutrition is above all an art and I wonder what part environmental pressures play in determining qualitative deficiencies in the diet, which is very greatly influenced by traditions, such as the concept of prestige food.

Dr. Kourouma (Chairman): Allow me to mention that the delegates may approach the subjects that we discussed yesterday since we have foreseen that a few minutes would be accorded to questions raised yesterday by the readings of the country reports.

Dr. N'Doye (Senegal): Thank you, Mr. Chairman. The Delegate from Gambia told us yesterday that eggs are prohibited because they are suspected of having the power to sterilize. She suggested that another reason could be that the adults want to keep the eggs for

themselves. Eggs are also forbidden in Senegal (though not as much as in the past) because it is believed that they prevent the child from speaking at an early age and also prevent the women from nursing. Professor Satge will agree with me that eggs might be the best or worst of things. Indeed, despite its eminent nutritive qualities, the egg can provoke mortal intoxication, especially in the vulnerable groups. The village elders had certainly condemned the egg, but the reason they gave had nothing to do with women becoming sterile.

Our Gambian colleague also suggested that among the causes of kwashiorkor might be the husband's eagerness to resume marital relations, which could or could not cause premature weaning of the baby. In this regard, I remind you that we still have polygamy, which might be beneficial to the husband. Social and cultural requirements never impose more than three months of continence which does not appear to be above human fortitude.

Dr. Fuller (Gambia): The last speaker has stated that he was concerned with my remarks about the effect of eggs on fertility. I should make it clear that eggs are only alleged to cause sterility in females, not in males. The other point made was about kwashiorkor being caused by early resumption of marital relations. This was intended to stress the importance of repeated pregnancies in the causation of kwashiorkor. It has been the custom in the Gambia until recently for sexual intercourse to be interrupted until two years after confinement and three years if the traditional period of breast feeding has been observed. Of course, I must point out that the Gambia is a Moslem country in which polygamy is permissible and is frequently practiced. Under these circumstances, the period of two years does not mean a period of absolute continence for the husband if he has more than one wife.

Dr. Mahoney (Gambia): Mr. Chairman, I think we need a point of clarification here. Like most African countries, the Gambia is undergoing a period of social evolution, so that, although there is still polygamy, we have found that there is a tendency towards monogamy, especially among the urban population. This is what precipitates frequent pregnancies in one wife, be she the only wife or the favored wife.

Dr. N'Doye (Senegal): The Delegate from Liberia told us yesterday that people in the rural centers of Liberia have only one meal per day. This greatly impressed us because in Senegal we are so accustomed to having three meals per day. I know that this is not the practice everywhere in the rural sector. However, the Delegate

from Liberia adds that the food diet of her country is satisfactory for two-thirds of the population. Are we to understand that this one meal provides 66 percent of the necessary diet?

Mrs. Nancy Nah (Liberia): We, the group from Liberia, would like to clarify the statement in our report concerning the FAO survey finding that one meal a day is consumed in the rural districts of Liberia. After working with rural families for 10 years I have found that the word "meal" has different meanings to different people. For instance, a rural woman might carry to the fields with her some food left over from the previous meal, or she might prepare what we can call an emergency meal, composed of cassava or cocoyams, sometime during the work day in the field. To her and her husband, however, this repast is not a "meal," for according to their interpretation of the word, a meal is something the woman has cooked that day. Although we, in nutrition, may not consider this food (which may be cassava or cocoyams, or some other sort of carbohydrate quite deficient in protein) to be a balanced diet, nevertheless, we must recognize that some food is consumed during the day in addition to the hot meal which the FAO has reported.

Dr. Gadagbé (Togo): Mr. Chairman, in order to reply to the comments, I would like to recall a study that we presented in Abidjan the other day. This study showed agreement with Professor Satge that the birth weight in Togo is lower than that found in certain European countries. The average birth weight for 500 children was about 1,922 g. and we think that there will be no great changes before a generation. The birth weight is nearly that observed during wartime in Germany, for example, or during the undernourishment periods in France, and we are quite worried about this. We know that the birth weight is influenced by malnutrition, especially during the last three months of pregnancy. It is during this period that the weight of the fetus increases fastest and it is also during this last three months of pregnancy that feeding the pregnant woman is a very important problem. We do not have any means for supplementary feeding of our mothers. During this last three-month period, the women work a little more than usual because they either want material or monetary reserves to cover the period when they are confined to the house with the young child. For this reason, they work even longer, adding fatigue to undernourishment because they want to economize. Therefore, malnutrition and pregnancy is one of our greatest problems.

Yesterday, we heard an analysis of the malnutrition and agriculture problem. The number of agriculture representatives among us is considerable; therefore, it is for that reason that, once again, I emphasize that we must find solutions and not bury ourselves in discussions only. Our agriculture and livestock should be able

to provide food and meat. The underfed women to whom I referred would be able to buy meat if its cost were cheaper. In Lomé, meat costs 200 to 250 francs per kilogram as compared to cassava which costs 5 francs per kilogram. When the wife goes to the market with 150 francs in her pocket, and a family to feed, she first buys starchy products for everybody, and proteins (small fish or meat) come later, if she has any money left.

Weaning and pregnancy! This is also a problem. Husbands send their wives back to the village to give birth so as not to have to pay the expenses of medical consultations or of giving birth in the organized clinics of the big cities. The wife nurses for a long time and uses ancestral methods of care. The husband and the family recommend breast feeding. We also recommend using this method for a long period of time in order to avoid the expenses of artificial milk. Yes, certainly, we have need for weaning products but they must be produced in large quantities so that their cost will be cheaper.

During this time, the husband is all alone. We speak about continence, but a man is a man; it is a physiological fact. Then he takes up with another woman, they marry and the first wife comes back to find a second wife. Thus, polygamy is perpetuated and perhaps it is an institution adapted to our economy. Perhaps we should reform this also. But where do you find the money necessary to keep the family together while getting rid of the mother-in-law or the second wife? This is also a problem which should be discussed here but we are not inclined to do it because our economy is not ready for a change.

Repeated pregnancies lead to premature weaning which leads to the child's death. Professor Satgé told us that within one to five years we will bury half of the children who shall be born, but if we bury half of the children who will be born, we lose our place in the sun as a nation. In our country, the death of a child is so banal that when a child dies, there is no ceremony; we bury him and each one goes his own way. Therefore, this problem must also be resolved. The woman must not wait until she is pregnant in order to think about weaning food. Let us not forget that, by priority, the woman must feed the man first, he who brings in the money; that is the reason why he gets the best part of the meal.

The children themselves have a long way to go to school. They do not return home at noon and they have only a small cassava cake for the entire day; therefore they sleep in class. When we give them a supplementary ration, their scholastic results are higher.

In the new schools which we have built with aid from FAO and UNICEF (from whom we receive supplementary food), the children show better results up through the time they receive their diplomas because they are less distracted and therefore work better.

The children whom we admit to our pediatric service are fed improperly regardless of the cause declared upon their admission. The symptoms of their sickness are completely different; we study in Europe and upon our return to Africa, we see symptoms that we recognize but under different and graver aspects. Parasitoses are partially responsible for this state of malnutrition: the treated children discharge 80 to 200 or 250 ascarides in two bowel movements. This quantity represents many milligrams of calcium excreted with the parasites. Feeding and sanitation must act together; we must purify our environment and that also requires funds.

For a long time we have denied the existence of rickets; but we are now persuaded that it does exist. We are at a disadvantage from an ultraviolet ray point of view, since the sun's rays do not penetrate through our forests. I do not mean by that that we must uncover all the country, but only that we must allow for better sunbathing by the population. For example, the young child is constantly carried on his mother's back because she must work, and the loin strap which fastens the baby to the mother's back absorbs some solar rays. There is also a question of economics. When the mother has more means, she will watch her children while they play in the sun. At this time we are organizing nurseries and kindergartens where mothers can leave their children while shopping.

As for the problem of iron, many of our plants contain iron, but most of these foods are considered products for poor people, well-known to you as "the unfortunates." We have the tendency not to utilize these plants anymore because we want to appear civilized. Our physicians are trained in the West in the Western image. We have started to prescribe pharmaceutical iron, but its cost is expensive. Therefore, we have been instructing the mothers for some time to make infusions with local products. We have set up a State Pharmacy in order to sell these products cheaper, but we have difficulties with the State Pharmacy. We cannot lower the price of the products below a certain level, so the people do not always come, they do not buy.

Another problem is the fact that Africa exports fish and meat. Do you not find this abnormal when in Africa we speak about the necessity for protein food supplements? Africa exports proteins and we must buy foreign proteins, sometimes from Argentina, at a

more expensive rate. Lakes Nyassa and Victoria abound in fish, but the fish is sold abroad. If it were sold inside Africa, it would be cheaper and we would have enough. According to the work of the Congo Research Institute, Lake Nyassa suffices to feed Africa with fish at a cheap price, but the fish is exported. Who is going to prohibit this? The Africans? We do not have the power to forbid it, because the only industries interested in fish are the foreign industries. The government which seeks to correct this situation enters into difficulties with the large economic and money powers. Therefore, it is truly a mass of nutritional problems that must be resolved and I believe that it is here that we must find a solution to all of this and this is why we have come.

Dr. Sai (Ghana): Since this is the first time I am speaking here I would like to add my personal thanks and the thanks of my delegation to the Government of Senegal and the Government of the United States for making this meeting possible. Those of us who entered the field of nutrition in Africa a long time ago are very happy to see how the number of our colleagues has grown in this time.

I would like to amplify a bit on a previous statement which, if left as it stands might cause some people, especially those who make political decisions relevant to nutrition, to make a decision which may not be quite right. The statement was that the major nutrition problems of Africa are qualitative rather than quantitative. I am familiar with a lot of the drier parts of Africa where there is only one rainy season each year, and I know that when the inhabitants of these areas produce grain, although on paper they harvest enough per capita per year, by the time the next harvest comes, even long before the next harvest, the insects and the rodents have so worked their way through these grain stores that the people do not have enough to eat. These are the periods to which we have given the name "hungry season" in English or soudure in French. This particular problem is a simple, straightforward quantity problem. It may not be quantity at the time of production, but it is certainly quantity during protection of crops, storage, and distribution.

Then there is another facet of the quantity problem and this is the aspect which is dependent on communications. Sometime ago, we had to deal with the problem of food production in the north. It was found to be easier to ship corn from the coastal area along a trunk road to the north than to collect food from the Ashanti and the Brong-Ahafo areas to send north, although on the map this would appear to be the logical thing to do. So I think we should not minimize the factor of quantity.

There is a third aspect to this problem of quantity, and that is the aspect of trade. If Africans do not learn to produce a large surplus of those things which they can produce better than anyone else, the idea of inter-African trade will fail. Therefore, even from the pure trade point of view there is a need to encourage, wherever possible, the production of surpluses, especially as far as grains are concerned.

The final point about quantity is that in spite of the bulk and the tonnage obtained from products like cassava and plantains, 60 to 70 percent of these products consists of water, and therefore in terms of actual quantity they are not very useful. Moreover, the overhead cost of transporting them makes them completely uneconomical products to handle.

Then there is the more intricate facet of the quantity component which is related to the protein deficiency situation in Africa. We have gradually worked away from concepts of protein deficiency to the statement of protein-Calorie deficiency because it has been realized that the bulk of the tired stomach is such that it cannot absorb all the nutrients required, especially Calories, because of the type of food it is faced with and the infrequency of feeding. The once-a-day meal in Liberia has been mentioned and my friend Dr. N'Doye stated that in Senegal they are impressed because there they have three meals a day. Well, in Ghana, small country though she is, we have three-meal people, two-meal people, and one-meal people, all in the same country, depending on the communications system, the economy, and the food supplies available. So there is a quantity problem there, too.

Someone wanted us to mention specifically some of the things we do to solve our problems. I know there has been quite a bit of health education. One thing we as health people would like some of our scientific colleagues to get involved in, is an assessment of what happens to the nutrition of children when extensive disease control measures are undertaken. We have, at the present time in West Africa, a wonderful opportunity for making an assessment of what happens if measles is controlled. I do not know whether the U.S. Agency for International Development is supporting programs aimed at evaluating the measles program in terms of its possible influence on the overt cases of protein-Calorie malnutrition, or any other malnutrition one may choose. I would like to recommend to our colleagues who are in the survey and scientific research field that this is a study which would have a very important significance to medical planning as it affects human nutrition in our countries.

Another subject I would like to discuss is the problem of fertility. Physicians always amuse me because they will talk about the population explosion, and they will talk about what they are doing about it; but when you ask them, "Why don't you try advising your patients not to think of fertility as if it is something which they cannot do anything about?" they say "I am a doctor; this is not my business." It is not their business as far as patients are concerned, but it is as far as their own families are concerned. Most of these doctors have limited their own families quite successfully.

With our social and cultural situation changing so that there is more monogamy, women are beginning to go to their husbands much sooner after childbirth; and, at the same time, we doctors are making a greater effort to save the children. The time has come for the doctors to try small experiments on whether lactation, even in a monogamous situation, can be made to go the full length although the woman is already going to her husband. If so, she is not likely to become pregnant again as quickly and it should be possible for her to carry this particular baby its full length on breast milk. I think this kind of study is called for because otherwise we will be talking in terms of credos. This is the time for us to make some of these very simple, straightforward epidemiological studies so that we will be prepared to meet our planners with facts.

Dr. Sow (OCCGE): Mr. Chairman, the comments of the Honorable Delegate from Ghana have confirmed my opinion that perhaps I can profitably raise an aspect of certain questions which, up to now, have only been alluded to in the program. My purpose is to try to relate nutrition and demography. I have been pleased to hear, both in the presentation of our friend, Dr. Fofana, as well as the comments of the Honorable Delegate from Ghana, that this problem has been thought about. Physicians speak of the vulnerability of infants; their arguments clearly tend to orient us toward child protection and, therefore, to keep alive the 50 percent of this age group which we lose annually.

The direct consequence of this attitude, should it be able to succeed, would be to increase the population pressure. Yet if we listen to the economists discussing the problems of developing countries, it appears clearly that the developing countries have the most food and nutrition problems and are the ones with the highest population growth rates, amounting to a population explosion.

Mr. Chairman, this aspect of the question has been discussed elsewhere and it has raised the problem of birth control in the developing countries. This question of birth control has been discussed in the various countries, and, indeed, the solution is a matter of national policy. But it is certain that there is a close relation between nutrition and demography. Mr. Chairman, in my capacity as observer and without attempting to develop the subject further, I would like to see this point raised during the course of this conference, especially in the study committees.

Dr. Tahiri-Zagret (Ivory Coast): First of all, regarding the presentation of our friend Dr. Fofana, I must say that we can derive nothing but satisfaction from this magistral speech.

Turning now to comments made in some of the country reports, yesterday, Dr. Campbell mentioned that despite an important consumption of corn, deficiencies in vitamin PP are not observed in Africa. In the Ivory Coast, before corn is consumed we soak it in water containing potash, which is obtained from banana skins and other rinds. It is possible that this treatment releases vitamin PP. This indicates the necessity of conducting a census of our traditional technologies. The Ivory Coast Delegation would like the delegates from the other countries to consider in their respective countries the study of methods supposedly archaic, but which could serve as a point of departure towards a more thorough understanding of the resources contained in our local products.

The Delegate from the United States of America emphasized that in her country there are still nutrition problems. To us this means that regardless of abundance of scientific and even technical developments, a country can always have nutrition problems. Hence, I suggest that, as soon as possible, we introduce the idea of scientific and technical research in our young countries in order to better understand our proper resources so as to base our dietetics on actual availabilities. Thus, we will thoroughly study certain harmful food interferences which are known as "antifoods." For example, we have ascertained that certain millet, supplied by the Infantile and Maternal Protection Center in the Ivory Coast, contains too much phytic acid which precipitated mineral salt of calcium in the diet of the feces, and prevented its absorption. Coprological examinations had allowed us to dismiss any parasite infestation. There was also the question of apparent carbohydrate indigestibility caused by millet rich in bran, which in turn engendered excessive phytic acid which precipitated calcium in the form of insoluble phytate  $\text{Ca}^{++}$  eliminated by the feces. In this manner the phosphocalcic ratio was disturbed and glucidic indigestibles provoked diarrhea.

Another example of food interference was furnished to me in the case of eggs prescribed for poorly fed children. Soon after, mothers noticed a loss of appetite, emaciation, and general weakness accompanied by diarrhea. Clinical and medical examinations dismissed the hypothesis of the presence of parasites or amebae. In this case we recommended that fresh coconut milk, an abundant source of biotin, be combined with the children's food. The state of health improved considerably. We can explain this by the important rate of biotin in the coconut milk, an indispensable element which was destroyed by avidin, present in the white of the egg. Here, there is a problem of informing and educating mothers: the egg must be sufficiently cooked in order to avoid the presence of an important amount of avidin, an amount responsible for this biotin deficiency among children.

Dr. Fofana (Mali): I would like to extend thanks to all the friends who have kindly congratulated me for my paper and I would like to try, within the limited time available, to reply very briefly to the few points that were raised by my colleagues. First of all, Dr. N'Doye raised the problem of quantitative and qualitative requirements and placed emphasis on a possible environmental influence. I think that as far as quantitative requirements are concerned, there is, indeed, a certain environmental influence. Consequently, and as a simple example, when you have heavy eaters in a family, the children risk becoming equally heavy eaters; obesity is recruited by the family. From the qualitative point of view, however, the question is quite different. Indeed, we have need for certain chemical elements, even if they are presented in the form of foods. In certain cases, pregnant women sit down and suck or even eat kaolin. I believe that this is because they are in a state of calcium deficiency and that they are attracted by these foods. The animals do likewise. Children, too, are attracted by a certain necessity. Besides the fundamental requirements, which appear to me to be more biological, I believe that the qualitative aspect does not depend very much on environmental influence.

To our colleague from Togo, I would say that I am entirely of his opinion. He has made pertinent skillful observations in placing emphasis, above all, on the economic problem. This is, perhaps, similar to our friend Baba Kourouma's point of view, namely, that health depends on economic possibilities. I believe that we tackled the problem backwards. First of all, it would have been better to emphasize the economy which, through its own improvement, automatically entails an improvement of the conditions.

This leads me to say a word from the demographic point of view. As Dr. Sow has said, it is a question of problems influenced by national policies. It seems to me that except for Nigeria, not another African country has declared itself in a positive manner on these questions. Of course, the demographic evolution of Africa is considered to be explosive, and it is felt that through birth control the problem can be solved. I believe that this is twisting the problem. Moreover, we must place emphasis on our economic possibilities. I think that we have not yet sufficiently drawn benefits nor have we exploited to the maximum the possibilities that are offered to man. The population problem appears to be too important and influenced by too much data for us to be able to take a stand here. All that we can do, in our very modest condition, is to attempt to promote, as much as possible, the development of resources within our range. There is my point of view on this very important question.

To our friend from Ghana, I would say that I share entirely his point of view on the quantitative aspect of nutritional requirements. I do not believe that I have minimized this problem, but I thought that it was known and that it was not necessary to stress it. It is certain that the hungry season problems in Africa are due to multiple causes; lack of foresight, for example, and perhaps also to the lack of sufficient distribution circuits. Dr. Sai placed emphasis on these particular aspects of nutrition which appear very pertinent and which deserve all our attention.

To Dr. Tahiri-Zagret of the Ivory Coast, I would say that I share his point of view concerning traditional technology. I would like to recall an experience that was reported on milling grain in Ethiopia. From a nutritional point of view, the traditional milling appeared infinitely more effective than modern milling, which tends to give simple carbohydrates to consumers. Excessive milling leads to equally excessive losses in nutrients, that is to say, losses in mineral salts and in proteins.

In the same order of ideas, Dr. Tahiri-Zagret evoked the classic example of corn, but it seems that it is a simple question of hydrolysis which was discovered by the English and which was put into practice centuries ago in Central America. Whether it be by potash or quick lime, the problem remains the same; it is a question of making a hydrolysis which releases the niacin contained in corn, thus assuring that the exclusive consumption of this commodity does not cause pellagra. This is contrary to the practice of the Europeans who had imported corn from America, but did not know the facts. They

did not import the recipe and therefore, particularly in France and Spain, pellagra explosions resulting from the consumption of corn were prevalent.

Dr. Tahiri has given several examples of the wrongdoings of a technology badly understood and the inherent advantages of a technology having a well-established traditional base. I believe that it is good, as he suggested, that we should take inventory of our traditional and technological empiricism instead of always seeking ultra-modern means, which from a nutritive point of view offer absolutely no advantages. It is the same concerning the classic steaming of rice. The super polished rice which we like and which we appreciate from an organoleptic point of view because it is pure, from a nutritional point of view is, nevertheless, inferior to the rice steamed by our traditional preparation processes. I believe that this point merits all of our attention and that it is necessary to take an inventory of our traditional means in the field of food technology, even at the risk of improving them, if need be, but attempting to safeguard as much as possible the few nutrients which are contained in local food commodities.

## NUTRITION AND AGRICULTURE

by Mr. Abdoulaye Samaké

The problem of feeding ever growing populations has become acute in all the States of West Africa. In addition, the economy of these States is essentially based on agriculture and this field of activity should enable countries involved to obtain abroad what they cannot procure for themselves by their own means.

Thus, the goal of agriculture in West Africa is production, first of all for feeding the populations and then for export so as to be able to derive those resources required for the financing of the different improvement and equipment installation programs.

African agriculture, however, finds it difficult to satisfy this twin goal. In spite of the large percentage of the population living from agricultural activities (90 percent) and the cultivable surfaces available, the production of food is generally inadequate to take care of the needs of the populations. This is the reason why the African countries are obliged each year to import food products (milk, sugar, rice, beverages), although these imports do not always satisfy actual needs. It is estimated that the imports of food products by developing countries have approximately doubled in a little more than 10 years (FAO report, 1967).

In the matter of industrial products, some of which play an appreciable role in food (peanuts, cocoa, coffee), their export, consequent to the fluctuations of world market prices, does not always live up to the hopes of the African countries. The FAO report points out that the receipts gained by developing countries from their agricultural exports have fallen by 2 percent in 1966 and by 3 percent for the three first quarters of 1967.

The diversification of crops and their improvement, protection of harvest, organization of the commercial cycle and application of one nutritional policy are some of the problems whose solution presently is the goal of all the efforts of the Chiefs of State of West Africa.

### FOOD CROPS AND INDUSTRIAL CROPS

Some unfortunate circumstances were required to bring the African countries to the understanding of the necessity for diversification of crops and, more especially, for the development of food crops.

In its agricultural policy, the Government of Mali has always granted much importance to food crops. But the priority granted food crops over industrial crops was specified after the cereal deficit recorded following the poor harvests of the agricultural season 1965/1966. Out of the total surfaces cultivated, approximately 82 percent are devoted to food crops (millet, sorghum, rice, corn, fonio, cassava, yams, sweet potatoes, cowpeas, beans), 16 percent to industrial crops (peanuts, cotton, hardy tobacco) and the remainder to truck and fruit crops. Agriculture is extensive on the whole. The farmer applies very few of the recommended crop techniques, and consequently receives low yields. The agricultural food crops, which thereby are insufficient, are used for the needs of domestic consumption. Export involves only the industrial products, these likewise being insufficient. The truck crops, which contribute appreciably to the food needs of the population and even are appreciably involved in exports, are not well-developed everywhere.

The commercialization of food crops may be placed in two fields: the domestic and the foreign. In the domestic field, commercialization consists in purchasing the surplus of their products from the farmers for centralization by the government in order to ensure the supply of the whole of the population. In the distribution of cereals, the needs of deficit regions must be taken into account (i.e., those regions not producing enough), as well as the needs of the cities and even of the rural producing districts which have no reserves during a certain yearly period (the interseason crop "gap"). It is only following satisfaction of all these needs that produced surplus can be sold abroad.

In the foreign field, the commercialization of food crops is almost nonexistent because of reasons given above. Some countries, however, one of which is Mali, show great capabilities for development of food yields and consequently for export. An economic agreement should now be set up between the countries of West Africa which should enable the mutual solution of the problem of feeding their respective populations.

Concerning the food crops of Mali, a heavy consumption of legumes is recorded in the cities, whereas the underfed rural populations hardly consume any. This explains the surplus which is apparent from this production, after the needs of the cities have been taken care of. Mali exported legumes in 1967 chiefly to the Ivory Coast and France.

In the field of fruit crops, whereas Mali produces mainly for its domestic consumption, some African countries (Ivory Coast, Guinea) supply African and metropolitan foreign markets with bananas, oranges, pineapples, etc.

#### AGRICULTURAL CREDIT

In Mali, the role of agricultural credit is to ensure supply of the farmer with agricultural equipment, fertilizers, pesticides and various products for the purpose of improving his productivity. In this way, the Agricultural Credit and Rural Equipment Service (SCAER), connected with the Bank of the Republic of Mali, ensures the equipping of the farmer according to three formulae: cash sale, loans until end of the season, and medium-term, five-year loans. Since the individual farmers cannot offer sufficient guarantees, the loans are always granted through the agency of cooperative bodies.

The harvests are financed in Mali directly by the Bank of the Republic of Mali which grants advances to the organized bodies of commercialization. The State firms concerned with commercialization are: Office of Agricultural Products of Mali (OPAM) for cereals, legumes and fruits; Malian Import-Export Company (SOMIEX) for peanuts and oil-yielding crops.

The purchases of cotton are carried out by French Company for the Development of Textile Fibers (CFDT), since the export of fibers is still within the jurisdiction of SOMIEX.

Financing is carried out on the basis of the commercialization forecasts as declared by the organized bodies referred to above. The Bank grants low-interest loans (40 percent) which are renewed depending on the justifications. These justifications are provided according to the certificates of taking over, attesting that the products have, in actual fact, been purchased and that they are in warehouse storage.

As pointed out above, the quantities of commercialized food products hardly succeed in satisfying the domestic needs of the country. It is for this reason that in 1966/1967 the food assistance supplied by A.I.D. to Mali (10,000 tons of sorghum and 1,500 tons of corn) allowed making up for the cereal deficit from commercialization.

The problem of the increase of agricultural products and foods in particular must therefore be solved. In West Africa, except for a minority of farmers applying rational agricultural techniques, the result is reflected in very low yields and in badly appearing harvests which are difficult to preserve. The agronomic research

services, found practically everywhere, endeavor to make available to the farmer those improvements allowing intensification of agriculture. Among the methods capable of modernizing agricultural practices and increasing yields per hectare are the following:

- the proper preparation of the soil (clearing-uprooting-tilling-harrowing);
- the use of organic fertilizer;
- the practice of rational crop rotation allowing agriculture to become sedentary and, in this way, avoiding cultural nomadism;
- the use of selected seeds;
- the adherence to sowing dates;
- the treatment of seeds with fungicide;
- sowing by row and using an appropriate density;
- the use of inorganic fertilizer;
- insecticide applications;
- the proper upkeep of crops (hoeing, weeding, earthing up, etc.);
- the connection between agriculture and stock-farming;
- the conditioning of harvests;
- the popularization of drawn agricultural equipment (plows, sowers, drills, harrows).

Among the reasons for inapplicability of these popularization topics, there should be mentioned:

1. The conservative mentality of the farmer who still remains oriented towards ancestral methods of agriculture;
2. The cost of the proposed improvements (fertilizer, agricultural equipment) which prevents the farmer from always having the means of procuring them;
3. The inadequacies of the personnel for agricultural popularization, in quality, as well as in numbers.

In my opinion, only the carrying out of the specific programs for development of agricultural production, combined with all the means necessary for their execution, will allow our agriculture to come out from this state of stagnation. Indeed, confronted with the demographic growth which we now record, the production of agricultural foods has remained almost stationary, in some cases, has even been reduced. The great majority of the peasants have not yet understood the advantage of increasing food production to compensate for effects of demographic growth. During our agricultural seasons, an educational campaign should be conducted on the topic "Nutrition and Agriculture" specifically to bring out the importance of the relationship between these two ideas, in order that the farmers may

profit from it and modify their attitude on the question. For very often, although the farmer knows that he cultivates, first of all, in order to feed himself and his family, he does not think that he has, in addition, fellow countrymen, city dwellers who do not cultivate but who count on the surplus from his food production in order to live. The tendency observed in some farmers and occasionally encouraged by some governments to have little to do with food crops in order to devote more effort to so-called cash crops should cease. Nevertheless, without wishing to sacrifice the second ones for the profit of the first ones, it is important that Africa take the road toward increases in food production in order to ensure the feeding of the populations, the first stage in the struggle against underdevelopment.

### MARKETS

The weekly fairs which are held in most of the large villages in West Africa constitute the markets where all commercial transactions take place. These markets do not have special customs, on the whole. The modes of transactions, nature of products exchanged and prices, vary according to the regions and the seasons of the year. Barter of food products is becoming scarce. The producer now prefers to be paid in cash, which allows him to obtain other commodities or products needed by him. It sometimes happens that product exchanges take place between stock-breeders and farmers or between the farmers themselves.

Concerning the sale of food products (chiefly cereals) on the domestic markets in Mali, the government regulates it, on one hand in the interests of the producers, on the other hand, to be able to control the distribution of foods among all social levels of the nation. This regulation consists in fixing prices with the producer, the determination of purchase or sale outlets and the normal conduct of commercialization operations.

The policy of the Malian Government as to prices is to stipulate for each product a national price to the producer. The Government had to increase prices beginning from the season just past, for the purpose of encouraging producers. This measure is being well-received.

Purchase outlets generally correspond to the large markets. No regulation has been instituted for the sale of other food products (tubers, cowpeas, beans). The period for the sale of cereals and other industrial products is from November to March. The farmer, having a product for sale, places it on the market and the purchases are made by a sales team of the commercialization body or by the representative of the village cooperative for the account of the firms referred to above.

Sometimes a sales calendar is set up (cotton, peanuts) to which the producer and sales team must adhere. The purchases are made by weighing on the scale and the producer can see on the spot the value in cash of the tonnage delivered.

It is up to the Government to take the measures required for the good development of the commercialization campaign price controls, collection and shipment of the products, temporary storage, etc. In parallel to official purchases, some merchants act for their own account and profit from the inter-season gap to resell to the farmers at exorbitant prices the very products which initially only cost them several kilograms of sugar or a few meters of cloth. The cereals purchased for the State's account are stocked on the spot at district (circonscription) level, and a part is apportioned throughout designated, deficit regions. During the inter-season gap, (July-August), the stocked cereals are returned to the populations. The peasant is obligated, at this time, to pay a higher price for the same grain which he had delivered three or four months before. He does not understand this idea which consists in causing the consumer to pay for the different expenses consequent to handling and protection of the food products. He has therefore, an interest in producing more in order not to have recourse to the State during the off-season.

Although commercial exchanges in the field of fruit and truck products exist between some countries of East Africa, the same is not true for food or industrial products. Even if these exchanges sometimes do exist, they are not organized. It would, therefore, be desirable for the interested countries to improve their commercial systems by the institution of regional markets which will allow a solution of the problem in the field of food products, which is the feeding of their respective populations. This would also allow them to promote industrial products on the world market.

#### NUTRITION

Cereals constitute the basic food in many countries of West Africa. Meat, milk and fish products are inadequate to take care of all needs; however, a greater consumption is observed in the city than in the country. The peanut plays a very large role in the feeding of the populations (paste, oil).

In the field of food, the great consumption of imported food products should be noted. These products are sometimes very expensive (e.g., sugar, condensed milk, salt). These costs heavily burden the family budget.

In a general way, the populations of West Africa suffer from malnutrition. The chief cause is a result of low incomes. However, aside from this aspect, it should be pointed out that the local food resources are not wisely used. Some local products, presently neglected, can become part of the menus and ensure in this way, an adequate nourishment. The consumer would have to be educated in this direction. The farmer should, in addition to cereal crops, expand his operations to leguminous crops (beans), which are very nourishing, as well as to the production of vegetables. The city and country consumer should not be limited to a single product for nourishment. Food should be varied without additional expense being necessary. The consumption of meat, milk, fish and eggs should take place within the scope of menus prepared at the family level. In a word, it would amount to carrying out a program of agricultural and nutritional development. Such a program will have to be worked out jointly by the different Ministries entrusted with the problem: Agriculture, Health, Education. For this purpose, it is absolutely necessary for the agricultural popularizers who will have to take action with the farmers to have the proper nutritional concepts. They will thus be able to advise the farmer, not only in production, but likewise, in the consumption of local products.

#### PROTECTION OF HARVESTS

The protection of harvests in Africa takes place in two stages:  
1) protection of standing harvests in the intra-African sphere;  
2) protection of harvests, either standing or in the warehouse, at the level of each state.

Concerning the protection of standing crops, an effective agreement has been established between the African countries engaged in the battle against crickets and birds. For this purpose, the two existing bodies (OICMA and OCLA) have joined to form the Joint Organization for Control of Birds and Crickets (OCLALAV), whose seat is in Dakar. The member countries are: Mali, Niger, Chad, Cameroon, Senegal, Ivory Coast, Upper Volta, Mauritania and Dahomey. The operational programs, planned at the directorate level, are carried out by four groups, set up in several East African States.

Mauritania-Senegal Group (Richard Toll)  
Chad Group (Fort Lamy)  
Niger Group (Zinder)  
Mali Group (Gao).

The operations of these groups involve crickets and birds, with priority awarded the former. This means that if the group is carrying

out operations directed against birds, and operations directed against crickets prove to become necessary, it will abandon the first operation to engage in the second. It is only after removal of the danger from crickets that it will return to bird control. This priority is understood, if the magnitude of damages from crickets is known. Following passage of a flight of grasshoppers on a field, the vegetation is completely destroyed: crops, leaves of the trees, grasses and shrubs, etc. Owing to timely and rapid intervention by capable services, these grasshopper invasions are no more to be seen. This result is attained by a constant surveillance of the breeding ground of the migratory cricket (Adrar of the Iforas in Mali) and by preventive controls.

The controls levied against birds have greatly allowed the reduction of damages committed by the quelea on harvests. It is estimated that the damages attributed to birds at the Niger Office, which was on the order of 25,000 tons of paddy per year, is presently calculated to be in the neighborhood of 10,000 tons, owing to the controls carried out by the Mali group of the OCLALAV. The results of the OCLALAV controls in Mali in 1967 (OCLALAV report), are reflected in the destruction of 19,650,000 birds in 3,729 ha of detected rookeries and nesting sites.

The struggle against other species of crickets preying on harvests, whether standing or in the warehouse, is entrusted at the State level, to a Service for Protection of Plants. In Mali, this service has restricted operations owing to its inadequate resources (personnel, products, equipment). At the present time, the anti-parasite treatment of the cotton plant tends to be popularized with the contribution of the CFDT. The greater and greater use of fungicide for the disinfection of seeds should likewise be noted. This product has given excellent results on millet, sorghum, and cotton. But there are grounds for solving the problem with insecticides for domestic use. Indeed, the products purchased by the farmer to disinfect his seeds are very often used in controls against rodents or warehouse pests. The losses owing to rodents, insects or molds on the products while in storage are very great. The Service for Protection of Plants is obligated in its control to limit itself to the outskirts of the capital where it only takes care of some public warehouses for cereal storage. The farmer and consumer find it very difficult to preserve food products.

#### CONCLUSION

In West Africa, agricultural production is inadequate to the food needs of the populations. The problem to be solved by the

interested governments is, first of all, the increase in agricultural food products. This, however, is not enough. In addition to the cereal products and starchy foods which make up the nutritional base in African countries, other products (legumes, meat, milk, etc.) or other methods for processing products can ensure a good nutrition. Therefore, parallel to the increase of agricultural products, a food policy in the true sense will have to be put in practice. For this, it will be desirable to institute nutritional programs in our agricultural schools in order that the agricultural popularizers may be able to educate the farmer as to the meaning of nutrition.

The organization of the markets, domestic as well as foreign (between neighboring States), should be the concern of the African Chiefs of State. The questions involving the protection of crops should be better examined with a view towards an urgent solution.

But all these questions will only find their response within the scope of a specific "Agriculture and Nutrition" program whose proper carrying out will ensure the well-being of the populations. The problems of qualified personnel, food, and means are just so many obstacles leading me to believe that only bilateral or multi-lateral assistance will allow West Africa to improve the nutrition of its population and thereby increase its agricultural production.

## GENERAL DISCUSSION

Chairman: Dr. Baba Kourouma

Mr. Ibrahim Touré (Ivory Coast): Food production is one of the most important problems of our country. Production must be logically oriented towards satisfying the tastes and needs of those who eventually consume the product. In the Ivory Coast, there are 90 different ethnic groups, each one with its own way of eating. Some eat rice, some eat cassava, and some eat other products. Consequently, we must anticipate by region the product best suited to the needs of the population. In a word, our production must be planned, not globally, but regionally. For example, in the Baoule region, where tubers are the basis of the diet, we concentrate on the production of yams and we anticipate educating the people to consume yams in balanced means.

Production also means waste. FAO has estimated such losses at 30 percent of the crop. Therefore, we must attempt to stop this loss through the processing of these products. It is with this goal in mind that we have created the Institute for Food Technology which has already performed good work and has developed a food prepared industrially, called "Yam Foutou." With its accompanying sauce, the whole meal is balanced and is well-liked by the consumer. We think we are now in a position to process the surplus yam production.

In all the African countries, we encounter the problem of the "hungry season." With us, it is a question of distribution, and in other countries it is a question of communication between the surplus zones and the deficit zones. I regret that our friend touched only lightly on the function of the Food and Nutrition Service within the Ministry of Agriculture. This problem was of concern to us recently in Rome, and I believe that we unanimously passed a resolution to that effect. Such an agency can be very small in the beginning and yet render important services in the planning of food crops. First of all, the information pertinent to the food situation must be collected and subsequently translated into terms of satisfactory diets, qualitatively and quantitatively. This service should also pursue the evolution of food crops throughout the territory and establish short-, medium- and long-range projections of the population's food requirements. This service should also be able to provide technical aid to the experts in education. Up to now, we have taught cassava or yam farming in the schools, but never the utilization of these foods.

To conclude, I would like to insist on the importance of coordinating the different services concerned with nutrition. In the Ivory Coast, we have at least five ministries concerned with the questions of food and nutrition; they work separately. The Government has decided to coordinate all of these activities and has created a National Committee (therefore interministerial) for Food. You will be happy to hear that this committee operates very satisfactorily at this time.

Dr. Fofana (Mali): I would like to take up three points concerning the statement of our friend Samaké. The first point concerns marketing. I would desire that this conference place all its attention on the organization of regional markets: there are natural complementarities between regions (for example, between coastal and savanna zones) that we should develop to intensify and improve trade so as to create a homogeneous food complex.

The second point concerns production assistance. Dr. Sen, the last director of FAO, had implemented an important program entitled: "Aid to Production." It consisted of coordinating all foreign aid so as to avoid duplication and rivalries among the different donors. I do not know what the results of this measure are going to be, but it seems to me that we must support it and solicit from the developed countries a little more aid to production, because this is where our whole problem lies.

The third point, which our friend Touré has already mentioned, concerns the training of our agronomists. I believe that the setting up of a section in our agricultural schools is not enough. Programs for agronomists and agricultural instructors should really include nutrition ideas which should be integrated into their training programs. This is what we have noticed, at least in the French School. Agronomists usually recognize soil and animal nutrition, but know nothing about man's nutrition which is, of course, an aberration.

Dr. Gadagbé (Togo): Mr. Samaké spoke to us about the trade in food products between France and West Africa. What was the purpose of this trade? Was it to obtain French commodities? Dr. Fofana just spoke about the reorganization of regional markets between countries. This is a very good idea and I recommend that there be an intensification of trade between our countries. Before 1959, Senegal had a surplus of fish; farm women from Togo came to Senegal bringing starchy foods, rice and yams, and took back to Togo bags of dried fish. This was a very good thing and it should be encouraged now. In the days of French control, we got rice from Mali, which

was also a good thing. From the complementarity point of view, it would be desirable if the organizers present here spoke about this matter to their respective Heads of State, so that relations between States, which sometimes have been tense, could be made easier through this trade.

Mr. Batiébo (Upper Volta): During the inaugural session, we were given a quick synopsis of the activities of our different countries. Professor May promised that these reports would be published in a final volume. At the end of this conference, we should not separate from one another without having unanimously adopted the creation of an inter-African committee to deal with these problems. We must thank the Government of Senegal and the Government of the United States of America for having made it possible for more countries (French- and English-speaking) than we have ever seen united before, to concentrate their attention on the problem of nutrition.

A little while ago, I said that we had inverted the order of the day and that we should produce food first before discussing disease. Producing requires diversification based on large-scale enterprises. The political question has then to be considered. All of us here must act as messengers to our respective governments so that the inter-African committee I previously referred to, may be created. Only large-scale operations reducing production costs will provide the solution to undernourishment. I am not yet speaking of malnutrition, which will be noticed only when the basic food commodities have provided the necessary Calories. When we will have attained this level of production, we will have to evaluate the best quantitative and qualitative requirements.

The question of demography raised by Dr. Sow is important. Upper Volta has manpower but it lacks good soil and good climatic conditions. Therefore, we first have to overcome adverse natural conditions and to be able to do this we must consider the subject of trade, which the delegate from Togo has referred to. Since the Ivory Coast lacks manpower, why not proceed with an exchange. For example, we could make the region formerly known as "Upper Senegal-Niger" the protein region, since livestock breeding is practiced there. A center could be set up, not with foreign experts, but with delegates coming from the 13 nations which are represented here who would plan production, exportation, and consider the problem of tariff barriers. We can see, therefore, that the problem of nutrition is a problem with parapolitical characteristics.

To conclude, we should also communicate with the international organizations and with the representatives of the bilateral and multilateral aid organizations. In this respect, I think, like many others here, I am sure, that limited monetary aid is better than great material aid. Let us not forget that material aid is subject to preconceived ideas. Barley, wheat, and other cereals that the donor countries produce do not mean much to us; but, after all, the most beautiful girl in the world can only give what she has! If they produce only that, that is all they can give. Therefore, we are going to propose to the study committees that are about to be formed, that they voice their views on this question. Besides, let us mention that the distribution of a given commodity on a determined scale raises the question of employing personnel to do the work, and also involves a problem of amortization of long-term credit investments. For my part, I would suggest to the great nations that their aid take the form of long-term loans, leaving to the local experts the role of finding a solution to the development and organization problems.

Dr. Omololu (Nigeria): Mr. Chairman, may I take this opportunity to say that it is a privilege for the Nigerian delegation to be present at this conference. We have until recently been unable to meet other West African colleagues, particularly from the French-speaking countries, and we enjoy this opportunity very much.

With reference to Mr. Samaké's paper, I would like to bring out two points. The first one is that the most effective way to improve the position of agriculture in West Africa is to make the Nutrition Section of the Department of Agriculture a very important office. As was already mentioned by the Delegate from the Ivory Coast, it is necessary to plan for the nutrition of the people in terms of agricultural production for a period of 5 or 6 years. In Nigeria, Liberia, and other West African countries, national development plans have not done justice to the importance of nutrition.

The second point I wish to bring up is the statement that the production of export crops is overemphasized. I do not think this is true. The economic situation of the individual governs his nutritional status to a large degree. Kwashiorkor and other animal protein deficiencies occur because the people are unable to buy animal protein. Therefore I think that in planning for agriculture we should plan for export crops. We in Nigeria thought that we were devoting a good deal of our energy to the production of cash crops, but on better scrutiny we found that only about 16 percent of our agricultural facilities is devoted to cash crops; the remaining nearly 84 percent is devoted to food production. In fact, the small amount of effort put into cash production is not even

receiving an adequate return. We made a study of the prices paid for export crops compared with the prices paid for imported materials. We noticed that, taking 1964 as the baseline, the prices for cash crops, such as cocoa and groundnuts, have been going down, while the prices of imported machinery and fertilizers have been going up. The gap is so significant that the need for a concerted effort by the West African countries producing these goods is extremely important.

If the developed countries would pay realistic prices for our cash crops - for our groundnuts, for our cocoa, for our other produce - we probably would not need any additional aid or assistance from them. If we received sufficient value for what we sell outside, we would be able to plan our agricultural productivity so that it would be commensurate with our nutritional needs. This is why I support the point made earlier that there ought to be a more effective marketing organization like that developed between Senegal and Nigeria and other groundnut-producing countries. I think this kind of organization should be strengthened.

Mr. Okpoti (Ghana): Mr. Chairman, while most of our people are engaged in agriculture, the yield is low. It would be important to find out what inducement can be offered to the farmer to get him to produce more. Low production is to some extent linked with the land tenure system. As tenant farmers, our agriculturalists produce whatever the land is suited to produce, but they are discouraged because most of the crop does not go to them.

The problem of nutrition and education is also important. Some time ago we received a shipment of yellow maize from the United States. Our people are accustomed to white maize and they would not touch the yellow, although this variety is more nutritious. We need to educate our people in the nutritional aspects of these various foods. On the other hand, since it is difficult to change food habits, at the same time research should be aimed at making local foods more nutritious. For instance, the nutrients of yellow maize should be incorporated into lines of white maize so that the people can eat what they like while receiving the benefits of a better food.

Turning to another point, we Ghanaians are offered milk or milk products by many donor countries. This is useful because, contrary to most French-speaking African countries, we have but few cattle. However, it is up to us, when we go back, to bring about the promotion of the kind of breed of dairy cattle that can help feed our children.

Mrs. Nah (Liberia): I would like to make two points. First, in Liberia we are faced with the problem of the decentralization of the African way of life. The rural population is leaving the village and coming into concession centers such as iron ore centers and diamond areas. It is vital to counter this trend by making the rural district so attractive that rural people will stay where they are.

Second, one of our colleagues said earlier that if people have money their nutrition will improve. I hope I misunderstood him, for I do not think this is true; even those who have money very often have the wrong diet. Ignorance is the big problem and even those with money need to be taught how to prepare better meals in order to raise healthier families.

Dr. Sow (OCCGE): Mr. Chairman, in light of the talks which have taken place, it seems that our purpose is to define: first, a policy for production and consumption, determined by domestic factors of each country; second, a policy relative to market outlets and marketing, also linked to domestic factors and to regionalization; third, a policy of foreign aid. These three aspects lead me to attack the problem which I alluded to this morning, and which our friend, Bénitiéni Fofana, said touches on politics and consequently is out of our field of discussion. It is true that technical problems of production, consumption, outlets, marketing, and foreign aid include a political aspect. This implies the necessity to call a working committee competent to discuss these political problems, before going on to the problem of a common market in West Africa.

Dr. May (Convener): I thank Dr. Sow for his remarks. I have noticed that another speaker has made the same suggestion and I am happy that the question has been raised. It will be up to the committees, which will be formed tomorrow, to make a recommendation on this subject which, of course, will be transmitted to our governments; but here we cannot undertake a political discussion.

Dr. Kourouma (Chairman): Honorable Delegates, here we are at the end of this morning's session. The Chairman wishes to extend thanks for the attention you have given to the debate. We can recapitulate the essentials of our remarks and of our formulated recommendations in a few words. One delegation here spoke of revolution. This is a word which shakes Africa when it is heard; it implies many exigencies, sacrifices, and imperatives. Certainly, there is a wide gap between self-sufficient and non self-sufficient countries. In order to ensure world peace, it is indispensable that those who are well provided consent to give the little asked of them, so that underdeveloped countries can also make their way

towards a better tomorrow, thanks to their own national efforts because these efforts must be, above all, on the national scale. Revolution means transformation from the qualitative point of view. Let us borrow an example from physics: if you take a ton of iced water and add ten tons of iced water, the revolution has not taken place in water; but if you take only 1 liter of water and you increase the temperature to the point where water becomes steam, then you have changed the nature of water from its original liquid state into a gaseous state; therefore you can say that you have made a revolution in water.

The strategy of human development starts first of all by favorably modifying human thought, passing from negative to positive, or from positive to superpositive, therefore changing man's mentality. Man cannot be considered as belonging to a developed country because within this country there are many buildings and roads, if the mind itself is not free, if man does not feel like a man and, if, as such, his conscience is not the beacon illuminating all his activities. This is the great difference between man and animals. Before acting, man thinks. When he wants to build a house, he thinks: there are so many people to house, it needs so many rooms. Take the example of the bees on continents all over the world since eternity: the bees have made their hives in the same manner; they decide about it and the hive is made; there is no idealization, no conception, no plans; representation is replaced by action. Therefore, we, the backward people in technical development, must start by making our peoples conscious so that they apply themselves to all tasks.

My second comment is that it is not with individual solutions that we can achieve great undertakings. Man considers himself superior; however, he does not always succeed in coordinating his efforts. Yet, microbes which are infinitely small know how to coordinate; we have never seen a single microbe attack man; it is always in large numbers that they work; the aggression is collective. In the same way, common solutions must be applied to common problems.

## NUTRITION AND CHILD FEEDING

by Mr. F. Peter Primus Kluga-O'Clloo

### WHY IS SUPPLEMENTARY FEEDING NECESSARY?

Supplementary feeding is necessary because it has been observed that in the lesser developed countries in general and in Africa in particular the level of nutrition is low. This has been demonstrated as a result of a number of nutrition surveys.

Most important of all is the lack of protein. There is data to prove that this deficiency has resulted in serious cases of malnutrition in 2 to 4 percent of the infant populations of the countries. The highest incidence is found in the areas where roots and tubers are the staples of the diet. Protein malnutrition is less common in the areas where cereals provide the basis of the diet. In addition, it has been noted that a swift passage from a cereal diet to a starchy diet can result in cases of protein malnutrition. We have observed this in Togo on the occasion of a survey of populations which had abandoned their ancestral habitat in the Sudanian zone where diets are based on cereals, to establish themselves in an area of new colonization where yams are cultivated on a large scale for the ultimate purpose of exporting these tubers to the forest zone. The number of children affected by protein malnutrition was significantly higher than the ratio found among members of the same ethnic group who had remained in the region of origin where cereals and legumes (like groundnuts, voandzou, and niébé) were consumed.

In addition to protein malnutrition, frequent widespread signs of vitamin deficiencies, such as beriberi and scurvy, are commonly found in most of the countries of West Africa. In the areas where starchy foods (roots and tubers) form the basis of the diet, and where green leafy vegetables and fruits (especially red and yellow fruit) are not consumed in abundance, iron deficiency anemia, calcium deficiency, and symptoms of folic acid deficiency are commonly found. These are made more serious by the inadequate consumption of protein.

Vitamin A deficiency is uncommonly found in areas where fruit, green leafy vegetables, and palm oil are consumed, but in the drier areas where these foods are available only during a short part of the year, cases of avitaminosis A are found in large numbers. The same can be said of ariboflavinosis which is found wherever animal proteins are not consumed in adequate quantities.

Intestinal parasites and transmissible diseases add their contribution to the deficiencies I have just listed to create a miserable state of health among children and other vulnerable groups.

It has also been found recently at Berlin, through studies made in cooperation with physicians from several areas of Africa in April 1962 (quoted by Dr. Gadagbé, Director of the Mother and Child Service in Togo), that in West Africa infant mortality rates were high, as shown by the following table:

<u>Country</u>	<u>Percent</u>
Ivory Coast	20 - 25
Ghana	20 - 40
Madagascar	18
Upper Volta	40
Togo	18 - 25

These rates compare with:

<u>Country</u>	<u>Percent</u>
Italy	8
Mexico	25
South America	25
Japan	3 - 4
Netherlands	3 - 4
USSR	1 - 2
France	2
Germany	3

It would not be fair to blame malnutrition for these high levels of infant mortality, but there is no doubt that malnutrition contributes a great deal to this state of affairs. We all know that in many non-educated African families, children do not get their fair share of the diet. The proverb goes, "Meat to the grownups, starch to the children" a sentence that children often hear when sitting around the table. Thus, the establishment of supplementary feeding is entirely justified. It consists essentially in bringing to the meal and into the diet such nutrients as are lacking. This should be continued until such times when food supply is adequate for the needs of the families, and when the families are educated in the problems of nutrition.

## PRELIMINARY OBSERVATIONS

Prior to establishing supplementary feeding programs, it is essential to gather some information needed to ensure proper adaptation of these programs to the environment considered. The most important data are related to the existing food supply and to the levels of nutrition prevalent among the population where the supplementary nutrition program is going to be established. Hence, a preliminary survey is essential. It should tell us:

1. If the deficiencies observed are the results of total lack or of inadequate supply of certain important nutrients.

2. If these deficiencies are the result of ignorance and lack of education among the mothers, housewives, heads of households, and/or if this ignorance results in bad feeding practices.

3. If nutritious foods, which could be making a valuable contribution to the health of these vulnerable groups are subject to permanent taboos.

4. If the local market is adequately supplied from neighborhood production sources and whether these supplies come regularly or intermittently. At this point, we have to stress that an important factor influencing the family's supply of nutritious foods is the low purchasing power of the populations in developing countries.

A thorough knowledge of these different items might permit an improvement in the general nutrition situation and in the levels of nutrition without distributing supplementary foods. Along this line, an intelligent nutrition education program established concurrently with an improved trade circuit could obviously help in raising the purchasing power of the population.

## FOR WHOM ARE THESE PROGRAMS INTENDED?

In establishing a supplementary feeding program, the highest priority is obviously to be given to the most vulnerable groups, that is, infants belonging to the population groups suffering from the lowest nutritional level, preschool children belonging either to low-salaried urban workers or to low-consumption rural families, school children from villages or towns who cannot return to their homes for their mid-day meals because of long distances, children from either rich or poor families whose diet has been found to be improperly balanced with an excessive intake of empty Calories and inadequate consumption of protective and development nutrients, lactating and pregnant women, and finally, but with a lower priority, adolescent workers, people recovering from illness, and teenage groups.

## HOW TO REACH THE TARGET POPULATION

The problem is different whether it addresses itself to accessible population groups or to isolated communities. In the first instance, the target population is best reached through health centers and mother and child care establishments. In the second instance, which chiefly concerns preschool children or any children, for that matter, who cannot benefit from school lunch programs or other food distribution programs (through health centers in mother and child care centers), distribution of supplementary food should be made directly to the families at their homes. Personnel involved are people specialized in nutrition education, sanitarians, educators, and social workers. If it is not possible for this kind of personnel to make home calls, either because there are no roads or for any other reason, then we must use our imagination and initiative to devise new measures to meet the needs of the situation. For instance, it is possible to give the weekly ration of food supplements to relatives of these target groups or to pregnant women by taking advantage of their occasional visits from the jungle to the village on market day or on any other occasion, such as religious ceremonies, youth gatherings, or traditional feast days. It could also be used to demonstrate the usefulness of these supplementary foods and to show how they could be integrated into the regular diet.

It is, indeed, extremely important to make sure that these supplementary feeding programs have a guarantee of continuity. Since they cannot be considered as emergency measures, they must be integrated into the normal curriculum of services provided to the schools and to the mother and child care centers.

If in special circumstances, such as a sudden threat of shortages, it is deemed essential to bring a quick improvement to the current diet of the people and the government finds it necessary to call upon foreign assistance, it must be remembered that this assistance can be only temporary. The program should be established in such a way as to allow its continuation after foreign aid has ceased. This aid can be represented by expert advice, equipment, or even imported foods. I insist upon the need for continuity. If the program were interrupted before it had reached its goal, the harm caused by such an interruption to the health of the children would be immeasurable. The recipient population, as well as those who had contributed to the designing and implementation of these programs, would be discouraged. Thus it is essential that these programs be set up in such a way that the recipient country can, after a certain length of time, undertake their management completely.

If supplementary foods must be imported to provide for the needs of the program, the choice of these foods should favor those items which could eventually be produced in the country itself. The preparation of the supplementary food should not be the occasion for unusual expenditure nor should it create new needs and new habits.

These programs must also contribute to nutrition education, economics, understanding of community development, and to a better utilization of the resources available so as to avoid wastage. The programs should also be geared toward the education of native personnel for administration and distribution of the supplements.

#### POPULAR PARTICIPATION IN THE PROGRAM

All steps capable of leading to a greater acceptance of the program among the population should be considered and taken. At the very beginning, during the exploration stage, the most influential people of the community should be involved.

#### USING SUPPLEMENTARY FEEDING PROGRAMS FOR THE IMPROVEMENT OF NUTRITION IN THE WHOLE FAMILY

It has been observed that the families of children who are beneficiaries of these supplementary feeding programs will gradually understand their usefulness, will adopt them, and will contribute to their continuity by investigating on their own how to improve their diets. Indirectly they will help spread these programs to other communities. This, of course, will be made easier by the spectacular results in health and development among the children and women who have received the supplements.

Such programs can also be used to introduce new foods that improve nutrition among certain populations. These new foods must be developed from local resources so they will be better adapted to the eating habits of the various social groups. Since the minds of children are more open to new ideas than the minds of adults, it is easier for children to appreciate these new foods. The parents whose responsibility it is to feed these new foods to their children will be persuaded of their value by the spectacular changes that they will bring about in the health of those partaking of the supplement.

## CONCLUSIONS

Major constraints are the lack of equipment, of funds, of qualified personnel, the inadequate number of schools and mother and child care centers, and the inadequate development of roads serving the hinterland. No one can underestimate the help that the United Nations Agencies, such as FAO, UNICEF, WHO, UNSF, and WFP give to those countries which present acceptable proposals. Bilateral assistance has also been very helpful. The Catholic Relief Service of the United States provided 82,143,549 lb of food during fiscal year 1967 for the total region of West Africa. OXFAM and CARE, to quote only a few, have also contributed to the feeding programs of the region. We all know the assistance to production that nations such as Germany, the United States, France, Canada, the Netherlands, and Australia are giving us every day. However, all this assistance does not quite reach the target; while we do not want to be dependent on foreign aid to solve our food and nutrition problems, the facts are there and we need more aid to production under various forms.

Excellency, Honorable Delegates, Experts and Scientists from national and international organizations, as you all know the children of today are the citizens of tomorrow, and I do not have to tell you how worthy it is to sacrifice funds, time, goodwill, and energy to make these future citizens stronger, more intelligent men and women capable of building the Africa of tomorrow. Millions of children, their elders, the adolescents, all those of the vulnerable groups, to whom I add all the rural laborers and their parents, all call upon your wisdom so that together we can find solutions to the problems of infant malnutrition during this conference.

## GENERAL DISCUSSION

Chairman: Dr. F. T. Sai

Dr. N'Doye (Senegal): For a long time I have shared the experience and the opinions of our colleague Mr. O'Cloo of Togo. Allow me to take the liberty of mentioning two practical agencies working with supplementary food programs. I am referring to the maternal and child care centers, which could be provided with an experimental kitchen to prepare food supplements, and kindergartens for preschool children. Presently, a country can evaluate itself by its state institutions for children. However, I must say that my government's claims in this regard are weak; we have very few kindergartens and very few nurseries. In town, we have private centers, which are very expensive, but in the rural areas there is nothing.

I would also like to draw your attention to an experimental aspect of the question. Up to now, our experiences with supplementary feeding are provided by Uganda, Kenya, Ghana, Senegal and Gambia, where spectacular results have always been obtained, and Mr. O'Cloo is not an exception to the rule. May I make the observation that these experiments have always been made in the best possible scientific conditions: these children have been treated and conditioned away from their homes. Under those circumstances, we do what we want with a child; but every time that we have undertaken the experiment in village surroundings, the benefits obtained were less evident and diluted in many. I think that the solution here is to be found at the village level in the context of rural markets.

At the present time in Africa, we know of seven formulated foods destined for weaning. I believe that Algeria, Nigeria and Ghana each have one, all different because we do not have the same staples. However, it would be better if these products were regional. Our experience is based on complementing millet and peanuts with an addition of vitamins. We had to abandon the idea of using fish because this product was not acceptable within the family circle; therefore, we recently replaced fish with milk. However, this experiment has not been concluded yet. I will return to the speaker's stand to speak about "Nutrition and Industry" and this will give me the opportunity to collect your experience and to study with you what measures we can use to accede to these weaning foods on a regional basis.

Dr. Fofana (Mali): Mr. Chairman, I would like to emphasize certain aspects of the very complete talk of our friend Mr. O'Cloo. Mr. O'Cloo has indicated all the advantages to conducting inquiries

before undertaking any supplementary feeding program. I believe that this point is very important, indeed, because before bringing something to the people, we must know what they eat and what they lack. With a few rare exceptions, there is usually something available locally to feed the population.

Supplementary feeding programs must be limited as much as possible. First of all, we should attempt to educate the population to get the most out of available resources. In fact, what are we lacking? A few vitamins and proteins? We have at our disposal protein sources that we can develop: our livestock, our river and maritime fisheries, and especially our leguminous plants, which can grow everywhere and of which some subproducts are exported. I am referring especially to the peanuts, despite the curse which has been placed on them since the discovery of aflatoxin. There are also cottonseed cakes and only yesterday Colonel Toury was telling me about the very conclusive experiments he had made with cottonseed cakes. With cotton, too, there is a handicap in gossypol; but there are actually some varieties of cotton that contain no gossypol. Therefore, I believe that we can attempt to valorize the by-products of our industrial crops to develop food supplements for the children. Thus, our rare foreign exchange will not be exported; these products could give way to small connected industries which would promote agriculture while providing necessary protein complements.

There is also a great possibility to develop market-gardening crops in Africa. With some alterations, we can grow vegetables in all seasons. It is, therefore, a question of coordinating and planning these activities before thinking of importing products.

We are aware of the dangers of basing supplementary foods on imported commodities. For example, milk is very expensive for us and we do not have enough to cover all our requirements. At times, certain types of milk have been labeled "poisoned presents" because the necessary precautions had not been taken from the start. This milk, or these foods, had been given to the population as a right; we accustomed the people to this munificence and the day when imported milk was lacking, the population was not pleased. We must avoid this situation and consequently stress our local possibilities.

I should like to tell you an amusing and significant anecdote. When we say "purée" we think only of potatoes. A mother who had been hospitalized with her kwashiorkor-afflicted son had noticed that, in addition to other foods, her child had been given mashed potatoes; the child was cured. Upon returning to her village, the

mother thought that it would be necessary to have some potatoes in order to prepare "purées" and then include dried fish or other types of protein. When she returned to the hospital for the second time, she was asked why her son had become sick again. She replied that she had searched in vain for potatoes and consequently she was unable to give the recommended dried fish to her son. If, during the mother's stay at the hospital, some maternal education had been provided along with her son's treatment, she would have been told that local resources (cassava, sweet potatoes or eddoes) could have been used just the same as potatoes to mix with fish.

I would also like to say a word about the nutrition of the workers, to which Mr. O'Cloo has made an allusion. In the Ivory Coast there was a pineapple cannery where the workers consumed large quantities of this very sweet fruit while doing their work. It was discovered that a certain number of the workers were diabetics. Why? Because they did not have the level of vitamin B<sub>1</sub> intake necessary to metabolize their carbohydrates. I believe that, considering our industrialization projects, we should give some attention to the question of supplementary feeding for a certain category of workers. FAO is very much concerned with these problems.

Dr. Forman (United States): Not long ago we looked into the history of supplementary feeding and we discovered that the concept and practice existed in ancient times in special circumstances; for example, in Aztec history when both parents were required to work there were government-instituted supplementary feeding programs for children. In most of the cases we know about, supplementary feeding was instituted for a particular purpose and phased out when the special conditions ended. The concept of supplementary feeding for children in developing countries is, for the most part, a post-World War II phenomenon, a relatively recent activity which began initially in response to relief needs of war-torn countries. The United States and the other major grain-producing countries had surpluses of food because agricultural productivity had been stepped up during the war. There then developed a program of transferring food from those nations with surpluses to people in countries where there was need. This type of "relief" program should be terminated when the justification for relief has passed. On the other hand, supplementary feeding programs, i.e., the organized distribution of food to children of either preschool age or school age, can serve a very useful purpose as a permanent program, as a permanent service of governments to people. In the same way that other health or education services are often government-provided this activity is being given increasing attention by governments and private organizations.

If governments do undertake to have such programs they should recognize the consequences of initiating them. Some governments have started supplementary feeding programs because they seemed relatively easy and there was an offer of assistance from an external source. For a very small output of money for expenses, countries could avail themselves of a very considerable resource, and certainly there was need for the programs. However, when such programs lack serious planning and understanding of commitments and obligations by the host government, they are very vulnerable. If there is any fluctuation in the external assistance, the program suffers and, of course, ultimately the recipients of the food also suffer.

There have been instances where people get used to this service and want to retain it, and sometimes there are even political repercussions as a result of terminating feeding programs. One day food is there and the next day it is not, and woe to the political leader who is identified as the one taking this from people. Therefore, governments should make a conscious rational decision as to whether or not they want to initiate, or as in the case of many countries who are already involved, whether they want to adopt on a permanent basis, a supplementary feeding service for preschool or school age children. They should consider the ration, the diet, whether or not to use this type of program to modify eating habits and change tastes, and so forth. They must consider how they are going to include this program in the budget of the country because it costs money to make the food available to children.

The advantages of these programs must be weighed against the disadvantages to which I have referred. The advantages are: getting food energy for people promptly, on a large scale where there is need; increasing the work capacity and attention span of children by putting food into their bodies at the beginning of or during the school day; and educating people to the use of new foods. We have ample evidence that food habits are one of the hardest cultural habits to change in adults but they are not too difficult to change in children. We know, for example, that when people migrate from one country to another the adults take their food habits with them, even when doing so is more expensive than eating the local food. They do not change over to foods which seem less spicy if they are used to spice and vice versa, yet children easily adopt new food habits.

The major point I wish to make (and I confess that I am an advocate of organized child feeding programs) is that feeding programs

should not be "backed" into but be carefully considered by governments and organizations, and a decision made as to whether or not these are services they really want and can afford.

Dr. Sai (Chairman): Thank you, Dr. Forman. There is indeed, a need to make this difference which you tried to bring out. However, I want to broaden the discussion of this subject a bit because I know that in some countries in Africa the supplementary feeding programs are based on the addition of specific nutrients to a basic food. For instance, in some countries which have maize meal, donated milk powder is not used as milk but rather is put into the maize meal as an enrichment before it goes into the supplementary feeding program. I think it would be useful if those countries who have had this experience would come forward and share their experience with us.

Dr. B. A. Johnson (Nigeria): In Nigeria we are very much concerned with the production of high protein foods for women and children because most of the children who are weaned on traditional foods suffer from kwashiorkor. Therefore, we try to encourage mothers to wean their children on high protein foods, such as enriched maize flour since maize flour is one of several diets on which mothers often wean their children. We have found that if soy flour is added to maize flour to raise the protein content, we can increase the protein intake of children without changing food habits. We use 75 percent whole maize flour and 25 percent soy flour. We are dependent on the United States to send us our flour for such work and for the production of our high protein food. We are hoping that in the very near future we shall have enough money to set up our own such factory where flour could be produced.

We are now embarking on another project as well. Cassava is a great staple in the diets of most West African countries, and we are now trying to fortify it with groundnut flour and soy flour. You either use groundnuts or soy flour to fortify cassava flour and then make bread with it. We got this idea from the Dutch. I imported about 100 loaves of Dutch-made fortified cassava bread to find out if the Nigerian people would like the taste of it. Although I met with much resistance (some people found it to be horrible), I will say that I think the lower classes, for whom this type of bread would be useful, will like it. For one thing, it is very, very filling. It is so heavy that if you eat half a loaf of it you only need 2 or 3 pints of water to be able to go on with your work. We want other ideas like that to add more protein to our food for the children and for the adults. I think supplementary feeding for our children is actually a very good thing which we must all try to achieve.

Mrs. Pearce-Marshall (Liberia): First of all, I want to take this opportunity to express our thanks to the organizers of this conference and to convey our sincere appreciation for being invited to attend this very worth while and educational meeting.

I would like to make a comment on the subject of child feeding. We in Liberia are very interested and concerned with both complementary and supplementary feeding. As a Department, of course, we emphasize breast feeding because we have observed in the children's clinics throughout the country that mothers are imitating complementary feeding, which we call bottle feeding, mainly because they see a neighbor giving her baby a bottle and feel it must be the best thing to do. We did a simple little survey among mothers attending clinics, asking them why they bottle-fed their babies, and the replies were: "Oh, I don't want my breasts to get out of shape," or "I have to go to work." (In Liberia today many women are working to increase the family incomes.)

We get assistance for supplementary feeding from international agencies such as CARE and Catholic Relief Services. We use supplementary feeding as an educational project to teach mothers that their children do need additional foods. While giving them the skim milk and other baby foods we get from the international organizations, we emphasize the need to utilize locally-grown foods, such as fruits and leafy vegetables. We also urge the use of fish and meat where they are available. There is a common taboo among our people against giving children any fish or meat until a certain age because these foods are believed to cause worms in children. This is a very deep, secret feeling and we are trying to educate the mothers away from that idea. We are trying to get them to include high protein foods and foods that are rich in vitamins and minerals in the diets of their babies in order to reduce the incidence of kwashiorkor and marasmus. We find a lot of kwashiorkor and marasmus among children in the 6-months to 2-year age group, so we place a lot of emphasis on nutrition education for mothers.

As our speaker said, we feel that bringing in food from an outside source serves a purpose, but if we do not step up our health education program, when this food is cut off nothing will have been accomplished. Health education is really the pivot upon which our nutrition education program should be hinged, and all categories of personnel, including the churches and other organizations, should take an active part in this education as to the preparation and storage of necessary foods. We have plenty of fruits and vegetables. We eat the vegetables but we do not eat as much of the fruits as we could eat or should. As you go through the country you can see

oranges, pawpaws, avocado pears and other fruits. When they are ripe they sometimes just fall on the ground and rot there; so one can see that nutrition education is essential.

Dr. Sai (Chairman): Before I call on the delegate from Togo, I would like to state that it is probably necessary for us to look at this subject a bit more closely, especially the way Mr. O'Cloo presented it. He talked about the child under 1 year of age, about the preschool child, and about the school child. So far, the statements of the various speakers following Mr. O'Cloo have glossed over these differences. I am sure that in supplementary feeding programs for these groups the difficulties, the possibilities, and the methods of approach might be completely different. I think it would be useful if some of the speakers would try to bring out these difficulties and some of the approaches and methods of evaluating them.

Dr. Gadagbé (Togo): Our friend O'Cloo made allusion to the shifting population problem which has provoked malnutrition problems in our countries. This is very important for us because poorly cultivated, poorly maintained, or poorly exploited areas have raised problems. We have been able to resettle several populations through various methods. When governments consider this problem, they do not study the nutrition questions. A population which was nearly balanced as far as nutrition is concerned, like the Cabrais, moved into areas where it found different food possibilities; cereal eaters are moved into yam producing areas; hunters settle where there is no game.

As concerns corn, the fact that we prepare it with potash fortifies it a little in vitamin PP, but corn used in this manner in the Ivory Coast is not appreciated very much in our country; it is a dirty paste which does not have very much taste. We prefer to let our corn ferment for a few days; this is time-consuming and does not enrich the corn with vitamin PP. As a result, we have simultaneously kwashiorkor and pellagra syndromes. Therefore we need an additional supplementation.

Pregnant women also have need for a special supplement since we want to increase the birth weight of our babies. In our country, we have many premature births, not because they are born before their time, but because of their insufficient weight, often less than 2 kilos. In the rural areas, the birth weight is even lower and this creates difficulties during the first three months following birth.

As concerns preschool age children, they do not have a proper diet. This morning I told you that the children receive only a small portion of meat, or fish, served at the dinner table, because it is the most expensive product and because this product goes to the breadwinner, to the man. Therefore, we have an educational problem. The efficiency of school children is low, and by 10 o'clock in the morning, they become dizzy and eliminate the little they have eaten. Many children are brought to our school health service and we find that up to 10 or 15 a day are in a hypoglycemic state. They are children who are underfed; when we feed them, they are cured. They eat a bowl of akassa in the morning and leave for school; at about 10 a.m. they are hungry; the same thing happens in the afternoon. They also need supplementary feeding.

Theoretically, these supplements could be based on fish. We have enough fish in the capital cities and on the coast, but internal transportation is not yet organized on a commercial scale. Tons of this fish spoil and are thrown into the sea, while in the interior fish costs 150 or 200 francs per kilo. As concerns fruit, we have seasons when fruit is literally covering the ground, especially in the plateau region and the central region; it is difficult to drive a car there because grapefruits, mangoes, and oranges lay on the ground and no one picks them up. Would it be possible to create a food canning industry? Unfortunately, our production as it exists is very expensive and canned fruits are not within the range of those who should consume them. There are problems to resolve and capital to import.

The problem of passing from peasant status to that of worker is another aspect of underdevelopment. We have not succeeded in obtaining high salaries for the farmers who have become workers. Even union officials and important agitators have only succeeded in having them discharged from their jobs. The chief exploiters of phosphate fields request work forces, but they do not listen to us. They are more powerful than we are; they make the law and impose low salaries. With 2,000 to 4,000 francs a month, these workers are unable to meet their food quota. Malnutrition, which we thought we had eliminated in the rural areas by introducing chicken farms and by encouraging consumption of eggs, reestablished itself among the farmers who became workers, and kwashiorkor occurs again among their children. Due to the fact that they are undernourished, these workers are prone to accidents; they are discharged for ineptitude, incompetence, somnolence or other reasons, when in reality, they are improperly fed.

Nigeria, our big, powerful neighbor, exports soy and other products which we have need of. Meetings such as this one will permit solving many regional problems between African powers and small states.

Mrs. Tay (Ghana): I would like to make a remark about the problem of developing new recipes and introducing these recipes into foods for children. First of all, I think that food research institutions should analyze some of our traditional recipes and find out whether they are good from a nutritional standpoint, and whether they should be encouraged and passed around. For instance, in some parts of Ghana there are traditional recipes based on groundnuts (groundnut meal, groundnut powder mixed with cornmeal, and so on) which are probably very nutritious.

Secondly, I think we should try to incorporate the best of our traditional recipes into new recipes for the use of donated foods from external sources, such as milk, bulgur wheat, and yellow cornmeal. In Ghana we have tried to mix bulgur wheat with palm nut soup, with fishmeal, and with other local foods and some interesting results have been obtained.

Dr. Sai (Chairman): You have raised an interesting question, Mrs. Tay. At a recent FAO nutrition seminar it was suggested that an attempt be made to collect the traditional recipes of Africa so that they can be exchanged among regions. For instance, recipes developed by people who have traditionally eaten groundnuts could be made available to people whom we are encouraging to consume groundnuts.

Dr. During (Sierra Leone): In Sierra Leone we have developed a mixture called the "benniseed mix" as a food supplement for women. The mixture is made of venison, groundnuts, and rice flour. It has a very high protein value but it requires laborious preparation and for that reason has not been produced on a national scale. Mothers are asked to prepare it on their own and most of them do.

However, the main point I want to make is that in spite of all the talk about the need for nutrition education, I wonder whether we medical people are making the impact on the population that we should. I have sat in clinics and talked to mothers about nutrition. I have had local foods in front of me -- groundnuts, rice, everything the mother's child should have. Outside the clinics there are people selling groundnuts and acaran, a local food made of black-eyed beans which is good for children, and across the street are vendors of Coca-Cola. It is amazing how often you will find mothers buying Coca-Cola instead of groundnuts or acaran. What is wrong here? Commercial people have a way of putting over their products which we professional people cannot compete with. We have to look into this more carefully.

Moreover, if we are going to produce a supplementary food for women and children in developing countries on a national scale, we must produce one that is acceptable to the poor as well as to the rich; and I would recommend that the promotion and sale of such a product be left to the commercial people. As medical people I think we are making a very small impact.

Dr. Sai (Chairman): I am sure the FAO observer is amused because his organization actually employed a food promotion expert to advise them. I do not know, though, whether they have had any success with his promotion methods. Now I would like to give the floor to Mr. O'Cloo who may have some concluding remarks.

Mr. O'Cloo (Togo): I am sure that the point of view of Mr. Touré, delegate from the Ivory Coast who spoke to us about the importance of traditional recipes, is shared by others. I would like to say to Dr. Forman, who just spoke of the difference between supplement and enrichment, that for us these two things are inseparable because if we could fortify the present foods, it would no longer be necessary to think about supplementary food programs. When our committees are set up, I will request the committee in charge of this matter to invite Dr. Forman to come and help us better understand his point of view.

When we Africans sit down to eat, energy and health food is placed in front of us: energy food is made up of starches and health food is the sauce containing vitamins and proteins. However, it happens that children and workers eat cassava without anything else: when there is no money, there is no sauce. I believe that we should start by fortifying present food that the people already recognize and educate the women who are preparing these foods. It is useless to introduce new recipes, new products, and new programs, if we can improve the basic situation at the kitchen level.

I insist on taking an inventory of traditional resources. Sixteen years ago, I traveled with a "healer". We were suppose to walk for four days and the healer told me, "Take all the necessary food, for you will find nothing in the bush." However, I noticed that he took only some red powder and that he also had a large flask containing water. For five days we walked in the bush and came back to the village. He was taking only a few pinches of this powder and I was opening cans, without which I could not have survived. Upon our return to the village, I asked him: "What have you eaten? I would like to know the composition of

this powder which was sufficient for you." He told me, "It is not possible; it is an ancient recipe. You are a Christian, you are young and you go to school, it is too dirty for you." I wanted to know badly what this powder was which resembled quinine. I gave him three months' salary in order to have this recipe, and I am going to give it to you today as a free gift.

Here is the recipe: this powder is composed of roasted parkia seeds, cithorus seeds, sorghum seeds, some pepper, ginger, and dried fruit. To these dried and powdered plants we add some lemon. This mixture was the concentrated product that my boss had in his little flask and with this powder, he walked for five days without fatigue. My father had some friends in England to whom I sent this mixture and they informed me that these fruits and plants were very rich in vitamin C, vitamin A, proteins, calcium, and vitamin B. We have to completely dismiss our European customs, descend to the level of these "healers," become friends with them, speak their language and tell them that they will contribute to the development of our country if they deliver their secrets to us.

I hope that during the course of this conference, we will be able to organize something on a regional basis so that one day we will be able to obtain this inventory of local products and their nutritional value.

Dr. Sai (Chairman): Thank you very much for winding up on that strong note. As chairman, I have the pleasant duty of thanking Mr. O'Cloo for doing his job so well and you for being such a good audience.

## NUTRITION AND EDUCATION

by Dr. Adewale Omololu

We have been discussing different aspects of nutrition and the problems of child feeding over the past two days and I am glad to see that the emphasis has been more on programs and plans than on philosophy and ideals. Before going on to discuss nutrition education, I would like to review the present state of nutrition in West Africa and the common causes of malnutrition, since malnutrition is what we aim to correct through nutrition education.

Over the past ten years many nutrition surveys have been carried out in the region. I do not intend to discuss these surveys for they are many and varied. All I intend to do is to give the general findings in order to discuss the types and causes of malnutrition.

Firstly, the surveys reveal that people in the region are not getting enough to eat. The daily per capita caloric intake is below the minimum requirements recommended by the Food and Agriculture Organization (FAO) and other organizations. In most of the urban areas, this caloric inadequacy is present throughout the year. In a few farming areas where food crops are grown, caloric intake around harvest time may be adequate but it falls below requirements during the rest of the year. There is just not enough food to go around. It is pertinent to discuss the reasons for this inadequacy of Calories, or chronic starvation (for this is what it is), so as to plan nutrition education programs.

- a. The amount of food produced in most areas is limited by the amount of land available, by land tenure practices, by traditional farming and harvesting methods, and by the non-use of fertilizers.
- b. Absence of proper and adequate storage facilities results in heavy pest infestation and deterioration of foods. This is calculated to result in the loss of about 30 percent of the food grown.
- c. Inadequate organizations and facilities for distribution and marketing of foods cause a bottleneck and result in large losses of available food.

Education to correct the inadequacy of Calories must be directed toward administrators, politicians, senior civil servants and policy

planners, to give high priority to the provision of better roads, better transportation, better co-operative and marketing facilities, improved land tenure, and money for research aimed at improving storage facilities and diminishing food deterioration. Education must also be given to farmers for better farming and harvesting methods, use of improved seeds, and the production, distribution, and use of fertilizers.

Secondly, the surveys show that protein intake is very low throughout the region. In some areas it is as low as 50 percent of requirements. Most of the protein that is eaten is also of poor biological value, having been obtained from root staples. Very little animal protein is available for consumption. The reasons for this low protein intake vary from area to area. Apart from the big problem of the tsetse fly which restricts cattle farming, other important causes include:

a. Reduction in the amount of available animal protein in the rural areas. The traditional sources of animal protein in most of the tsetse fly affected areas in West Africa were the forest animals such as antelopes, monkeys, and crocodiles, and even smaller game such as bush rats and snails. These animals were found in the bush around the villages, and the farmer was always sure to arrive home in the evening with one or another of these animals as meat for his family. These animals found sanctuary and food in the large tracts of farmland which was traditionally left fallow for as long as 8 to 10 years. With increasing land pressure, more intensive use of land has resulted in shorter periods of fallow. These wild animals have moved farther away and have become much more difficult to come by. In most villages, bush meat is now more expensive than beef or mutton.

b. Greater competition for the available amount of animal protein. The increasing population in the region has to compete for the reduced amount of animal protein available. This competition has been made unequal by the large number of West Africans who, having taken the place of expatriates in the Civil Service and in the commercial houses, now command higher salaries and thus have greater purchasing power. For example, 25 years ago in Nigeria there were fewer than 50 people in the whole country earning salaries above £2,000 (\$5,600) per annum. Today, there are over 4,000 Nigerians in this income group. These Nigerians and their families live on the same foods as the ordinary Nigerians whose average annual income has been calculated to be about £30 (\$84). They compete in the same markets for the available animal protein. It is no wonder then, that the ordinary Nigerian gets priced out in this unequal competition. I am sure that this is true of the other countries of West Africa.

c. Lack of modern methods of food preservation and food technology. This lack results in great loss of all foods but the relative loss of available protein is of a much higher order. Lack of cold storage facilities in markets, coupled with the high environmental temperature, means that meat must be sold within a few short hours or spoil and become unfit for human consumption. Fish, which is abundant in coastal villages and towns, cannot be transported to inland towns because of lack of refrigeration. Losses during the traditional smoking over coal fire make smoked fish relatively expensive. To make fish available to the inland towns and villages in Nigeria, up to £9 million worth of stock fish had to be imported in one year from the Scandinavian countries!

d. Poverty or lack of available money. Poverty is now becoming important as a cause of malnutrition, especially in urban areas. In villages, the traditional extended family system ensured that one was always sure of a meal, while the farms provided some vegetables and fruits as well as the staple diets. In the towns, "money speaks," nothing can be had without money. The presence in the towns of large numbers of people with high salaries makes it important for us to educate the "have-nots" - the ordinary people - to use the small sums of money available to them in the best way.

Thirdly, these surveys show that malnutrition in children is very common. The needs of children for Calories and protein, not only for work but also for growth, make nutritional deficiency diseases more rampant. Some of the causes of this widespread childhood malnutrition include:

a. Break in traditional child-rearing practice. The traditional child-rearing practice involved a long breast feeding period - in most cases up to two years or more. This ensured that the child had at least 15 to 20 g of protein per day from breast milk, up to the age of 2. During this time, too, the mother was precluded from being pregnant so that she could devote her attention to the needs of the child. With urbanization and the sophistication that has followed Westernization, these traditions have been laid aside. Breast feeding is practiced for only a few months while pregnancies follow, one after the other, with only a short interval of months between.

b. Poor weaning food. The traditional foods onto which children are weaned from the breast in most of West Africa consist essentially of maize or cassava gruel, popularly known as PAP.

This gruel has a water content of over 80 percent, with the solids consisting mostly of carbohydrates. Traditional child-rearing practice ensured that this gruel was supplemented with protein from breast milk. Now, the much-reduced breast feeding period and the absence of cow's milk in most of the area leaves the child, with its high requirements for protein, on a diet consisting mostly of water and carbohydrates by the end of its first year of life.

c. Infection and infestation. Bad sanitation, poor water supply, overcrowded and unventilated houses, and an environment which favors insects, germs and viruses more than human beings, make infection and infestation very common. During a recent survey done in Lagos it was found that the children and families of mothers who have had more than six years schooling had fewer complications from illnesses and were much better fed and cared for than those of mothers who had less than six years of schooling. This occurred irrespective of the educational standard or earning capacity of the husbands.

These, then, are some of the problems our nutrition education programs must solve.

To make sure that nutrition education results in sound nutritional practice, it must be planned for almost everybody in the community. From the foregoing discussion of the problems that beset us in nutrition, it is apparent that nutrition education should not and cannot exist alone or in a vacuum. By this I mean that nutrition education cannot and should not be separated from health, agriculture, community development and formal education if it is to have practical meaning. In planning nutrition education for the region we must realize that man and foods existed long before the science nutrition. Changes in food patterns and food habits depend more on the culture and surroundings of the man than on formal education. We know that changes in food attitudes, food patterns and food habits are taking place all the time. In planning our nutrition education program the factors that make for these changes in the community must be understood and brought to play. Again, nutrition education to be effective should be multi- and interdisciplinary. It needs the coordination and cooperation of health, agriculture, education, public enlightenment and nutrition to plan and effect sound nutrition education.

It will be seen then, that to plan and effect nutrition education programs we have to educate almost everybody. The urgent needs, however, are to educate three main groups of people:

## 1. The policymakers

These are the politicians, senior civil servants and administrators who only seem to think about food when famine or starvation strikes. They see no connection between the low manpower yields that are the rule rather than the exception in the region, the high rate of absenteeism from work, the high childhood death rate, and the chronic malnutrition in the area. It is imperative to plan nutrition education programs for this group of people because, being highly educated in their special subjects, they do not feel that they have anything to learn about nutrition. A way must be found, however, to bring home the facts to them.

May I suggest two ways in which this can be done by appealing to their egos? Most of the senior civil servants and administrators from the former British colonies (Nigeria, Ghana, Sierra Leone, Gambia) looked forward to (and still look forward to) attending the Imperial College training course run by the British Government. This is a one-year course conducted in London, to which senior administrators from different departments and different Commonwealth countries, as well as senior officers from the Armed Forces of these countries, are brought together and given training in administration, defense, and policymaking. The Imperial Defense Training Course has a very high prestige value. Officers who have passed through the course are usually promoted on their return to their respective countries. If some time during this Imperial Defense Training Course (or a similar course) a few days or a week could be given to the economic problems of malnutrition in developing countries, a great service would be done to developing countries.

Now that most of the countries of West Africa are independent, it may be possible for a respected developed country like the United States, France, or Britain to arrange such a course for both English- and French-speaking countries of West Africa along the lines of the Imperial College Defense training. In order to appeal to these people, the course must have a high prestige value. The course must be annual and some part or most of it should be held outside West Africa to enhance its prestige value. Participants should be restricted to not more than three or five people from each country. Perhaps it would be of much greater use if participants for the course were drawn from all over Africa, since the basic problems of nutrition are not dissimilar.

Nutrition education for the policymakers should emphasize the great loss of productivity, life, and manpower yields due to malnutrition. Policymakers should be made to see the need to give priority in planning programs to local food production, better and safer roads, adequate and modern marketing facilities; to providing money for research on better storage facilities, on food supplementation and on the many causes of malnutrition. The realization of the importance of nutrition education at all levels must also be brought home to all policymakers.

## 2. Senior grade workers

This group will include senior workers in all the fields that are associated with nutrition education so as to create pools of teachers to train middle grade workers, primary and secondary school teachers, school children, and the general population. The associated fields of nutrition include agriculture, home economics, education, community development, and health. The training for this group of workers should be interdisciplinary as much as possible to show that measures to improve nutrition are not the preserve of any one discipline. The training course should be essentially practical and consist of lectures, seminars, fieldwork and teaching practice, study of the causes of malnutrition, the preparation of applied nutrition programs for countries and areas, the many ways of improving nutrition, as well as the planning and the teaching of nutrition to peoples of different levels of education and literacy.

These senior grade workers are meant to implement the policy made by the policymakers, to advise the policymakers as technical experts in their own fields, to inculcate and train the junior staff in the principles of nutrition and the contributions which their specialities can make to better nutrition in the community. It is hoped that because of the interdisciplinary method of approach and training these groups of workers, the cooperation between the different ministries, universities, and others needed for improved nutrition will be forthcoming. A course, as described above, has been in existence in Ibadan for the past five years.

At first, it was a joint venture between the London School of Hygiene and Tropical Medicine and the University of Ibadan. Now it is run solely by the Food Science and Applied Nutrition Unit of the University of Ibadan. The course in Ibadan is meant to serve the whole of Africa. Over the past five years we have had Fellows from most of the countries of Africa and outside.

The result of the training has been very encouraging, but there is one glaring defect: when Fellows return to their countries after completing the course they find that their training is not appreciated by their governments and no promotion or improved status is given to them. This is because we still lack policymakers trained

in nutrition education to make use of and encourage these Fellows in their work. The course is practical and arduous and Fellows who have passed through the course have a lot to give to their countries if given the opportunity and necessary encouragement. It is a great pity to report that because of the lack of necessary encouragement and promotion after training, some of the Fellows have left their countries and are now working for UN agencies where they are well-appreciated. We would rather have them work in their own countries.

Among the senior grade workers who should be trained are the teachers in teacher training colleges and senior high or secondary schools. With the production of these teachers, nutrition education can be made an important part of health, education, or civics in all types of schools in West Africa. At the present time the absence of these trained teachers in most countries of West Africa make the teaching of health and nutrition impossible in most of our schools. There is an urgent need for this deficiency to be corrected. Health education which includes nutrition education should be a specialty for which teachers should be trained and well-compensated.

### 3. Middle grade workers

Middle grade workers are the final link between the policymakers and the ordinary people. These workers should, as far as possible, be multi-purpose workers because of the shortage of educated people in most African countries. In at least one country of West Africa, however, workers of this grade are being trained specifically for nutrition education. Middle grade workers will be involved in the collection of data and materials for nutrition and dietary surveys and should preferably be trained locally. Other groups of workers in this section will be the extension workers in disciplines like agriculture, health and community development. These workers are essentially concerned with their specific disciplines but are involved in the general education of village dwellers. The training of these workers should include sound basic nutrition, common types and causes of malnutrition in the area, knowledge of local foods and their nutritional values, steps in the prevention of malnutrition. They should not be overloaded with education in nutrition but they should know where and from whom to get nutrition advice when problems occur. Because of their work, these workers are in a good position to advise on and evaluate applied nutrition programs; they are well placed to recommend cultural and social economic steps that could be of help in improving local nutrition. Community nurses or public health nurses who will be responsible for health care in rural areas also come into this group. Training in nutrition education will stand public health nurses in good stead in their work of educating mothers and children in both the rural and urban health centers.

Because these multi-purpose workers will be living in villages with our common people, it is important to see that they

practice what they teach and advise. Practice can only be inculcated by ensuring that the training we give is practical and meaningful. Rural people learn more by practice and by copying from people they feel are better than they are than by learning or demonstration. The nurse or community worker must practice long breast feeding if she teaches long breast feeding to mothers; so, too, must she practice what she teaches about food and food preparation.

I have spent some time stressing the context and type of nutrition education of these main groups because no national nutrition policies nor any lasting improvement in nutritional practices can occur in any community or country without a pool of these trained workers. Many countries and governments within and without this region have tried bypassing this very important, necessary, and basic stage of creating a local pool of nutritionally educated people. These countries ask for nutrition experts from other countries or from United Nations agencies to prepare national nutrition policies, to start applied nutrition programs, or to try and inculcate sound nutrition practices. In all countries without these three main grades of nutritionally educated workers, these experts, policies, and practices have failed. These three grades of workers are the roots of any national nutrition education plan or program. Without them, no lasting improvement of nutrition can evolve; neither can any implementation of nutrition policy occur.

Programs for improved nutrition depend upon all three grades of workers: the senior workers to produce the plan; the policymakers to approve the plans and allocate money; and the middle-grade workers to bring the plan to the people.

To be effective and lasting, nutrition programs should also be multipronged. By this I mean that all the disciplines associated with nutrition education should be used. Let us discuss such a program for improved child feeding and the education of mothers:

1. Definition of the needs of the community

This is determined by surveys and assessments of needs. Surveys will be conducted by the senior grade workers or, in places where these are absent, by public health nurses and nutrition assistants. The important causes of childhood malnutrition in the areas will be defined.

## 2. Contents of nutrition education program

What to teach the people and the other steps to be taken to correct the causes of malnutrition will be planned, based on the needs found as a result of the survey and on the limitations of government. Subjects requiring attention may include:

- a. Advocation of long breast feeding.
- b. Correction of poor weaning diet.
- c. Control of infection.
- d. Making more money available to the women in the villages.
- e. Introduction of better child care.

All these problems have to be faced to improve nutrition; action needs to be taken on all fronts.

The nurses in the hospitals, health centers, and villages have to start by teaching mothers the advantages of long breast feeding, the control of infection, and better child care. Community workers at the same time, while fortifying the lessons taught by the nurses, will have to teach budgeting to farm wives, villagers, and farmers, as well as better house care and environmental hygiene. Agricultural assistants will have to teach better production of crops, introduce cooperatives, better seeds, better marketing for more money, backyard gardens, fish ponds, and small village or home industries. The weaning diet has to be supplemented, either by research stations and institutions, universities, or commercial organizations, or by the encouragement of eggs and other compact high protein foods.

I would like to describe what has happened in the field of nutrition education around Ibadan over the past five years just to show the many-pronged attack system. The Food Science and Applied Nutrition Unit at the University of Ibadan:

1. Conducts a certificate course for senior workers in nutrition from many countries.
2. Teaches nutrition to B.Sc. nurses.
3. Teaches nutrition to nurses in the school of nursing.
4. Teaches applied nutrition to medical students during the compulsory 8-week field work that all our medical students have to spend in a rural area before qualification.
5. Teaches nutrition to postgraduates in the Diploma in Tropical Medicine and Hygiene and the Diploma in Public Health courses.
6. Has plans for training middle-grade workers from all over Africa and for conducting short 2-week courses for Administrators.

Research is being started on:

1. Energy requirements of workers in Nigeria.
2. Effects of traditional cooking methods and storage on vitamins of foods.
3. Field work on the use of community nurses for health education in villages - the distances over which a community nurse's educational teachings can be effective and the population of this area. This will help us to calculate the number of community nurses needed for the whole country.

In cooperation with the Ministry of Agriculture (Home Economics Section), work is being carried out on the needs of rural women so as to plan the contents of home economics education for female agricultural assistants who will be working with farmers' wives in our villages.

The Ministry of Community Development is training community development workers, both male and female, who will live in villages and help to develop the standard of living of people in the rural areas. Naturally, we are giving all possible help in their training in nutrition and child feeding practice.

The Department of Pediatrics and the Institute of Child Health have a concerted plan of action against malnutrition in childhood. This includes:

1. A 15-minute talk/demonstration before all clinics.
2. Presence of dietitians at all pediatric clinics to advise mothers on feeding.
3. Use of health visitors and almoners for home-visiting to teach mothers in their homes better child care, child feeding and health practices.
4. Assignment of medical students and nurses to accompany health visitors on these home visits and give talks to the other people in the homes and compounds.

Improvement of nutrition in our countries is not only the preserve of nutrition: all the other disciplines--agriculture, education, health, marketing, cooperatives, home economics and voluntary organizations--must be brought in. Nutrition education of all these groups of people is the keynote of sound nutrition policy and sound nutrition practice.

A Chinese proverb sums up the program: "If you are planning for a year ahead, sow rice; for ten years, plant trees; for a hundred years, educate the people."

## GENERAL DISCUSSION

Chairman: Dr. F. T. Sai

Dr. Sai (Chairman): Thank you, Dr. Omololu, for a clear and comprehensive presentation. Dr. Omololu has spoken of education at three levels: the policymaker level, the senior grade nutrition worker level, and the middle grade nutrition worker level. The international agencies have conducted two training sessions for African policymakers. A conference for representatives of French-speaking countries was held in La Napoule and a meeting of representatives from English-speaking countries was held at Bellagio on Lake Como. The political situation in our countries is such as to endorse what Dr. Omololu has said, that this sort of thing should be done again in Africa. Looking through the papers, I do not think that many of those who were at those conferences are any longer in a position to make active policy decisions.

Dr. Omololu mentioned the London-Ibadan nutrition course which has now become the Ibadan course. The equivalent one for French-speaking countries which you did not mention was the Paris-Dakar course, but I do not think it had the same success as the London-Ibadan course. Perhaps someone will point out what the differences were so that if we want to embark on a similar course in French-speaking countries in Africa again we will know what difficulties to avoid.

The floor is now open for general discussion.

Madame Verny (Senegal): I am particularly interested in adult education. Nutrition is the primary concern of sociology because it is a total human fact. Nutrition has geographical, agricultural and physiological implications. From physiology one readily passes on to psychology and to psychosociology. The eating habits of human groups are a social fact; we must approach them with a knowledge of values if we want to modify them.

When you speak of nutrition and deficiencies of Calories and proteins one assumes that you wish to modify human behavior. In order to modify behavior without distorting it, it is necessary to understand it and to find the social, economic and religious reasons for each taboo, to investigate the traditional roots.

Africa is full of scientists, both foreign and African who try to find solutions to local problems. Many wonder why there is some human resistance to their efforts. However, many countries are

making efforts to educate rural teachers, social workers, and rural animators along traditional or classical lines. Nobody will reach the mass of agricultural population by these means alone, although 70-80 percent of our children go to school. However, every villager in Senegal listens to the transistor radio for hours; so I wonder why we do not use the radio more extensively for the education of those people who will never go to school but who have a right to participate in progress since they are asked to participate in the development effort. Everyday they are exposed to radio announcements telling them to eat bread and drink Coca-Cola. Why don't we use the same methods as the commercials? The listener will listen with the same pleasure to a voice telling him, "Try to eat the produce of your own land. These products are good and rich. Use them in this or that way at such and such a time . . . . Your white corn is not good? Why don't you try the yellow? This is the way to use it."

It is true that this education will not change the behavior of men and women. Africans are now forced to revise some of their concepts of authority. In place of the authority of the elders, they now have to accept the technical competence of their sons who have acquired the right to speak in front of them. If farmers accept to modify their way of life, their way of making decisions, they will also accept to modify their feeding habits. It is through education at all levels -- at the farm, at the school, at the university -- by all possible means that collective behavior may one day be modified for the better.

Miss Jarrett (Sierra Leone): I quite agree with all of those who have said that we have to educate our people. In Sierra Leone we are trying to do just that. At the moment we have community development workers going to the villages to teach the mothers exactly what we teach their children in the schools, for it has been a problem for our more unfavored or unfortunate people to accept what their children bring from school into the home. I honestly feel that there is not a strong enough link between formal and informal education. We must recognize that a great percentage of the African population is illiterate. These people are not to be blamed; the reason for their condition is either poverty or ignorance. We must raise them up closer to ourselves. We should also agree that there is a class distinction in Africa which varies from the sophisticated to the poverty-stricken. This is something we have to try to avoid. We have to bring them much closer to us, then they will readily accept the importance of nutrition.

Dr. Kourouma (Guinea): I associate myself very sincerely with the congratulations that have been addressed to the Delegate from

Nigeria and I thank him for the rich information he has given us. We all agree that our populations, 90 percent of which are illiterate in the rural areas, should be kept informed and educated. You will notice that education does not mean instruction because you see people with instruction who have very bad habits. This makes these people very dangerous because the uninformed take them as examples.

In Africa it would be unrealistic to hope for progress if we did not base our efforts on the interest of the masses. If certain methods of education have been successful elsewhere, it would be vain to hope that these might be successful here. Failures can readily be ascribed to the ignorance of most educators of the environment in which they are supposed to operate. If we do not understand the motivation of both urban and rural populations, we cannot hope to correct their bad habits. We have to establish a priority list. The discussions we have had so far have emphasized the dangers that result from the cleavage between the "have's" and "have-not's;" this is the primary problem and its solution depends on ourselves. We should prove that we are capable of handling our own affairs. If, on the contrary, we expect the solution to come from outside we are bound to witness an increase in depth of the gap between the two.

Education can be horizontal, which means that it can be spread across the various sectors of national life without creating differences of levels between categories, especially between children and parents and rural and urban populations. The goal of horizontal education is to initiate the primary stages of development, which is why we have to deal with all sectors. If you want to develop a country socially and economically you have to build a platform based on a community of interests. In the strategy of development the liberation of human capital is the second step, which is why health education has its place at that time. Reducing mortality increases manpower and integrates labor into the development cycle.

On the vertical plane, I agree with Dr. Omololu that one should start by educating the teachers. You do not teach what you know, you only teach what you are, and some of the educator himself rubs off on the students. Because of my function in my country, I have to deal with the methods of education used by my peers and collaborators. Long ago I abandoned the method of checking the records; you have to talk directly to the people responsible for the activities to find out what is being done.

If you want to teach people who are illiterate you have still more problems. Our Government has decided, therefore, to start a literacy campaign next spring.

In spite of our words about progress and about education, it is a daily sight to see 90 percent of our population defecating around the fields, washing their clothes in the streams where they have defecated and urinated, and even drinking that polluted water.

Miss Bicaise (Liberia): I am happy to tell you that last week the legislature of Liberia recommended that the teaching of food and nutrition be included in the curriculum of all private and public schools in Liberia. Children being instructed in nutrition at school may now go home and teach their parents how to prepare food so that it retains its nutritive value.

We have also started to educate our unlettered people, for it is those people who cannot read and write who take care of the homes and the babies while the more literate go to work. We have instituted a short course in food, nutrition, food sanitation, and food preparation for women who want to work as helpers and babysitters. After the short course we plan to give these women jobs. This will encourage people to learn more about nutrition. That is part of the problem that we are trying to solve.

Another part of the problem is family budgeting. Some people have money but do not know how to spend it for food. Thus, budgeting must be a subject of primary importance in our curriculum.

Our President has also organized what we call "home production." Under this program, everyone has to plant some kind of food in his backyard, and each county (we have nine counties) or territory is responsible for this production. On holidays we go to see what the people of this or that county have done. This really encourages people to plant more food and to learn how to prepare the food they produce.

Nutrition education from infancy to adulthood is necessary through different programs. How to promote or "sell" nutrition education to our policymakers is the problem we have to face. I think we should all be on the look-out for suggestions on how best to achieve this purpose.

Dr. Fofana (Mali): I only want to take up a few points made by Dr. Omololu, namely, what should be taught, who should teach it, to whom it should be taught, and how it should be taught. On the first point, Dr. Omololu insisted on the various results that educational surveys have brought to light. This is important but what is more important is the cost of these surveys. Many states cannot afford the money or the considerable personnel resources needed for such

surveys. I would hope that international organizations such as FAO would help us in this work. Perhaps our speaker would insist that these points be made part of the committee recommendations. This would be useful because our statistics have often been criticized as being nothing more than estimates. I was happy to hear Dr. Omololu associate health education with nutrition education. All these problems are closely related and we should also recommend rural education, including education on how to produce.

On the point of who should teach, we are all involved. I am referring especially to the nutritionists who have been trained in the London-Ibadan course or the Paris-Dakar course. What have been the results? Dr. Omololu remarked that when these trainees return home they do not get proper recognition from their governments. I agree, and I think we should draw the attention of our governments to these trainees on whom our hopes are based. They should be encouraged by being given awards and promotions.

As regards whom we should teach, of course, we should teach the whole population; but we should concentrate on children and women because adults, especially male adults, are already set in their habits. We might be able to influence some of them, but long-term results will rest with children, especially at the schools.

As to how one should teach, I was happy to hear Mme. Verny from Senegal stress the advantages which could be derived from the use of transistor radios. We sometimes use movie vans for education and the results do not justify the cost, especially when compared with the results that one could get through radio or school. These movie vans appear only once or twice a year and have no impact. Education must be repeated on a daily basis.

I would like to stress the importance of educational materials. FAO is now busy preparing such material. However, since FAO is international, it has to cater to a variety of States and, therefore, we have to select what we can use from the material offered. We know of too many books that are not good for teaching Africans. We have a responsibility for all educational material, wherever it is born.

Mrs. Pinder (United States): I want to agree heartily with Dr. Omololu on his comments regarding the different groups that must be educated. As my friend Dr. Sai knows, I am very familiar with the importance of educating policymakers and the other groups which Dr. Omololu mentioned, as a result of the long time I have spent in Ghana. There are one or two particular things I would like to

mention. I strongly agree with him on the utilization of universities for training personnel other than university students. I have observed that often the university is thought to be an ivory tower where only the "ultra" group is permitted to participate and I think we lose a great deal by not utilizing our universities to their fullest extent.

In regard to the types of methods or techniques to be used, I agree with the use of mass media techniques in certain situations, but I think we should keep in mind that in very few places has it been found that mass techniques motivate people to change their behavior or attitudes. These techniques can certainly be used to reinforce information, but my experience has been that the most successful way to get people to modify behavior is through persons living in the village, working with the people, and being an example to the people in the village.

I would also like to comment on the various teaching aids. We find frequently that when anybody is going to a village to teach, he thinks he must have all kinds of gadgets to use -- flannelgraphs and various other things -- yet when they are used, the people do not comprehend at all. Unless these "gadgets," as I will call them, are used very carefully, they are useless and I think it is a waste of money to think in terms of having such an array of teacher aids when we have much more effective teacher aids right at our hand in the village. We have the foods that are produced in the village or in the local community and I think if they are used in practical demonstrations, utilizing the facilities that the woman has in her own kitchen -- her own cooking pots -- you can do a much more effective job of teaching than you can in trying to put some pictures on a flannelgraph or using some other mechanical aid.

The other point I would like to stress is the importance of health education. When I say health education, I incorporate nutrition education as a part of it because nutrition education alone is not going to solve our problems. As was pointed out, the problem of malnutrition is associated with infestations, infections, etc., and unless we teach those other aspects of health -- general child care -- we cannot solve the problems of malnutrition. Thus we have to have a broad approach to the problem. We do not want nutrition educators, we really want health educators. And when I say health educators I am not talking about specialized health educators; we want some of them too, but we want every worker in the village to have an understanding of the health implications as well as nutrition implications that are concerned with the problem.

## NUTRITION AND INDUSTRY

by Dr. Thianar N'Doye

### CONCEPT AND EXTENT OF THE SUBJECT

#### General Data

The concept of industrial food processing is not new. However, the results which were expected when the concept was put into practice have not yet been achieved. This is true in West Africa. In Africa in general, consideration has been given to the industrial progress made by our countries. Therefore, it is justified for our Conference to place a high priority on this subject. The fact that a nutritional physician must discuss it, emphasizes the importance our government attaches to this question, as well as the desired orientation to be given it.

The concept of Nutrition and Industry appears to be still feeling its way along. Nutrition is dependent upon empiricism and the application of experimental medicine, whereas industrial technology has its basis in scientific research. However, nutritional science can no longer reply in a satisfactory manner to all questions asked. Science only participates in the food fact, it is not the orchestra leader. Indeed, as estimated by Prof. J. Trémolières, nutrition has been useful up until now more as an art than as a science, and traditions in foods have been justified in most cases. The need is clear for a closer collaboration between research, medicine, and industry, as well as for humanizing the industrialist. How could we, in Africa, not accept and use this teaching?

#### Technological Data

The Indians of Mexico have long treated corn with limewater in order to destroy the complex masking the niacin. In India, as well as in Morocco, making the most of vitamins by steam cooking was known and common practice from long ago. The salt stones chewed by Nigerians were forerunners of the salt tablets given to Allied soldiers during the Libyan campaign. From the most ancient times, the populations of Kanem in Chad have used Spirulina maxima as a food. This is the same algae which the French Petroleum Institute hopes to be able to procure in the future in a more assimilable form.

Still better, the most advanced technique for inoculating micro-organisms into the bean seed resulted from the efforts of Buddhist monks. In Black Africa itself, similar traditional techniques allowed us to consume on a daily basis, unbelievable quantities of millet, cassava, yam, taro, plantain banana, and leguminous plants. Placed in the same conditions as our rural housekeepers, we would not often be able to do much better than they. It is, therefore, highly recommended that our growing national industries take advantage of all this. Since transformation should increase the value of production, one of the roles of the Food and Applied Nutrition Service will be to process the preindustrial sample. Preindustrial and industrial technology will relieve the seasonal character of the availability of foods and provide remedies for the simple and important losses resulting from waste. The mixed formula for the association of capital and technology at production level as well as the transformation, has, moreover, passed its tests wherever it has been applied.

#### Local Capabilities

We shall spend no time on our local capabilities in this field. They are well known.

We should especially like to draw your attention to the possible desirable exploitation of our many products which can be picked or gathered. We shall refer, among others, to the Adansonia (powder prepared from leaves, fruit pulp, seeds), Parkia biglobosa (fruit pulp, fermented seeds), Balanites aegyptiaca (fruit pulp, oil from the kernel), Parinarioe macrophyla (fruit pulp, oil from the kernel), Hibiscus sabdariffa (leaves, pods, fermented seeds), Dialium nifidum (fruit pulp), Ziziphus (fruit pulp), Viteax cuneata (fruit pulp), Lancolphia (juice and fruit pulp), and Detarium (fruit pulp).

These products are known in some of our dialects as follows: gouy, ouï, neré or neté, soump, neou, bissap, madd, toll, ditakh, and boro. I must emphasize the nutritional advantage of netétou or soumbara. It is to the West African what the nuoc-mâm is to the Vietnamese. Although the nuoc-mâm is a concentrate of animal proteins, the netétou can be considered as its vegetable equivalent. We should especially like to emphasize the lack of interest paid by industry to these many possibilities for protein, vitamin, and lipidic complexes. The leguminous plants from which much could be expected in Africa are hardly grown any more. Owing to the quantity of raw material that they provide, millet, peanuts, cocoa, coffee, and palms are preferred products.

The use of our picking crops is not energetic, if undertaken at all. Often, these only come into question as a supplement or enrichment of the new food. Some precious sources of fatty materials are, moreover, neglected here at a time when, elsewhere, interest is turning to corn, sunflower, and even the grape.

## PROMOTION OF THE NEW INDUSTRIAL FOOD

### Principles

At this point, public health considerations become involved. They require that the weaning food be given priority. However, our purpose has a greater goal. The analysis of the food-health correlation has always encountered the complexity of the relationships of plant, soil, fodder, animal, and man. The new industrial age now is added to this complexity in order to justify the coming of industrial foods. The promotion of the new industrial food has as its chief goal the connection of the urban to the rural environment within the total phenomenon of urbanization.

Another important phenomenon current in our countries, which should be of special interest to the food industry, is the transfer of prestige from foods connected with socio-economic evolution and the orientation of consumption tendencies. The inferior status of the leguminous plants, the new prestige of vegetable fat, the desire for products sought after for their stimulant qualities, such as coffee, cola, and alcohol are all a function of the phenomenon. The direction in which the temptation will lead can be easily understood (coca-cola is in a position to ruin some of our countries). The food industry would gain more by helping to rehabilitate the often neglected traditional foods which are frequently the most nutritional. The drop in consumption of these products is partly explained by the progressive disappearance of their traditional technical support.

Finally, not the least of the obstacles to be overcome by the food industry rests in the personalization of the food by the consumer. Some conjuncturists predict that the kitchen will disappear in about 40 years. We shall then realize all that the industrial food is incapable of providing the consumer.

### Production

The discussion of production of the new food leads us outside the reasonable limits of this presentation. I shall only remind you that the cost of industrial foods with respect to the purchasing power of the populations targeted is prohibitive at the present

time. This is owing, partly, to the cost of the conditioning required to protect the products against parasites and to avoid their chemical transformation.

### Methodology

With respect to the methodology of promotion, the same problem of the purchasing power of the targeted populations arises. We do not recommend limiting the new food to the vicinity of the large cities. However, the limited purchasing power of the village could constitute an obstacle to the establishment of industry in the rural environment. The solutions to be applied to nutritional problems only involve 25 percent of physicians, pediatricians, and nutrition experts; the other 75 percent involve economists. The industrial production of the food -- the proof of its biological value -- is not sufficient to support its promotion. Following an in-depth study of the acceptability in a family environment, there should still be a campaign for educational popularization conducted by the physician, pediatrician, and rural teacher. The distinction must be made between educative popularization and precommercial popularization. Advertising and publicity campaigns should avoid regrettable failures which set up grave obstacles to new promotion schemes as a consequence of unfortunate previous experience.

All measures should be taken to avoid the danger of going on the economic, technological, and organoleptic rocks. The competition of similar commercialized products compels the waiving of guarantees of short-term earning capacity.

Finally, to close this chapter, nothing is worth more than having one national policy, one national choice, and one national will. The new industrial food should originate from this policy, this choice, and this national will.

### Policy and Programs

These considerations plot the lines of policy and programs to be followed in collaboration with State and private industries, according to the formula of mixed association of capital and technology. The direction will be toward the disinherited masses and vulnerable groups of the nation. However, it would be suitable to ensure with the new industrial food, a sub-regional basis at the moment of integration and African unity. There is an opportunity here to achieve a better coordination between interested governments as well as between bilateral and multilateral assistance agreements.

### Legislation

A last word should be said concerning the possibility of establishing inspection laws for the protection of food quality. It is a matter of legislation which is already of concern to us at the most crucial level. The needs of our States are the subject of an investigation conducted by the FAO/WHO Food Code Commission. This investigation was instigated by us. If conclusions are late in coming, it is understandable because we have chosen to place the definition of processing standards before that of food standards. The criteria applied to these standards are not within the reach of our young industries. We will, therefore, do well to confine ourselves to defining the possibilities for establishing inspection laws for the safeguard of our food quality. This should be undertaken without relaxing strict protection of the consumers.

Along this line, we must first have available competent State institutions and the key elements lacking must be solved one by one:

- sanitary inspection code for foods;
- inspection code and repression of smuggling;
- hygienic practice code for various products;
- inspection code for products such as milk and milk products.

In actual practice, we are capable only of revising laws which existed before independence was given us and establishing from them the basis for approaching these different codes.

I am grateful for this remarkable opportunity to commence building together.

## GENERAL DISCUSSION

Chairman: Dr. Campbell

Dr. Toury (OCCGE): I do not represent any country in particular and it is in my own personal capacity that I would like to congratulate Dr. Thianar N'Doye for what he said, and especially for the stress that he placed on the precautions which should precede establishment of an industry, whether it be the food industry or another type. Indeed, at the time the African territories became independent, each State based its efforts on industrialization, hoping to find thereby a rapid means for development. They counted on industrialization as a panacea. Many States realized that this is partially false and, like Senegal, they have reverted back to the primary sector during the course of their second four-year plans. It must certainly be considered that in states populated by 2 or 3 million, or sometimes less, the establishment of profitable industry poses a delicate problem. Thianar N'Doye stated that even Nigeria, with its large population and low purchasing power, had an example with weaning food.

As soon as we switch to commercial production, even with low-cost base products, it results in a final product which is generally too expensive for 90 or 95 percent of the population. In particular, these products are too expensive for the people in the rural areas and urban peripheries who have the greatest needs, who have left their residence in the bush and who, in general, are without means in the cities. Evidently, the manufacturers are interested in the question but they are never philanthropists. Therefore, I think there should be an inter-nation agreement by which industry can benefit from the clientele of a few countries and not just one.

Some time after having launched the weaning food in Senegal, I received a letter from an expert at FAO who requested the composition of this food, as he intended to establish a similar industry in Upper Volta. If the experience proved itself to be non-profitable in Senegal it is probable that results would be similar for Upper Volta. This is a basic error. I think that the solution should consist of establishing rural workshops whose equipment and installation expense would be much cheaper. This would have the advantage of using local products and would stabilize the peasant populations which always have the tendency to encumber the cities.

In a recently published article we pointed out some crops which are grown in the bush, and which are very rich in proteins. Certainly none of these small crops can justify the establishment of industry

through foreign capital. But I think that the former can justify creation of small rural workshops. At Touba there were some women who established a workshop for the manufacture of couscous; this worked very well. I wonder if that is not the way to the future: establishment of some small production workshops in the interior of the territories which would place inexpensive products at the disposal of local populations. This is my expressed opinion; perhaps it can be examined thoroughly and studied.

Dr. Forman (United States): I would like to add an observation or two to the paper that was presented on Nutrition and Industry. The first suggestion is that we should consider everything that we do with regard to combating malnutrition - research, training of personnel, education, - as activities or means toward an end, not as ends in themselves. Our ultimate objective, simply expressed, is two-fold: first, we have the goal of educating a population to the need for preventing malnutrition and motivating it to do something about it; second, we want to avail people of the means for improving their nutrition. One way of doing the latter is to provide nutritious foods at prices within their means. Private industry has the key role in achieving this ultimate solution of making foods available at prices that people can afford. This is their business, and they are better equipped than governments to carry out this role. The problem is getting private industry to devote its resources and talents - technical, promotional and monetary - to this purpose rather than to more lucrative endeavors.

My second point concerns the selection of potential solutions and their order of priority. There is a tendency to look for panaceas or to jump at solutions that seem easy; and every time something new comes along, particularly if there are elements of a "success story," there is a tendency to latch onto it and hope this will solve everything. We do now have some reliable studies for guidance: two major reports that were done last year. The first is a U.S. report made by the President's Science Advisory Committee on the World Food Problem, involving a panel of over 100 experts who worked over a year on the many aspects of the food problem. The other is a report on increasing world protein, produced by the Committee on the Application of Science and Technology to Development, presented at the UN Economic and Social Council meetings which were held in Geneva last July. These two studies, which are very similar in nature, came to the same conclusion, in terms of the order of priority, concerning ways of increasing protein production and actual consumption. First priority was given to increasing the production of traditional foods, that is, foods that people are already eating and know how to

eat, such as cereals, and legumes which, after all, are major sources of protein. Second priority was given to modifying the processing and milling techniques used in developing countries in order to increase the nutritious value of the products. This is a very inexpensive method, involving no change in the composition of the product to affect its acceptability. Third priority was given to fortifying staple foods with amino acids, protein concentrates, and vitamins and minerals, which also has the advantage of requiring no alteration in the basic food. Fourth priority was given to the development of new formulated food mixtures geared to specific population groups, such as weaning foods or food for pre-school age children.

It is in this latter category of developing and marketing new foods that private industry must be involved. While there is great potential for this, it does involve the problem of changing peoples' tastes. We must be able to create the motivation for people to buy this more nutritious food instead of something else, for that will be the ultimate test of success. In our view, to serve properly their purpose in being developed, such new foods should meet four basic criteria: (1) they must satisfy certain nutritional requirements and be wholesome; (2) they must be sold at low cost ("low" is a general term and it must be accepted that even at best, they will not reach the population that is most needy, but at least they will reach a population that is needy); (3) they must be composed of locally-available raw materials (most countries cannot afford to use foreign exchange to import ingredients and in most cases these materials are in fact available locally); (4) the food must be acceptable to local tastes. It is this last criterion that most of the foods that have been introduced over the past 10 years have failed to meet. Food technologists, assisted by medical scientists, can easily create an infinite variety of food mixtures which will be nutritious and healthful. They can even introduce foods that are relatively inexpensive. But the very difficult tests of producing something that people will like, and will like well enough to go out and buy it, is one not often met by the scientists and food technologists.

There are several different approaches to developing new foods. One is to create a food supplement: a food ingredient that is not eaten by itself but which is used to fortify or supplement gravy, flour, or cereals, that is, by mixing the supplement with a traditional food. Another approach is to create a new formulated "complete" food designed to be eaten in whatever form it is presented, that is, a new textured food. The third is to take a food such as bread or noodles, or a drink of some kind, and fortify it so that it is higher

in nutritive quality. There are several ways of implementing such production: (1) private industry can develop a food itself, using its talent to develop the food and to market it; (2) the State or government can develop a food and then turn it over to private industry in the hope that they will manufacture it, either for the government or commercially; (3) a nutrition institute can develop a food and then franchise it to private industry or anybody else who wants to avail themselves of it.

Unfortunately, most of the experiences to date have been unsuccessful. But there have also been some successes and something can be learned from both. One outstanding success is a product called "Vitasoy." Vitasoy was developed by a private Chinese entrepreneur in Hong Kong after many years of struggling. Basically, it is a soy beverage. Initial attempts at marketing the beverage were unsuccessful because it was being sold as something that is "good for you." Eventually the distributor, the manufacturer, realized that selling the product depended on its being "good," not "good for you." This product is now produced in a clear glass container of about 1/2 pint size, and it is sold on the market as a snack food. At the present time it outsells both Coca-Cola and Pepsi-Cola as well as other commercial beverages in Hong Kong, and it is a high-protein food. It has been so successful that it has now been taken over by a major international corporation and there are plans to market it in modified forms in other parts of the world. The people selling Vitasoy are making a profit, and the people purchasing it are benefiting.

A second successful product is one that was developed by the Hinds Co. in South Africa. It is now being marketed in several other Africa countries under the trademark "Pro nutro." The manufacturers are making money on it, it is a low-cost and wholesome product, and it is tasty. It also had an initial failure largely attributable to the manufacturers' limiting its principal consumers to those in the lowest income group. People would not buy it because it seemed like it was not good enough for the upper classes. It was only after the manufacturer decided to promote the product within all social levels, to put it on the shelves (even if the upper class people did not buy it, it was available to them), that they achieved success. These examples pertain to purely commercial products; they were not produced by a government-type organization.

On the other side, we have a number of semi-successes or semi-failures and most of these were cases in which governments got into the food business for the first time. In one instance, a food called "Peruvita" was developed in Peru. In this case, the

government did not develop the food in its own laboratory but asked an international company, (Nestle in this case), to develop a food for them made from local materials. Peruvita was developed, and it was wholesome and nutritious, low in cost, and it was promoted all over the country: on TV, in the newspapers, by word of mouth. It was put out on the market and it had a tremendous round of first sales, but there were no repeat sales. People did not like the taste, and would not buy it the second time. Now in Peru they still have a considerable supply of this commodity, and to finish off the terms of supply under the contract, the government is putting it into supplementary feeding programs until they use it up. No successful private food industry dependent on commercial sales for their profit would have made that mistake. Industry has learned from years of experience that it pays to put money into testing acceptability, and they test repeatedly until they are sure, for it is better to write off development expenses as a loss if it is not acceptable before they become involved in the bigger expense of production and distribution.

There are also "middle" types of cases in which a private nutrition institute creates a food and turns it over to industry. One example of this is Incaparina, perhaps the best known of these foods because it was developed at the Institute of Nutrition in Central America and Panama (INCAP) in Guatemala and as a result, it has frequently been written about, discussed, and studied. This food can best be described as having had limited success up to the present time. That is to say, its sales are continuing to increase, but very slowly and only really successfully in two places: in Guatemala, and in Colombia where it has been franchised through a major food company, the Quaker Oats Co. Quaker has now put up a manufacturing plant in Colombia. There have been attempts to produce it elsewhere but so far they have not met with success.

Now we will be able to witness from the beginning (and it is worth watching), the development of a similar food at the American University of Beirut, the AUB "Laubina." Laubina was developed by scientists in an institute. It has been tested for wholesomeness and it has gone through the animal testing phase, but it has not yet been marketed and attempts are being made at this time to get private industry to pick it up in the hope that they will market it in competition with other foods which cost the same but are not nutritious.

The U.S. government has been trying for some time to interest private industry to get into this kind of business and we are having some success. A recent exciting development was the announcement

just last month that the Coca-Cola Co. is market-testing a new product to be called Saci, which will be sold in glass bottles and distributed as a snack food for people to buy because they like it. However, instead of being the usual soft drink, which is primarily flavoring, sugar, and coloring, this will be a nutritious food containing about 3 percent protein and seven vitamins. According to the manufacturer, a 7-ounce bottle (which will sell for the same price as 10 ounces of "Coke") will supply one-half the daily protein requirements of a 2-year old. The first market-testing is now under way in Brazil. This is the kind of project which, in the long-run, can have real impact. Granted that such products do not reach rural areas, granted that they are geared for urban populations, and granted they are for populations enjoying a money economy with all these limitations - these foods do reach areas in which there is need. A number of other similar projects are currently under study in several countries by major international food companies.

## NUTRITION PLANNING AND COORDINATION

by Dr. Frederick T. Sai

It is generally believed, with some justification, that ideas, especially good ones, take a very long time to be disseminated and even longer to be universally accepted. One great idea that has proved an exception is the acceptance by practically all mankind that rapid economic and social development of countries now considered underdeveloped is not only necessary but achievable within a reasonably short time, provided we go about such development conscientiously and wisely. Translation of this idea into action has not been easy or rapid. The economies of the countries needing most rapid expansion are the very ones with inherent weaknesses that make expansion difficult. The largely subsistence economy of West Africa must be changed into a complete cash economy as rapidly as possible.

At present, 60 to 80 percent of the working population is engaged in agriculture and a large fraction of this percentage is producing food crops only. Many families just grow or gather enough food for their immediate needs and sell any extras for clothing and other necessities of life. It is known that the production of food in this area is inefficient; consumption levels are below theoretical requirements for many all of the time or during some seasons of the year. There are groups or regions where quite severe shortages in quantity and quality of food occur all year round.

The consequences of all these factors are various degrees of undernourishment or malnourishment which interfere with the capacity for work. The Food and Agriculture Organization (FAO) in the FFHC Basic Studies states: "Almost half the world's population today is suffering from serious undernutrition and malnutrition with little hope of a quick remedy. In many countries, food consumption is still limited by the capacity to produce foodstuffs and by low purchasing power. In vast areas of the world, such as the overpopulated countries of Asia, as well as in Africa and Latin America, the development of agriculture and industry, which alone would ensure a regular and adequate food supply, is hampered by lack of suitable equipment, funds, and trained personnel. Lastly, not the least cause of the situation is the human factor, namely the low working efficiency of the people which, in turn, is partly due to undernutrition. Here is a vicious circle that has to be broken;

lack of suitable food - undernutrition and malnutrition - low working efficiency - low production of food - lack of suitable food."

This kind of vicious circle has to be broken if plans for economic development are to be meaningful and if any real social progress is to be successful. The recognition that the nutrition of the individual is a national investment worth making is quite recent. In fact, in Europe and America direct government involvement in the feeding of the people has only occurred in times of war. However, the last war demonstrated not only the need for a government-directed policy on food and nutrition but also how beneficial the effects are likely to be. The 1939-45 war demanded of Britain a very scientific food and nutrition policy, and it is generally accepted that though the actual quantities of food available were less in some respects than before, the nutritional status of the citizens actually improved. The U.S. has very effective organizations for food and nutrition.

Although the West African countries are not at war, they are in the midst of rapid economic and social changes. There is tremendous investment in industries, roads, and buildings; investment in education is increasing. The need to earn enough foreign exchange to support these programs is a constant source of worry for the African governments. In many countries, imports of foods have swallowed up large sums of foreign exchange and in others over-hasty attempts to prevent food importation have led to consequences which have not been very satisfactory. Ghana's imports of foods rose from £11,288,911 in 1955 to a peak of £27,155,197 in 1964. When some ill-advised attempts were made to cut this expenditure down, the results were chaotic. According to the FAO, much of West Africa is a net importer of food.

There is clearly a need to evolve scientifically-based food and nutrition policies, and plans which will ensure satisfactory consumption levels for all without being a drag on meager foreign exchange earnings. Unfortunately, many of the facts required as a basis for such policy and plans are either not available in many of our West African countries or are only enlightened guesses based on a few surveys. It is necessary to examine some of the important data required for planning national nutrition programs.

#### COMPILATION OF BASIC DATA

##### Demographic

The population structure of the countries and their distribution by age and sex are necessary. Such data can be obtained from the census. In most of West Africa some 40 - 45 percent of the popula-

tion consists of children who are either totally non-productive or only partially productive. The fertility rate is about 40 per thousand and the demographic expansion rate is between 2 and 3 percent per annum, which means that the population will double in 30 years or less. With such high fertility and infant mortality rates, the population structure is unlikely to change much and the nutritionally vulnerable groups of children and pregnant and nursing women will continue to demand special attention. The distribution of the population between urban (and therefore food-buying) and rural (food-producing) needs to be made. If it is at all possible, an effort should be made to have some idea of the levels of activity expected of the working population. Many African women do heavy farm work. Rural children walk miles to school and they are hosts to numerous parasites and infections.

#### Food balance sheets

Many attempts have been made to produce meaningful food balance sheets for West African countries but so far those that are available can only be considered intelligent guesses which require more factual substantiation. A food balance sheet is no more than a statement of the amount of food available to a given population in terms of nutrients per capita per day. This takes into account all the food produced and imported for human consumption, excludes foods exported or used in industrial processes and for animal feeding. The animals, if used as food, are included. An accurate food balance sheet thus gives average overall figures of the availability of nutrients. Like all averages this figure hides differences which may be due to lack of transport facilities, lack of money, or maldistribution within the family. At best, therefore, such a statement shows a government whether the nation has enough food of the right type available or not. Certainly it does not tell the government that the people are consuming it. Yet, this is very useful because if an accurate food balance sheet shows nutrient availability to be clearly in excess of national requirements, then there is a need to explain any evidence of undernutrition and malnutrition on bases other than lack of production. With the assistance of FAO and bilateral agencies, an effort should be made to get accurate food balance sheets because these will be the sheet anchor for our plans and a basis for assessment of progress.

#### Theoretical requirements

A food balance sheet will not be very meaningful if there are no standards of requirements against which to judge availability.

Some advanced countries have evolved standards for populations based on experiments and on measurements of energy output and growth studies. Such studies have been made in very few African countries so we are forced to rely on the international recommendations made by FAO and the World Health Organization (WHO).

These recommendations are to be considered a first approximation only and we should study the populations closely before applying them. In rural Africa large numbers of women do quite heavy manual work on farms. The requirements for at least a section of women, therefore, should be increased to allow for the extra energy output. Young children have to share their food with loads of helminths; they also suffer from frequent fevers, and allowances must be made pending the time health measures have removed this drain on food.

In spite of the difficulties mentioned above we still have to try to evolve food policies which will be rational and plans which will be realistic. The other facts necessary for planning nutrition programs include knowledge of the nutritional status of the population, the food consumption and dietary habits, and some idea of methods of food production, storage, processing, and marketing.

The facts or mere estimates of the situation are available for some of the countries. The Joint FAO/WHO/OAU Food and Nutrition Commission for Africa has put together some of the facts in their occasional publications - the Bulletins. It is to be stressed that some of the studies involving the assessment of the nutritional status of the population are costly in terms of manpower, funds, and time and it is better not to attempt such work unless reasonable chances of accurate performance exist.

#### ASSESSMENT OF NUTRITIONAL STATUS

##### Anthropometric data

Birth weights of children have some relationship to maternal nutrition and probably to chances of survival. The growth rate of children provides useful information on the nutritional status of the whole population. Adult stature, especially the variations of weight by season, is a good guide to seasonal food deficiencies. It is known that the height/weight ratio of savanna and forest belt populations in West Africa is not very good; that adults lose as much as 5 lbs during the "hungry season" or soudure. Forest belt dwellers may lose 1 to 2 lbs during a bad season. This is a

serious problem since energy output may have been decreased long before weight loss sets in. Other types of anthropometric data, such as skinfold measurements and anatomical indices, might help to sharpen the analysis of the problem.

#### Dietary intake studies

Dietary intake studies are very complex, time-consuming, and expensive. Truly quantitative ones have been done in very few countries, and even then only on proportionally few families. However, when these are combined with extensive qualitative data such as "frequency of use," some very useful information is obtained. On the whole, Calorie consumption seems to be almost adequate, at about 10 to 15 percent less than the estimated requirements. However, this average masks violent seasonal fluctuations. During the harvest many would be consuming 12 percent or more of estimated requirements whereas during the preharvest time a deficit of 30 percent is usual in some savanna communities, and may be as much as 50 percent in bad seasons. Although adults may be consuming enough Calories, children generally may be receiving 70 percent or less of their requirements. The urban laboring classes and immigrants generally do not fare very well. A problem of some considerable importance to work efficiency is, therefore, how to produce enough Calories at a low enough price for all the population all the time.

The major sources of the Calories are important. Over 70 percent of the Calories are derived from grains, root crops, and plantains. In the savanna, where grains are the major source of supply, it would appear that increasing production should be enough to meet the need. In much of the forest belt, bulky, less concentrated cassava, yams, and plantains are the staples. Not only are these crops costly to transport and difficult to preserve, but they fill children's stomachs before supplying them with enough Calories. They need to be replaced largely by grain for purposes of child feeding.

Protein is at the heart of the food and nutrition problem. The staple provides by far the largest quantity of protein in the diets of cereal eaters, and theoretically no gross deficit exists. However, the quality of such protein is generally low in that it is lacking in one or more amino acids and this restricts its usefulness to the body. The root crops and plantains contain only 1 to 2 percent protein and the forest belt dwellers are definitely short of protein. These shortages, again, are more pronounced in the diets of children. Davy has shown that children in the various zones of Ghana get the following nutrients:

NUTRIENT VALUE OF CHILDREN'S DIETS

<u>Area</u>	<u>Age</u>	<u>No. of Children</u>	<u>Calories</u>	<u>Protein</u>
Forest	1-2 years	4	828	18.2 g
"	2-3 "	7	964	12.8 g
"	3-4 "	15	941	19.7 g
Savanna (dry)	1-2 "	2	804	20.7 g
"	2-3 "	5	778	24.9 g
"	3-4 "	18	1192	42.5 g
" (moist)	2-4 "	2	1509	53.8 g

NUTRIENT VALUE OF CHILDREN'S DIETS  
SHOWN AS A PERCENTAGE OF REQUIREMENTS

<u>Area</u>	<u>Age</u>	<u>P e r c e n t</u>	
		<u>Calories</u>	<u>Protein</u>
Forest	1-2 years	69	46
"	2-3 "	74	48
"	3-4 "	67	36
Savanna (dry)	1-2 "	67	52
"	2-3 "	60	54
"	3-4 "	85	80
" (moist)	2-4 "	111	107

The foods that yield good quality proteins are in poor supply and are expensive. Fish is mainly obtained in the south. Milk production is very elementary, except in one or two countries, and poultry development is in its infancy.

Large scale deficiencies of the major vitamins are not common. Vitamin A deficiency is serious in the drier areas. It would appear from surveys and from hospital and health center clinical records that riboflavin and folic acid deficiencies are serious in the forest belt and especially among pregnant women. Iodine deficiency causing goiter exists in many scattered areas and hookworms are responsible for iron deficiency in many places.

Actual diseases due to faulty nutrition

Knowledge of the presence and extent of any diseases due to faulty nutrition is an important fact for good nutrition planning. Many surveys have been done in West Africa, and in all of them some ideas of prevalence of protein-Calorie malnutrition emerge. In the

savanna areas, Senegal and northern Nigeria, the prevalence of kwashiorkor is 2 percent or less. In the forest belts, with their much lower protein intake, the figures range from 2 to 9 percent. These are overt cases but when only one or two of the signs are used, staggering figures of prevalence - between 16 and 50 percent of all children under 5 - are obtained.

Signs of vitamin A deficiency are more common in the dry areas. Riboflavin deficiency is widespread through all areas and shows largely in pregnant women and preschool children. Of the minerals, iron and iodine appear the most important since anemia and goiter are not uncommon findings in all studies.

#### Vital statistics

These provide indirect information on the state of nutrition. Deaths directly attributable to nutritional diseases, such as beriberi, scurvy and kwashiorkor, are important. However, a high degree of sophistication in health services is required for them to be truly accurate and in many cases deaths due to these causes are recorded as resulting from other diseases. The death rate among children aged 1 to 4 is probably the best general index of poor nutrition. Whereas the infant mortality rate in tropical Africa is about 4 to 5 times the rate in Western Europe, the preschool child mortality is some 40-50 times the comparable rate. The excess is largely attributable to the nutritional difficulties of this age group.

#### THE EVOLUTION OF FOOD AND NUTRITION POLICY

From such devices, therefore, we are able to build a fairly clear picture of the food and nutrition problems of a country or region and provide the basis for thinking out a plan. The problems as outlined show an overall mild deficit of Calories, made worse in some areas by periodic food shortages, but does not take into account the very great wastages which occur. The smallness of the deficit hides the plight of small children and special groups, such as the school child who has to walk long distances to school, the woman who has to work long hours on the farm, and heavy manual laborers with small incomes. A major problem is that of overall protein needs. The majority of the population does not appear to have enough protein, and what protein they do have is generally from one source and therefore lacking in some essential amino acid. Animal proteins hardly feature in many diets; and the protein problem is most serious for the preschool child.

The theoretical objectives of any food policy are, therefore, to:

1. Increase the availability of Calories to cover the present deficit, and make room for expansion to meet the population growth demands.
2. Increase the production and consumption of pulses and legumes which are better sources of proteins than the staples and cheaper than animal foods, while starting on expansion of the production of animal foods such as poultry, fish and pigs.
3. Increase the production and consumption of green vegetables and fruits by all, and especially by those in the savanna areas.
4. Identify the special vulnerable groups and make special plans for their protection.

#### THE PLANNING OF NUTRITION PROGRAMS

Within the broad policy outlines, plans have to be made for nutritional improvements. The plans must be fitted within any over-all development plans that are being made and they must be based on knowledge of the true causes of the problems outlined above. In this regard it is very necessary for the chief nutritionist of a country to have a direct advisory role to the planning ministry. The part played by deficient production, storage, and marketing, as well as barriers to the acceptance of certain foods, must be known.

The extent of nutrient deficits are then stated, consumption targets are set in terms of nutrients and translated into actual food targets on a time scale. When setting the targets it is necessary to be very realistic and incorporate the feasible. It may be necessary to have different targets for different parts of the same country and different social groups. It is futile to set rather ambitious long-term targets in countries where the necessary machinery does not exist for forecasting the long-term economic and social changes. It would be better to have some long-term objective but work towards this by short- or medium-term production targets based on 4- or 5-year periods. Such targets are more likely to fit economic feasibilities than long-term ones.

#### The production of Calories

It is known that much of the staples and starchy roots produced in tropical Africa can never reach human mouths at all. Lack of adequate distribution systems lead to high spoilage of foods on the

farms. Insects, rodents and moulds destroy a sizeable quantity and in the end from 10 to 30 percent of all farm produce is wasted. It would appear that the first need is to prevent all the avoidable losses through better collection and storage of food. It seems reasonable to suggest that at least part of the tropical farmer's unwillingness to produce too much food is due to the certainty that so much will be wasted. Payment for, and collection of what the farmer does not need for his immediate use will be a valuable incentive to increase production and this should receive serious attention in the plan.

Increasing the efficiency of the individual farmer and of his land should precede any other type of reorganization for food production. The introduction of some simple but better hoes and harvesters, the selection of better seeds, and the increased use of fertilizer will definitely increase the yield per acre.

There is an insidious situation to be faced in many parts of Africa. When a cash crop is introduced, farmers flock to it. If there is no guidance, valuable land for food crop farming is taken over by cash crops. This is not necessarily bad if food crop production per acre is increased to make up the difference. However, one only has to look at what the increase in tobacco, coffee, and cocoa growing is doing to the production of maize, millets, and sorghums in some countries to appreciate that a sound food plan can only be evolved if cash crop production and food production are viewed together and some reasonable allocation of land is made. The extension services should also support both types of activity.

The bulky Calorie-poor root crops which are expensive to transport should gradually give way to cereals as human food in the long-term plan. This does not preclude their production for industry or animal feeding.

#### The production of protein-rich foods

Many varieties of pulses and legumes are grown in tropical Africa. Their production and consumption need to be stepped up. As with the cereals, the wastage rate is rather high and some improved methods of preservation, distribution and marketing are urgently required. Again, cash payments for the produce will be the best reward for farmers. Animal foods are a difficulty because of the disease problems. However, fishery development is possible. It should be policy to develop both sea fishing and fish farming in inland waters and artificial ponds. Poultry is another good source of animal protein. It has a satisfactory feed conversion ratio. The technology is known and as a practical proposition

it has been amply demonstrated in many parts of Africa. Piggery development is also possible and should be planned in areas where no taboos exist. If these objectives are tackled properly it should be possible within a short time to produce enough protein-rich foods for each individual to have about 20 g of pulse and animal protein in a day's total of some 60 g, which would appear a good target for most countries to set themselves.

Although it is generally true that the staples are cheaper foods, when proteins are at issue, as is the case in much of tropical Africa, other foods may really be cheaper. In the table below (based on 1965 prices in Ghana) the cost of 10 g yam protein is 5p while that of pulses and legumes is 1.5p. The cost of 10 g fully utilisable protein (taking into account the amino acid values) is 30p for cassava and 3p for pulses and legumes, and so forth. The grains show up very well.

<u>Food Group</u>	<u>Protein Percent</u>	<u>Protein/1,000 Cal. (grams)</u>	<u>Cost of 10 g Protein in Ghana Pesewas</u>	<u>Cost of 100 Cal. in Ghana Pesewas</u>
Millet	9.7	28.5	2.2 (3.7) <sup>1/</sup>	0.7
Sorghum	10.1	29.6	1.6 (2.7)	0.5
Maize	9.5	27.9	2.0 (5)	0.5
Yam	2.1	23.3	5.0 (25)	1.0
Cassava	0.9	8.2	6.0 (30)	0.5
Fresh fish:				
Fatty	10.0	111.1		
Nonfatty	8.6	180.0	3.0 (4.5)	4.5
Meat (beef)	15.2	100.0	7.0 (9)	6.0
Beans and pulses	22.1	65.7	1.5 (3)	1.0
Eggs	11.0	73.3	7.0 (7)	8.0

<sup>1/</sup> Figures in brackets are cost of 10 g fully utilized proteins as judged by FAO's recommendations in protein requirements.

Green vegetables and fruits are a problem for two reasons: they are not generally considered as food by many and they are so perishable that they require a very efficient marketing organization. Both indigenous and European type vegetables can be grown. Useful fruits include citrus, mangoes, and pawpaw.

#### Reaching vulnerable and special groups

It is one thing to make enough food available but quite another thing to ensure that the food is consumed in the right amounts by groups requiring it. Weanling children have less than their share

because their special needs are not recognized. It should be policy to develop as rapidly as possible a cheap high-protein weaning food. Formulas are already available which can be adapted and adopted. Investment in this area will contribute fundamentally to the development of the next generation which will ensure a better basis of human resources. If some evidence now coming forward is to be believed, protein-Calorie malnutrition has sequelae in retarded mental development, which no nation can afford. Similar developments should lead to the production of fortified foods for pregnant and lactating women. Industrial workers need some special attention and this may be provided through canteens and market cooperatives. Plans should be made for extensive nutrition education programs.

#### THE COORDINATION OF NUTRITION PROGRAMS

It should be obvious from the complexity of the subject of human nutrition, encompassing as it does the fields of agriculture, health, trade, education, economics, customs, and many others, that if progress is to be made without avoidable delays, duplication, unnecessary expense, and hardships, the plans should make provision for coordination machinery. In many countries there are nutrition units. Some of these are autonomous national units, others are to be found in the Ministries of Agriculture or Health or in the universities. Wherever it is, such a unit, efficiently staffed, is the real hope of any successful coordination of nutrition activities in a country and those countries which have none are advised to plan for their establishment and start training the personnel required to man them.

The unit should service a National Food and Nutrition Committee, Council or Board. The name is not important, but the membership status and definition of functions are. Such a body should have on it at the highest level possible representatives from the Ministries of Agriculture, Health, Social Welfare and Community Development, Education, Information, and Economic Development and Planning. In addition, it is a good idea to have on it representatives from the consumers organizations or major voluntary organizations, such as the National Federation of Women's Associations.

The chairman of a board of this nature is important. He should be a widely-respected person with either direct or indirect interest in nutrition. It is not usually very good to have either the Ministry of Agriculture or Health provide the chairman since this tends to make the particular ministry look upon the board as its own, and the other ministries then give only half-hearted support.

The board has to be placed somewhere within the government organization. Exactly where depends on national realities. There is much to be gained by having this national body either directly under the head of government or else under the Ministry of Economic Development. It may also be under the Ministry of Agriculture or Health. In the last two cases there would be a need to ensure that these ministries understand that the board is a parallel body to the ministry's overall administration and has direct access to the minister through its own chairman. It is a wise plan to make the representatives of Health and Agriculture joint deputy chairmen. At present in Ghana the chairmanship is to be shared alternatively by professors of the Faculty of Medicine and Faculties of Agriculture in the universities.

The nutrition unit's most knowledgeable nutritionist should be the secretary and the unit itself should service the board. A board of this type, if properly formed, should meet about four times a year only to formulate policies and plans to approve the budgets for nutrition and to assess work in progress. It is usually necessary for such a board to have standing committees that will gather and sift information and supervise all activities. The three most usual committees are:

1. Production Processing and Marketing;
2. Clinical and Surveys;
3. Education.

Each committee is chaired by the head of the major ministry responsible for its subject. The executive secretary is a member of all committees. Other members are drawn to make planning and evaluation realistic.

A thorny question is how much executive power a board of this nature should have. The answer is, unless the nutrition unit is directly under the committee, then the latter is unlikely to exercise much direct executive power. However, if the operational heads of the major ministries concerned with nutrition are members of the committee then each of these is, as it were, the committee's chief executive within his ministry's field of competence and its plans can be executed without difficulty. Another source of authority for such a body may derive from its having access to funds for activities it considers important and which require the efforts of several agencies, for instance, for surveys or for research and training.

The history of national coordination committees for nutrition has not been very happy in Africa. Many have begun with a lot of fanfare and have had a short life. Frequently, the representatives of the ministries get more junior with time until the body loses its role. Where the body had direct field activity clashes between its staff and those of other ministries, problems were created. Finally, the tendency for one of the major ministries to look on the board as its very own must be recognized.

Coordination at the national level must be supported by similar structured bodies at regional and district levels. It is only thus that successful coordination can be possible, and the only way to ensure participation of all levels in nutrition planning.

### CONCLUSION

The food and nutrition problems of the countries of West Africa are known in broad terms. There is a need to sharpen such knowledge in quantitative terms, if at all possible, because it is only then that real planning can be possible. There are problems of coordinating activities such as surveys, research and nutrition education. These exist, among national groups within a nation, between the national groups or individual workers and external agencies or groups, and between the external groups working in or with a country. Such difficulties can only be removed if the national plans start with a properly organized body charged with the responsibility for coordinating all nutrition activities.

Too many of our countries are leaving the problems of nutrition to solve themselves, as it were. We do not really clearly know, as scientists, what sequelae severe and early malnutrition can have on the development of a child and therefore a nation, but we should reflect on some of the findings of Danish observers of severe famine associated with improvements. They noticed:

1. Curtailment and brutalization of the emotional and moral outlook;
2. Impairment of the memory;
3. Diminished powers of spontaneous reaction;
4. A tendency to irritability and emotional instability;
5. Absence of libido;
6. Dullness, in some cases developing into apathy; and less frequently
7. Acute psychoses.

These are findings following severe conditions of hunger and no one wants to be alarmist and say similar things are happening

in our countries today, but, in view of some of the tentative results of studies of malnutrition and mental and psychomotor development, we need to start thinking of possible serious long-term consequences. Quite apart from humanitarian considerations, the development of a nation depends, first and foremost, on the development of its human resources. No nation can develop with undernourished or malnourished populations. This, in my view, is really what makes it necessary for us to take nutrition seriously in our plans for economic and social development.

## GENERAL DISCUSSION

Chairman: Dr. Edouard Campbell

Dr. N'Doye (Senegal): After Dr. Sai's talk there are very few things to speak about. I would simply like to go back to our previous discussions because here I have often heard mention being made of a Nutrition Division located in the Department of Rural Economy, or of a Nutrition Division located in a Department of Coordination, and so forth, and I believe that it is necessary to differentiate between a Nutrition Division within a Department and the National Nutrition Service. This is also a matter of coordination. The National Nutrition Service, or whatever its title may be, is unique. Very often, this service is attached to the Ministry of Health but it is not mandatory that it be this way; it is a service which can be attached to the highest echelon possible, even to the Secretariat of the Presidency of the Republic.

Dr. Tourey (OCCGE): I would like to go back over one of the points raised by Dr. Sai during his brilliant talk. I refer to the coverage or to percentage of coverage of requirements observed in Ghana. This notion of percentage of coverage of requirements brings forward the subject of food requirements in themselves. These requirements are defined in different manners in various countries: in Canada, Great Britain, France, and in the United States, they are established according to various criteria. FAO has set up international norms based on a human reference, adapting corrective factors in relation to temperature, weight, and age. However, I believe that these norms are not yet reliable and, to prove it, I only have to mention the latest modifications that FAO recently made to Dahomey's vitamin standards for the B complex and for vitamin A. In 1966, a survey conducted in Senegal revealed a 50 to 60 percent deficit in vitamin A during certain periods. If we utilize the new standards published since 1966, the deficit no longer exists or does not exceed 10 percent. The question of nutrient requirements is a basis for discussion.

Besides, it is difficult to evaluate the physical output of the individuals examined during the course of the surveys. At a certain time of the year, the farmers palaver on the village square and they do strictly nothing; then comes the main period to work the fields. How do we evaluate the difference in requirements? I would like to know if someone has already evaluated the Calorie expenditure of the African farmer at work compared to the farmer at rest.

My second question concerns coordination and I ask it in my position as Director of ORANA which is an institute of the OCCGE, a regional international organization grouping all the French-speaking countries of West Africa. I am very happy to see them reunited here so that I can provide them with some information. At OCCGE, we have annual technical meetings. Unfortunately, with the exception of Dr. Fofana who is attending this present conference, there is never any representation from the nutrition services of the member nations. In the member nations, it often occurs that the man responsible for nutrition is subordinate to a Ministry other than Health; such is the case for Dahomey. Because of such a situation, we at ORANA, whose function is to centralize information, never receive the essential data. This is why I take this opportunity to inform the member nations of OCCGE that I have requested the following from the Secretariat General: at the coming conference to be held next month in Bamako, the member nations of OCCGE will be requested to forward through their delegations, a report on the existing structure of nutrition matters in their respective countries, as well as on the activities of the national service so that we will be able to furnish any information requested from us concerning member nations.

We have been requested to establish a quadrennial work program. We already have one which expires at the end of the year and we have been requested to establish a second program. Before doing that, however, I think it is necessary for each of the member nations to submit to the OCCGE technical conference next month its suggestions and desiderata for programs and research programs to be undertaken by ORANA. The members should also indicate any surveys that they would like to see conducted on their territories. On the basis of this information, we could submit to the next inter-national ministerial conference to be held in November, a program which would seek to satisfy the desiderata of the member nations.

As concerns our English-speaking friends, a few observers always attend our OCCGE conferences. There were attempts to establish mutual goals but we ran into language and financial difficulties; however, it remains true that we will always be happy to receive technical information from the nutrition services of the English-speaking countries. We have mutual problems. I am referring particularly to peanuts and aflatoxin. Like Senegal, Nigeria is directly concerned. It would be desirable to have exchanges of information on work being accomplished on both sides; this would preclude losing our time working on the same subjects. I know of the existence of a committee for peanuts but I do not know if it is concerned with nutrition and aflatoxin problems. I know that in Nigeria, there is a great deal of work going on in this area and we would be happy to be able to exchange the results of our work for the benefit of everyone.

Mr. Toure (Ivory Coast): It appears that in all countries four or five ministries are concerned with nutrition questions, each one working in its own corner. However, we should attempt not only to coordinate all actions, but to do it in such a manner that the different researchers and technicians work in good harmony. As I said the other day, we have attempted to resolve this problem in the Ivory Coast by creating a National Food Committee. This committee is an advisory organization to the government. It is not subordinate to any ministry and is attached to the Presidency of the Republic in the sense that the Chairman of the Committee is a State Minister who replaces the President during his absence. This enables us to deal directly with any of the ministries without having to call on such and such a person.

Mr. O'Cloo (Togo): Mr. Chairman, I would like to address my congratulations to Dr. Sai for his paper which fixed two important points of our problems, namely: nutritional standards and coordination techniques. At the national level, FAO and WHO have formulated documents which permit all countries to have a basis for discussion. But, what about the sub-regional level? Two years ago, at the time of the first Food Technology Seminar for the African region, we had insisted on the necessity to create small groups from neighboring countries to resolve food problems. For two years, nothing has been done about this and I hope that, starting with this conference, something can be accomplished.

We must give many thanks to the United States Government for having reunited English-speaking and French-speaking Africans. At FAO's last conference, the Senegalese delegation had emphasized the fact that we should resolve our problems without bearing in mind the language difficulties. Togo receives from Ghana excellent small fish and we supply Ghana with some processed products such as half-polished rice. Why is it that Ghana, Togo, Dahomey, Niger, and Upper Volta, could not set up joint programs concerning food technology, marketing, legislation and repression of frauds?

Dr. Kourouma (Guinea): I will only take a minute to remark that the solution to all the problems that we have raised here depends upon our superior authorities. However, Africa must not despair since our leaders have organized and founded the Organization for African Unity (OAU). We are aware of the attacks that OAU was subjected to; nevertheless, sub-regions are forming: Central, West, East and North Africa. We hope that these regions will reunite and that we will be able to progress wisely, step-by-step, on safe soil. Africa will not despair, because it is on virgin paper that the best painting can be made. In Africa, nothing is done, all is to be done. If we brace our efforts shoulder-to-shoulder we can achieve the greatest realizations.

Dr. Oyenuga (Nigeria): Mr. Chairman, I would just like to emphasize one point which Prof. Sai has mentioned in his very brilliant paper. Obviously, the national level is the place to plan for improvement in nutrition on the national scale. But the question is, how do we get the government to do this? I would suggest that this aspect might be one on which committees may place some emphasis.

What Dr. Omololu said yesterday about educating planners might help. It is quite interesting to hear from Dr. Sai that such a course has been set up in Ghana. I remember in the 1950's quite a number were set up at the state or regional level in Nigeria, but as usual, they all disappeared after three or four years. Perhaps we need to know how to commit the government to really setting up this national coordinating machinery.

Dr. Sai (Ghana): In replying to Dr. Oyenuga's comments, I will take the last one first. How do we get a government to set up coordinating machinery? Actually this is not very difficult and throughout Africa many governments have set up such machinery with a lot of fanfare in the past. The main problem is to make such machinery work once it has been set up, and this has proved more difficult. It is an analysis of the failure of this type of machinery which has led me to the conclusion that unless a nation has trained personnel within a nutrition unit able to service a national nutrition organization, then it is better not to set up national coordinating machinery. In such a situation it would be better to choose some facet of nutrition activity that the country can handle and to set up simple machinery for undertaking that alone.

For instance, a country that does not have much expertise in nutrition, but which feels that the major nutrition problem is to try to get people to shift their emphasis in child feeding from an over-concentration on the staple to the richer sauces, needs only to provide for internal coordinating machinery between community development workers and the maternal and child health services of a Ministry of Health.

My paper was a general paper giving broad theoretical possibilities, but within this it is possible to progress in a step-wise fashion and to be ready to face setbacks. Ghana started setting up a Nutrition Coordinating committee as long ago as 1957. The committee was initially based in the Ministry of Health, then it was moved to the Ministry of Agriculture, and then it ceased to function. It had no executive powers. A new committee was formed in 1959 under the Ministry of Health and was moved in 1960 to the

Ministry of Agriculture and given executive powers. But that, too, failed. It was altered later and made a complete ministry on its own under the President's Office, but with excessive political interference that also collapsed. With the lessons from these and some of my experiences from other countries in the region, we have tried to set up another committee. Whether this will collapse or succeed is too early to say.

The main thing about such committees is to make them as realistic as possible in terms of funds, personnel, and work to be done. An important aspect of coordination is the need to coordinate the activity of individual workers within the same country. If there is a person working in nutrition in Ibadan, another in Lagos, or if within Ibadan one person is working on clinical aspects and another on biochemical aspects, there should be some way of bringing all these people together. This would avoid duplication; it would provide them with inner strength; and it would make them put up a better case for international assistance.

As regards the subject of nutrient requirements, it is necessary to recognize that the political boundaries of West Africa are not the same as useful ecological boundaries; therefore, if nutrient requirements are to be developed, they should be developed along sensible ecological lines. It should be remembered that a standard applicable to Bolgatanga is likely to be of more relevance to Ouagadougou in Upper Volta than to Accra in southern Ghana.

Unfortunately, not much work has been done on measurement of energy output. One of the best studies was a piece of work done by Fox in the Gambia. His unpublished data indicated that the activity of the people he studied was directly related to their energy intake in terms of Calories. Bruce Nicol came to the same conclusion in a study in Nigeria.

Unfortunately, human beings restrict their activity in face of Calorie shortage long before they actually lose weight, and they also do not change their activity level in direct response to feeding programs. It is therefore unlikely that anybody will be able to prove on a group of individuals convincingly that supplementary feeding leads to increased energy output. Many more studies of Calorie intake and energy output as well as Calorie expenditure in relation to work under varying conditions of temperature and humidity are needed.

## COMMITTEE REPORTS

### COMMITTEE ON NUTRITION AND HEALTH

Chairman: Dr. Bénitiéni Fofana  
Rapporteur: Dr. Mohamed Kader

Having heard reports on the food situation, the social and economic situation, the health conditions, and the goals for development of participating countries, and having attended the presentations and discussions of the six conference themes, the Committee on Nutrition and Health of the West African Conference on Nutrition and Child Feeding recommends:

1. That research on the physical and mental development of the child be intensified for the purpose of evaluating the consequences of chronic malnutrition.
2. That nutrition be considered an important factor of productivity deserving maximum attention in view of the economic consequences of malnutrition, such as:
  - a. Cost of treatment.
  - b. Greater susceptibility to infectious and parasitic diseases.
  - c. Impact on morbidity and infant mortality.
  - d. Impact on absenteeism and diminished work output.
3. That Health Departments:
  - a. Stimulate interest in nutritional problems among leaders and among the communities.
  - b. Participate in the establishment of development plans in order to influence production in the direction of the real needs of the population.
  - c. Give priority to health and nutrition education at all levels with emphasis on the nutritional benefits to be derived from local resources.
  - d. Participate in coordinating the activities of all relevant agencies in the government.

4. That existing activities to improve or to create national as well as international institutions concerned with nutrition be intensified, giving priority to:

- a. The education of high-level and middle-level instructors.
- b. The supplying of laboratory equipment, as well as nutrition survey equipment and teaching materials.
- c. The development of mother and child care centers.

5. The multidisciplinary surveys be undertaken to sharpen our knowledge of nutritional problems in order to find a rational solution to these problems.

The Committee recognizes that there is a close relationship between nutritional and demographic problems, the solution to which comes within the scope of the national policy of each State.

## COMMITTEE ON NUTRITION AND AGRICULTURE

Chairman: Mr. Abdoulaye Samaké  
Rapporteur: Mr. E. K. Okpoti

The Committee on Nutrition and Agriculture of the West African Conference on Nutrition and Child Feeding recommends that the member states:

1. Take the necessary measures to diversify production and use appropriate methods to enhance the use of fertilizers, pesticides, agricultural equipment and implements needed to develop uncultivated and arid lands.
2. Improve agricultural credit policies to permit farmers to acquire the necessary equipment under most favorable conditions.
3. Accelerate the training of personnel in agricultural extension and create more favorable working conditions to attract and sustain the interest of extension workers.
4. Study what is the most realistic system of land tenure to permit the best agricultural extension.
5. Encourage agricultural research and disseminate the findings through agricultural extension.
6. Concern themselves with the protection of crops: in the fields by a campaign against common pests and diseases, and in storage by the construction of protective units and the use of pesticides.
7. Improve marketing and distribution channels as well as transportation, packaging and handling.
8. Develop export marketing channels.
9. Concern themselves with the development of market gardening wherever possible by the introduction of high-yielding varieties of fruits and vegetables, as well as by intensification of the cultivation of legumes and pulses.
10. Develop a national policy favoring animal production with respect to feeding, mixed farming, and the selection of more productive breeds of animals.

11. Induce livestock owners to pay more attention to the concepts of marketing meat and milk, rather than the prestige factor in ownership of animals.

12. Encourage backyard poultry and small animal production for home consumption.

13. Encourage improved additional fishing methods through a practical training program.

14. Construct cold storage plants to assist the development of fresh fish markets.

15. Stimulate the development of improved local techniques for drying and smoking fish.

16. Support the development of the canning industry.

17. Seek solutions to marketing and distribution problems.

18. Request the assistance of bilateral and multilateral agencies to establish regional as well as national programs in planning, organization and execution.

## COMMITTEE ON NUTRITION AND CHILD FEEDING

Chairman: Mr. F.P.P. Kluga-O'Cloo  
Rapporteurs: Dr. S. Ofosu-Amaah  
Mme. Rahamata Diallo

The Committee on Nutrition and Child Feeding of the West African Conference on Nutrition and Child Feeding recommends:

1. That, just as governments have accepted their role in providing free elementary education for their people (as a pre-requisite to national, social and economic development) governments come to accept their role in providing for child feeding programs based on continuity, family nutrition and better new foods. Sponsoring and/or supporting supplementary feeding programs is one way of assisting people to achieve and maintain health.
2. That the operation of child feeding programs be based on adequate resources--monetary, material, and personnel. Such resources may be provided by:
  - a. Contributions from governments (national and local).
  - b. Contributions from the people themselves.
  - c. Contributions from international aid agencies.
3. That in supplementary feeding programs priority attention be given first to mother and child populations (pregnant and nursing women and pre-school age children, including infants), and second to school age children.
4. That, to ensure effectiveness, such programs be soundly established to ensure their continuity.
5. That in doing so, however, governments be realistic and develop programs which they can, in fact, implement successfully.
6. That governments recognize that foreign aid (whether bilateral or multilateral) can be of great assistance to a country in initiating programs and in improving and expanding them, but such aid is necessarily temporary in nature; therefore, program planning must provide for local support to ensure their continuity after the phase-out of the external assistance.
7. That governments not be tempted to avail themselves of aid without first carefully considering the costs and also the consequences of program disruption. Untimely termination or

disruption of a program may result in frustration, disappointment, and even turmoil.

8. That family nutrition be improved through child feeding programs by:

- a. Providing needed nutrition to pregnant and nursing women and pre-school and school age children.
- b. Educating mothers (in MCH programs) and children (in school feeding programs). In the latter case, parents can also be educated through the child. It must be emphasized that child feeding programs do not (or should not) consist merely of feeding. A program must include education as well.
- c. Introducing new foods and new food habits. In introducing new foods, it is essential to ensure that they are acceptable to local tastes and customs. Program sponsors should also be aware of the danger of creating a new taste which results in a new demand that may not be easily satisfied with continuity.

9. That, insofar as practicable, child feeding programs be based upon foods of local origin and traditional tastes.

10. That, "new foods" be introduced only if:

- a. The resultant diet is more nutritious.
- b. The new food is equally nutritious but less expensive.

11. That the introduction of new foods be accompanied by an evaluation program to ensure:

- a. Acceptability.
- b. Nutritious effect.

12. That cognizance be taken of the significant contribution modern food technology can make in the formulation of new foods to ensure that:

- a. They are improved nutritionally.
- b. They become more simple to prepare, thus relieving the housewife of the time required to prepare meals.

13. That in formulating new foods, technology be adapted to local conditions, not merely adopted. In an African setting, this implies exploring to the maximum the possibilities of local village industries developed for this purpose.

14. That in the preparation and processing of foodstuffs within a state, priority be given to small local cottage-type industries. For regional groupings with a population sufficiently large to provide a potential market, the Committee recommends that a food industry be set up and stresses the need for due coordination in any such development venture.

15. That in the implementation of supplementary feeding programs all methods of approach adapted to various levels of local authority be used. To achieve this aim, youth associations, cooperatives, cultural and religious organizations, trade unions, political parties, and other such groups should be encouraged to participate in program planning at an early stage.

16. That because people tend to cling persistently to traditional food habits, where possible improved nutrition should be brought about with a minimum of change in the taste, appearance, and other characteristics of the food. Where it is considered necessary to change such food habits, it will be necessary to create a positive motivation based on local values. New foods should not be stigmatized as being directed to the poorer classes.

In addition to the above recommendations, the Conference takes note of the desirability of developing supplementary feeding programs for working personnel during times requiring increased output of energy (such as planting and harvesting season) in order to provide such personnel with their increased energy requirements.

## COMMITTEE ON NUTRITION AND EDUCATION

Chairman: Dr. Adewale Omololu  
Rapporteur: Mrs. Jean Pinder

The Committee on Nutrition and Education of the West African Conference on Nutrition and Child Feeding recommends:

1. That each member state establish a coordinating body which would include the Ministries and other organizations concerned with problems of nutrition. Where feasible and possible, delegates from this Conference should assume responsibility for initiating such a coordinating body. Where this is not possible, delegates should initiate coordination by whatever means they deem most suitable.
2. That member states undertake nutrition education for the following levels of workers:
  - a. Policy makers such as economic planners, Ministers of Health, Education, Finance, Social Welfare, and Agriculture.
  - b. Senior grade technical workers such as senior agricultural, health education, and social welfare workers, and heads of technical training institutions.
  - c. Middle-level workers such as teachers, nurses, agriculture extension workers, and dieticians.
3. That in order to provide training necessary for the first two groups, regional training institutions be developed, either by strengthening existing institutions or, if necessary, by establishing new institutions. These institutions would conduct multi-disciplinary seminars and training courses for the first two groups mentioned above and also would provide specialized courses for the third group (i.e., the middle-level workers) on methods and techniques of adult and community education. The development of such institutions might require international or bilateral assistance.
4. That nutrition and health education be incorporated into the basic training courses of the various disciplines, i.e., health, agriculture, social welfare, teaching, and so forth.

5. That nutrition and health courses be included in all school curricula from the primary level through the secondary and teacher training levels, and that examinations in these subjects be included at the various levels.

6. That member states which have produced teaching guides, recipes, or other suitable nutrition education materials make them available for translation and for distribution to other countries in Africa.

7. That governments make middle and lower level workers directly responsible for the education of all groups in the communities-- school children, mothers, women's organizations, labor groups, market women, and so forth. Therefore, the training of these workers must include not only content but methods of teaching and communication suitable for various types of population groups.

8. That on their return to their respective countries delegates to this Conference organize meetings at the highest possible level to apprise local officials of the recommendations made at this Conference.

9. That in order to further the exchange of information and methods for dealing with problems of nutrition education each government arrange for workers of various disciplines and levels to have an opportunity to spend from three to six months in other West African countries, participating in and observing techniques and methods being used to further nutrition education.

10. That delegates to this Conference return to their respective countries and initiate the activities necessary to implement the recommendations made here, and that in two years time another conference be convened at which time delegates will report on progress achieved.

COMMITTEE ON NUTRITION AND INDUSTRY

Chairman: Dr. Thianar N'Doye  
Rapporteur: Dr. M. Tahiri-Zagret

The Committee on Nutrition and Industry of the West African Conference on Nutrition and Child Feeding recommends:

1. That traditional and national technology be studied and developed in the context of the knowledge provided by modern science without, however, deleting what local traditional technology had which was well adapted to the country.

2. That modern technology be used to the best interests of the population, taking into account the local purchasing power and economic realities of Africa.

3. That both food and cash crops be processed as near as possible to the village where they are produced so as to limit, insofar as possible, cityward migration and to facilitate the introduction of the money economy into the rural areas.

4. That bush foods and local resources be explored by modern methods with a view to their eventual transformation into new foods supplementing the diets of children and adults.

The Committee hopes:

5. That food testing and evaluation centers will be quickly established on a regional basis so as to guarantee that the consumer will be confronted with an acceptable product, wholesome and capable of improving the nutritional diet of both grown-ups and children. The establishment of these centers could be facilitated at the regional level through foreign aid.

6. That governments explore, without let-up, the possibility of encouraging the establishment of new food industries, giving them support either through tax waivers or subsidies so as to reduce their prices, or through market guarantees within the gift of governments, such as army rations, hospitals, and others, for the purpose of enlarging national markets within the regional framework.

7. That private industry understand that it is to its interest to reach the largest possible market, including people at the lowest economic levels since this should be considered as a long-term investment.

COMMITTEE ON NUTRITION, PLANNING, AND COORDINATION

Chairman: Dr. F. T. Sai  
Rapporteur: Dr. B. A. Johnson

The Committee took note of the fact that nutrition has not received the attention it deserves in national planning and discussed some of the reasons for this. The absence of data, the lack of trained personnel and lack of awareness of the problems on the part of the policy-makers are felt to be the main difficulties. Therefore, the Committee recommends:

1. That individual nations make efforts to collect demographic data (total population figures, rate of population expansion, extent of migration, population distribution by age, sex, and geographical areas, and so forth) where it does not already exist and that such data be carefully studied to determine, for instance, the effect of urbanization in relation to food production and nutrition.

2. That efforts be made by all countries to provide food balance sheets. Those countries which need outside assistance might obtain help from the United Nations Agencies or from bilateral sources. Such balance sheets, when produced, should be updated periodically.

3. That each country collect information on food movements, both inside and outside its borders. National data on food imports and exports should be collated at a regional level, since this might assist in planning for regional marketing.

4. That efforts be made by individual countries to obtain any additional data necessary to complete the picture of a country's nutrition statistics, such as anthropometric measurements, clinical assessment of nutritional status, and food consumption information. However, since collection of these data is expensive in time, funds and personnel, caution should be used in attempting to obtain them. It might be best for countries not in a position to support collection of such data themselves to invite outside help and to send their nationals for training in these methods. The international agencies might give attention to the possibility of conducting surveys in countries needing them.

5. That attention now be given to the possibility of producing reference standards to suit the different ecological conditions of West Africa, since food consumption tables for Africa are almost ready.

6. That consideration be given to the establishment of regional food testing centers to enable the evaluation of new foods from the point of view of acceptability, wholesomeness, and developmental benefits.

7. That international, as well as national, agencies give attention to the training of demographers who are essential to the collection and assessment of population data.

8. That assistance be sought for training personnel required to staff well-informed nutrition units within the national governments.

9. That in countries where they do not already exist, well-staffed well-informed nutrition units be established as soon as possible, as a necessary prerequisite to proper coordination of nutrition activities within a country. Furthermore, it is recommended that assistance be sought for training the necessary personnel, if needed.

10. That machinery be provided in each country for a national dialogue on nutrition at the highest possible level. This may take the form of:

- a. A large assembly, including all the policy-makers involved in any aspect of nutrition to discuss policy and finance, and to be serviced by,
- b. A Nutrition Commission which should have on it the highest possible executives of those agencies directly concerned with nutrition, such as the Ministries of Health, Agriculture, Education, Social Welfare. Voluntary organizations and the universities might also be represented on such a Commission.

This national nutrition organization should be attached to the Office of the President or Prime Minister so that its proposals can be carried out. With such an organization, it might be necessary to have either individual nutrition units within the various Ministries directly concerned with nutrition, or liaison officers who will report to the Executive Council or Commission. A Commission should have funds at its disposal.

Alternatively, where there is one single nutrition unit in a country, it should form the servicing machinery for the coordinating

body. The unit itself should become a resource point for nutrition activities and have liaison officers in the individual Ministries. The Chief of such a unit then becomes the Chief Executive of a Nutrition Committee.

If there is a Nutrition Society in a country, then the Society needs to be consulted over the choice of Chairman of the Nutrition Committee and it should itself be represented on the Committee. Where such a Society exists, it might try to coordinate activities of individual nutrition workers by bringing them to periodic meetings to discuss their activities. Otherwise, this function should devolve on the Executive Secretary of the Nutrition Committee.

Coordination with international agencies should also be channeled through the Nutrition Committee.

11. That at the peripheral level leadership for co-ordination devolve to the agency which has the most to do with the major activity and that the people who are being served be involved.

## CLOSING CEREMONIES

Mr. Cissé (Senegal): Ladies and gentlemen, we are here at the end of our working sessions, almost on the eve of departure. We are therefore going to endeavor to wind up efficiently, but at the same time, swiftly. We have asked the representative of the World Food Program, Mr. Pollaris, who is in more than one respect interested in our proceedings, to say a few words to us.

Mr. Pollaris (WFP): I should like to place the role of the World Food Program within the context of the various problems which have been discussed during this conference. The role of the WFP is, at the present time, strictly limited to the supply of foodstuffs. Provided the recommendations of the Director General of the FAO are adopted by the Inter-governmental Committee of the WFP during its 13th Session, to be held in Rome from 17 to 24 April next, it is possible that the WFP may be authorized to solicit contributions of fertilizers, insecticides, and agricultural machinery, thus allowing it to expand its operations considerably.

Mr. Cisse (Senegal): We shall now endeavor to summarize the salient points upon which we have reached agreement during our week's work. Initially, we had specified one goal for ourselves. This goal was to define the position of nutrition among problems of development. This position has been thoroughly examined with respect to its different constituent parts. We have approached the problems of this conference with an attention as great as any given the great causes of our continent. Indeed, we have done what is most important when we say that development without man is not possible and that development without being intended for man's use is likewise not possible. However, it was emphasized that man was to fulfill specific conditions in order for development to be carried out successfully; otherwise, the operation would be a sort of Danaides barrel without a bottom in which everything poured in by us would flow out.

In order for men to fulfill these conditions, it is required, first of all, that they maintain requisite conditions of health. The fact is that our committee has noted the importance of the relationship between nutrition and health: for the newborn, for the mother in whose care he is entrusted, for the social group which is to pass on to him the torch of development, and above all, for all society, whose forward development is dependent upon the intellectual capability of this future

adult. In this way, therefore, without any dispute being raised between different disciplines, the roles of health and nutrition in our development plan have been emphasized and properly placed.

The foodstuffs are intended as support for operations recorded in the social and economic development plans. Since the WFP does not have its own experts available, it resorts to those of other Specialized Agencies of the United Nations, such as FAO, WHO, UNICEF, ILO, and UNESCO, depending on the nature of the program it intends to support.

United Nations Organizations have often been criticized, and rightly so, for the delays between the presentation of a program and the beginning of its execution. There are very often delays of 8, 10, 12 or 15 months between the application and its approval. This is chiefly owing to the fact that applications presented to the WFP must be forwarded to all the Specialized Agencies of the United Nations involved in technical decisions.

Consequently, I should like to make a proposal. I believe that it would be possible to considerably shorten these delays if, during the time that a program is being worked up, the government would prepare a preliminary plan which could be examined jointly by competent officials and the experts of the Specialized Agencies working in the country and involved in one aspect or another of the plan. At the time of submission of the final text to the seat of the WFP in Rome, reference could be made to the fact that the plan had been studied on the spot by the experts of the FAO, UNESCO, WHO, and others, depending on the case, and had been approved by them. I believe that this procedure would allow reduction of the aforementioned delays by several months.

Next, since we are dealing with agricultural countries for the most part, we have dealt with the problems of agriculture. This is the very agriculture which, as a number of eminent economists have shown, is at the present time practically our sole source of income. The importance of agriculture in our economy has been shown and emphasis has been placed on the importance of its diversification; diversification, first of all to satisfy our needs, but likewise, to provide the qualitative requirements for our harmonious and balanced development. We have shown that, in order to give agriculture the benefit of modern technology, the problem of planning, of liaison between the rural and urban sectors, and of production and outlets, should be given a high priority in close coordination with nutrition since it is by meeting his nutritional needs that the "consumer" can be reached.

Since all of these operations are to transform minds, establish new national and international relationships, even to the point of occasionally disregarding individual selfishnesses, they can only be dealt with and carried on in the beginning owing to education. In order to accomplish this program in all its points, using different approaches but arriving in the end at a single result, we have emphasized the importance of education in this essential activity involving nutrition. Thus it is that we have all agreed to state that individual, as well as mass education, horizontal education at the management personnel level, as well as vertical education going from the very top to the bottom, is the only method allowing mobilization, during the educational process, of the different participants in the economic life of a country. We have also thought that the work in education that we have started here, complementing one another in our efforts as well as making us more and more humble with respect to the disciplines of the others, should also be an international activity in order for the different persons in authority in other countries with other economies to understand the role to be played by them in the solution of our problems.

These goals should be reached by two essential means: the first one involves the application of modern technology to the solution of the problems of nutrition. We have seen the place to be occupied by private industries in the struggle against malnutrition. We have approached the problem from the base, proceeding from agrarian societies, which make up the framework of our populations, to urban societies, which are also to be found in our countries. We have specified the course of action to be followed: modernization of production, modernization of marketing circuits, decentralization of small industries to the places of production in order to progressively develop inter-regional investments which will allow different campaigns to be joined and made more efficient. It has also been agreed that international assistance was a solution not unlike a double-edged blade. We have emphasized that it was necessary that international assistance be employed with carefully thought-out limitations and, above all, that this assistance be passed on by means of an internal campaign through collective organizations and national technicians.

Finally, we have stated that the harmonizing of these different problems could not be accomplished by spontaneous generation. The problems of organization have especially drawn the attention of each one of the speakers and, even during this closing session, the spokesmen from several delegations have returned to the problems relating to the planning and coordination of our efforts.

For this reason, we believe that the affirmation of the essential attention to be paid nutrition by each one of our States should be put into concrete form (taking into account the administrative customs of each of our countries) by an organization at the highest level where there would be no disagreement arising between doctors and nutritional experts or between economists and educators. There should be an operation which has been coordinated, planned, and programmed in order for the entirety of the needs to be recognized and adequate solutions to come into play within the measure of their priority.

This work of coordination, in order to be sustained by international effort, should be planned for by a national as well as regional effort. The fact that all of us here come from West African countries should certainly lay the groundwork for the premises of this collaboration.

Coordination implies realization and understanding without which no plan is possible and no priority can be established. The fact that each one of our countries has come here to listen to the others implies a strong desire to profit from all the experiences of the other countries here present.

We should like to express our appreciation to the Government of the United States for having taken the initiative -- accepted by the Government of Senegal -- for this timely conference. Owing to this meeting, we learned of the existence of solutions found by others for common problems. This gives us cause for hope that it will be possible, as, for example, in The Gambia, to accomplish many things by means at hand. This also encourages us to believe that the problems will be solved by science and intelligence and not by the size and magnitude of resources.

In conclusion, I should like to say that Senegal is very fortunate to be, perhaps, the first country to profit from this information exchange and this cooperation. Moreover, we have been impressed by the tact, dignity, and even the discipline with which the different participants approached the various plenary and working sessions. There were no defections; each one demonstrating his good faith by his attentiveness to duty. Now, since the greater part of the participants are governmental delegates, we are confident that the attention and serious demeanor shown by them for the study of these problems will certainly be passed on to the level of the organized bodies delegating them to this conference and that we shall, therefore, witness a later reassembling of these 14 countries, no longer for the study of problems, but for their solutions.

What should be hoped for, as has been said on all sides, is that a path has been plotted leading to eventual solutions of problems to which we have not as yet the answer. We hope that the Nutrition Program of the Public Health Service of the United States will publish the conclusions of this conference and the different discussions will serve to establish a bond with Dakar, resulting in a long period of cooperation. We hope that it will be possible to meet together at regular intervals and that these meetings will be the subject of extensive preparations.

What we have stated to the commission concerning education is valid not only for the whole of African countries but also, and perhaps above all, for the participants from international organizations and countries outside of Africa, such as, for example, the United States.

It would be advantageous if, before the next meeting, a maximum number of exchanges could be made. This would be owing to cooperation and international assistance and would involve exchanges of technicians between countries and between projects, as well as exchanges of experiences, exchanges of findings produced from research or by the carrying out of pilot projects. This should be done in order that the next conference may know the details of progress accomplished in the intervening time, on the basic recommendations made today in Dakar.

In conclusion, I should like to apologize for the absence, at this closing session, of the Minister for Plan and Industry. He was kept informed of the works of the conference and requested that I pass on to you his very favorable impression of the findings.

On behalf of the Government of Senegal, I should like also to express my appreciation to the body of participants who provided, in the course of many verbal exchanges, an illustration of what has been done for a long time by the Office of Food and Nutrition of Senegal, and to prove, in this way, the importance of its work, and show that each discipline finds its place there.

Likewise, as the interpreter for all the participants, I should especially like to thank Dr. May, who, by his complete knowledge of the working languages of the majority of us, where English- or French-speaking, by his availability, and above all, by this knowledge in depth of the different problems worrying us, knew how to anticipate all these difficulties, blocked them off and thus allowed us to economize our efforts and time so as to keep up with our schedule within the time anticipated.

In the name of everyone, I hope that each one of us will be able to meet again soon and, most of all, be able to pass on lessons learned here to all those persons, in the cities and rural areas of our countries, who will benefit from them and be able to prepare the coming generation to contribute much more intelligently and efficiently to the development of our countries.