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9. ABSTRACT
The purposes of this nutritional sector assessment of Nicaragua are: (1) to describe the extent and severity of the malnutrition problem; (2) to identify some of the most important variables related to the problem; (3) to highlight the governments current policy, plans and programs relative to the nutritional status of the population; and (4) to propose some areas where intervention may impact significantly on the nutritional problem. The major nutritional problems of the two most vulnerable groups, young children and pregnant and lactating women, are protein-calorie malnutrition, nutritional anemia, vitamin A deficiency, endemic goiter, and other vitamin deficiencies. Protein-calorie malnutrition affects over half of all the Nicaraguan children under five years of age. Other nutritional deficiencies are widespread within the general population. Given the nutrition problem, appropriate planning must be based upon knowledge of associated factors and causes. Malnutrition is a complex, ecological problem and is determined by numerous interacting factors in a community's physical, biological, and cultural environment. A conceptual, linear model is presented which provides a framework within which to view the interrelated, logical, and complex network of factors that directly or indirectly influence the nutritional status of any population. The quantity and quality of food ingested depends on four major factors: the availability of foods, income or purchasing capacity, food habits, and education and information regarding food and nutrition. Each of these variables is explored as it relates to Nicaragua. Perhaps the most significant factor affecting malnutrition is the inequality of income distribution. This factor is further compounded by poor environmental sanitation, low levels of education, and limited access to preventive and curative health services. The report also discusses policy, programs and alternative interventions.

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NUTRITION SECTOR ASSESSMENT

FOR

NICARAGUA

Transmitted By

United States Agency for International Development

Mission to Nicaragua

Managua, Nicaragua

May 14, 1976

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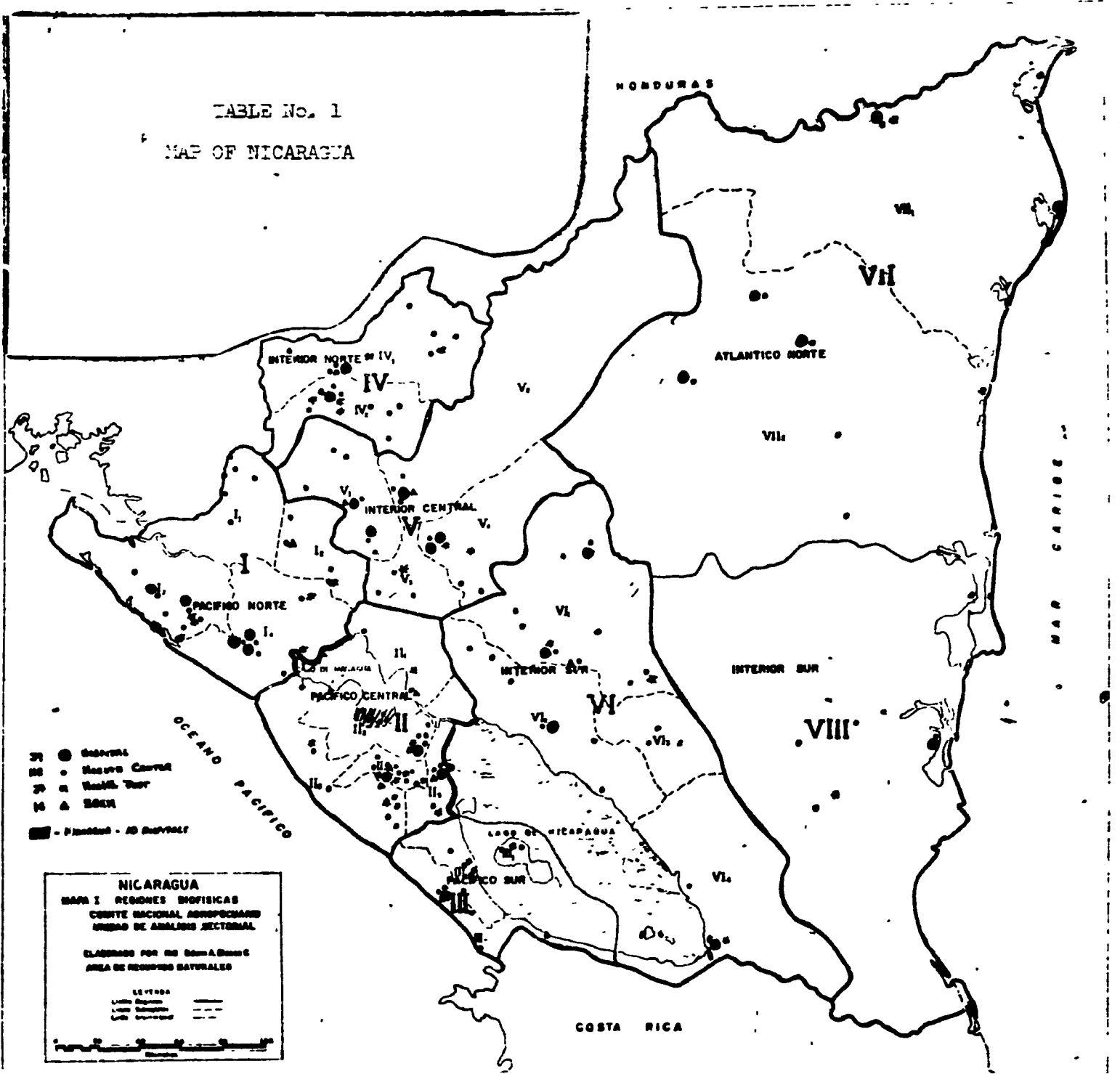
PREFACE

A. Purposes. The major purposes of this nutritional sector assessment are: (1). to describe the extent and severity of the malnutrition problem in Nicaragua; (2). to identify some of the most important variables related to the problem; (3). to highlight the Government of Nicaragua's current policy, plans and programs relative to the nutritional status of its population; and (4). to propose some areas where intervention may impact significantly on Nicaragua's nutritional problem.

B. Overview of Nicaragua. Nicaragua, the largest of the Central American countries, is a predominantly agricultural country with a population of 2.3 million and a density of 18 inhabitants per Km² (7 persons per square mile). The great majority of the population reside in the Pacific coastal plain and western lowlands between Lake Nicaragua and the Pacific Ocean, and it is here where socio-economic infrastructure is most highly developed (See Table No. 1, Map of Nicaragua). The Atlantic Coast is predominantly an extensive yet scarcely populated tropical rain forest. The Nicaraguan population is characteristically young, over 58% of the population is under 20 years of age and the population is growing at approximately 3% annually. Although Nicaragua is progressing as measured by almost every traditional socio-economic indicator, it continues to be a country with large disparities in income, education and land distribution. Chapter III further describes characteristics of the population.

C. Overview of the Nutrition Problem. This assessment emphasizes that malnutrition is one of the most serious and widespread socio-economic problems in Nicaragua. The major nutritional problems in Nicaragua can be grouped into two general categories: (1) protein calorie malnutrition and (2) other major nutritional deficiencies (Iron, Vitamin A and iodine deficiencies). Protein calorie malnutrition, whose detrimental effects are seen most readily in children under five years of age, affects some two out of every five children in Nicaragua, with a higher prevalence in rural areas. The prevention and treatment of protein calorie malnutrition, within the current socio-economic realities in Nicaragua, present difficult challenges. On the other hand, iron, Vitamin A and iodine deficiencies which are also widespread within the general population, are more clearly definable and conceptually more susceptible to prevention and treatment. Each in principle, may be eliminated by means of a cost effective technological solution through the fortification of a widely consumed product containing the deficient nutrient.

TABLE No. 1
MAP OF NICARAGUA



- Managua
- Masaya Capital
- Leon
- △ Bocay
- ▬ - Fronteras - AD Biologica

NICARAGUA
MAPA I REGIONES BIOLOGICAS
CORTE NACIONAL AEROFOTOGRAFICO
UNIDAD DE ANALISIS SECTORIAL

CLASIFICADO POR DR. CARLOS A. DOMESTICO
 AREA DE RESERVAS NATURALES

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D. Government Awareness and Commitment. It is readily apparent that nutritional status is the result of numerous interacting biological, physical and social factors in man's environment. Thus, any significant improvement in the nutritional status of the Nicaraguan population will of necessity require the concern and participation of numerous sectors.

Although up until the moment there has been no formal national food and nutrition policy adopted by the Government of Nicaragua (GON), there have been numerous recent indications of GON awareness of and concern about the nutritional problems pervasive in Nicaragua. A new Nutrition Coordinating Committee¹ has recently drafted a proposal for developing a National Food and Nutrition Policy. In April of this year, a Second National Seminar on Child and Family Nutrition was sponsored by the Ministry of Health (MOH) and the Organization of American States, with the participation of personnel from health, education and agricultural sectors. The conclusions of this seminar emphasize the need for both a national food and nutrition policy and a multi-sectoral approach to the nutrition problem. In addition, the Central Bank of Nicaragua has provided support personnel to work in nutrition-related activities, and has initiated studies concerning food technology and processing.

E. Information Gaps and Weaknesses. The assessment recognizes the paucity of data available in certain substantive nutrition areas as well as the limited representativeness of data in others. Nonetheless, the studies cited do not in general present conflicting data. They are unanimous in their documentation of widespread and severe malnutrition in Nicaragua.

F. USAID Strategy. Because of its breadth and complexity, the nutrition problem requires broader program strategy than do many other sector problems. Special attention must be paid, for example, to the relationship of nutrition strategy to problems and strategies in agriculture, education and health. It is in this regard that a multi-sectoral food and nutrition policy is so important, in order to avoid the

¹ / Composed of a subgroup from the Health Sector Assessment team, delegates of the Central Bank, National Planning Office, Ministry of Agriculture and Ministry of Health with technical advisory services from INCAP.

problem of designing policies and programs in a given sector which hold the potential for limiting or nullifying nutritional gains made elsewhere.

It is not sufficient that such a food and nutrition policy be elaborated as a static, unchanging statement of nutritional goals. Rather, there must be a continued effort to determine whether national policies regarding nutrition continue to be viable and effective, and how they must be updated to meet the changing needs of the population. Such a view implies continued efforts in analysis, planning and evaluation concerning nutrition problems and program alternatives.

The current USAID strategy can be basically described in two stages: (1) the development of a technical assistance nutrition grant project and (2) the development of a nutrition improvement loan program, both of which will be directed at the major nutritional problems identified. The general purpose of the grant project--- for which a project paper is being transmitted concurrently with this assessment--- would be to assist the newly established Nutrition Coordinating Committee in its efforts to define nutrition policies and establish a corollary multi-sectoral administrative mechanism capable of executing project design and coordination. In addition, the grant project would define components and cost-effectiveness of a national nutrition program to be partially financed by a 1977 nutrition improvement loan. Up until now, the most explicit form of A.I.D. assistance in the nutrition area in Nicaragua has been PL-480 Title II feeding programs. This assistance will phase out on June 30, 1976.

The two stage nutrition strategy forms an important part of the overall GON-AID strategy for integrated rural development in Nicaragua. That strategy is to simultaneously conduct multi-sectoral programs designed to provide Nicaragua's rural poor with a full range of opportunities for improving their lives. A.I.D. support of this strategy formally began in mid-1975 with authorization of a \$14.0 million loan program in the agriculture sector that has been instrumental in creating an innovative rural development bank, the new Nicaraguan Instituto de Bienestar Campesino (INVIERNO). This program is being followed by a rural health program--- now in the final design stages---and will also be followed by programs in rural education, rural municipal development as well as in nutrition improvement. The nutrition improvement loan program will be developed during the first, grant stage of USAID assistance. It will fit very appropriately within the multi-sectoral context of the GON-AID strategy for integrated rural development.

I. THE NUTRITION PROBLEM

Malnutrition is recognized as one of the most serious and widespread problems in the world. In developing countries, malnutrition makes its most dramatic and significant impact on young children. As the children of a society constitute its future, it follows that whatever effects the health and development of children will affect the health and development of the society in which they live. The magnitude of the nutrition problem can best be appreciated by considering the extent of childhood mortality, the relationship of malnutrition to that mortality, and the extent and effect of malnutrition among the survivors [1, P.3.]^{1/}

A. Vulnerable Groups

Within the population there are two groups which are especially vulnerable to the problem of malnutrition: infants and young children; and pregnant and lactating women.

1. Young Children

While children under five years of age in Central America represent 17.8% of the population, they account for approximately 32% of all deaths. [2, P. 5.] Of these, it is estimated that malnutrition plays a significant role in at least 50% of these deaths by allowing what are usually minor childhood diseases such as measles, mumps, respiratory and gastrointestinal infections, to become killers.

The great majority of malnourished children, however, do not die. Instead, they live in a state of chronic malnutrition that extends into adulthood. Although the effects of malnutrition are not dramatically visible in this group, the problem adversely affects both mental and physical development, educational potential, productivity, and the span of working years. These all significantly influence not only the economic potential of man and his society but the quality and longevity of his life [1, P.9.].

^{1/} All bibliographical references will be identified by brackets [], and listed at the end of the document.

2. Pregnant and Lactating Women

A pregnant woman, if she is to remain nutritionally healthy throughout her pregnancy and give birth to an infant of normal birth weight, must be nutritionally healthy prior to conception and must meet increased nutritional needs to avoid contracting preventable, nutritionally depleting diseases. She must be knowledgeable about basic principles of nutrition and food preparation so that she buys the correct foods and prepares them in a manner that does not destroy their nutritional value. She needs an adequate understanding of basic hygiene and must be near sanitary resources and facilities to be able to put what she knows into practice. Access to potable water and a sanitary waste disposal system are essential in this regard. After she gives birth, if she is to nourish her baby adequately, she must produce breast milk in sufficient quantity and quality for an adequate length of time. To provide her child with resistance to a multitude of nutritional and non-nutritional diseases, she must be aware of and be able to afford the food to meet the basic nutritional requirements of her growing and developing child. An adequate diet will not only build her child's resistance to preventable diseases, but will contribute toward building his physical and mental potentials so that he is able to contribute socially and economically to a growing and developing country.

Albeit simplified, the above example does suggest the enormity and complexity of the problem. In order to begin to come to grips with the problem and to develop potentially effective interventions, we need to understand more about how malnutrition is caused, what it is, how it is manifested in the individual, how it is detected, how it is treated and, if untreated, what its effects are on the individual and at the societal level.

B. Measurement of Nutritional Status

The extent and severity of malnutrition are generally assessed by both direct measures and indirect measures. The direct measures are primarily clinical examinations, nutritional anthropometry and biochemical tests. Since clinical examinations and biochemical tests generally require not only a great deal of knowledge and skill, but also costly equipment and facilities, anthropometric measures (such as the Gomez

technique^{1/} which uses weight and height data for given age groups-) are the most simple and frequently used methods in assessing the growth and development of children. It has been demonstrated that nutritional status is strongly correlated with these anthropometric measurements, especially in the period of rapid growth during early childhood. Of the variety of measures available, weight is thought to be the most sensitive and useful single indicator of nutritional status and general health [28, P. 75].

Indirect measures are those thought to be associated with the presence of malnutrition and to constrain or foster the nutritional status of a population. The most frequently used indirect measurements are cause and age-related mortality and morbidity, as well as a large number of socio-economic indicators.

The types of malnutrition most prevalent in Central America have been documented by INCAP (Instituto de Nutrición de Centro América y Panamá) for over twenty years. These are: protein calorie malnutrition, various types of iron deficiency anemias, Vitamin A deficiency, endemic goiter and riboflavin deficiency.

C. Principal Nutritional Problems

1. Protein Calorie Malnutrition

Protein calorie malnutrition (PCM), the most important form of malnutrition in Central America in terms of incidence, prevalence, and severity, is a term used to group the whole range of mild to severe clinical and biochemical symptoms and signs present in children as a consequence of imbalanced or deficient intake and/or utilization of protein and carbohydrate calories [4, P. 75-86]. The two types of severe PCM are kwashiorkor and nutritional marasmus.

^{1/} Gomez Scale is a standardized growth scale based on studies on Central American children. This scale provides a simple diagnostic tool for assessing nutritional status of children. Based on deviations from normal standards for weight and age, Gomez describes three levels of malnutrition: Grade I (mild), Grade II (moderate), and Grade III (severe). These three levels of malnutrition correlate significantly with biochemical and clinical signs and symptoms of malnutrition.

Kwashiorkor is caused by a diet that is very low in protein, especially animal protein (or its equivalent^{1/}). Kwashiorkor is not starvation, but rather a condition due to an imbalanced diet. The proportion of animal protein calories to carbohydrate calories is inadequate. While it can occur from infancy to adult life, it is most common in the one to three year-old age group. During this period of life, the growing child has very high protein needs and yet often receives a partially indigestible, bulky, largely carbohydrate diet. He is further burdened nutritionally by multiple, common, often simultaneous infections including measles, malaria, and infectious diarrhea. Not only do these infections cause decreased intake of food because of poor appetite during the period of illness, but they also interfere with the utilization of what little is eaten.

Four signs predominate in the clinical appearance of Kwashiorkor: edema (swelling of the feet and ankles as well as other parts of the body); growth failure (especially low weight for age); weak muscles with some overlying subcutaneous fat; and psychological symptoms such as misery, apathy and poor appetite.

Since Kwashiorkor tends to be a severe condition of short duration before recovery or death, the number of visible or apparent cases in a community at any given moment is small [5, P.107]. Severe cases of kwashiorkor require immediate medical treatment and hospitalization to give the victim a chance for survival as mortality rates even in hospitals are known to be as high as 30%.

It is generally agreed that there are four main principles in the prevention of Kwashiorkor: (1) a high-protein diet in the early years of childhood; (2) the prevention of infection; (3) adequate child spacing; and (4) the early recognition and prompt treatment of mild and moderate cases.

Nutritional Marasmus, the other severe form of PCM, differs from kwashiorkor in several respects. It is due to a diet poor in both animal protein and calories; and it is, in fact, the direct result of starvation. The condition occurs commonly in the first year of life when it is most often the result of a failure of breast feeding and unsuccessful attempts to rear the baby on diluted infected bottle feeds. Unfortunately, marasmus is on the increase in many countries, especially in urban areas where the practice of breast feeding has decreased. Late marasmus from starvation can occur at

^{1/} Certain vegetable proteins when taken in the correct combinations and amounts are an adequate substitute for animal protein.

any age. However, it most commonly develops in the second year of life in susceptible children who subsist on breast feeding alone without the necessary other foods.

Marasmus, much like Kwashiorkor, is made worse by various associated infections, and children with this condition may well be suffering from tuberculosis, infective diarrhea and parasites. Marasmus is characterized by extreme growth failure (often body weight will only be 60% or less of what would be expected for a child of that age) and a very marked wasting of muscles and subcutaneous fat. These conditions give the child the appearance of a wizened little old man.

Prevention is based on the same principles as have been mentioned for Kwashiorkor, but with special reference to the first year of life. In practice, for developing areas of the world such as Central America, this means: (1) breast-feeding, (2) avoidance of bottle feeding, (3) the introduction of other foods by 4-6 months of age, (4) the prevention of tuberculosis and other communicable diseases by early immunizations, and (5) the avoidance of infective diarrhea by the use of potable water and by using clean foods and feeding utensils.

It is mild to moderate PCM, however, which is endemic, affecting over half of the young children in developing areas of the world. For every case of severe PCM, whether Kwashiorkor or marasmus, there are hundreds of thousands of young children suffering from various other stages of PCM. The majority of these children live in a state of chronic malnutrition, which is inapparent except for smaller body size. It is these children who are at considerable risk not only of developing a more severe form of PCM, but of suffering the ongoing developmental physical and mental consequences of malnutrition. It is these children which will form the future of society. Plainly, it is necessary to try to detect PCM cases in the early stages, and with acceptable and effective means prevent them from ever reaching a severe degree. Early cases of PCM in children may be most readily detected by weight measurements.

Thus, the presence of PCM can be likened to an iceberg; a small proportion of severe cases (kwashiorkor and marasmus) represent the visible peak of the iceberg, while the great majority of children suffering from earlier stages of mild to moderate PCM are hidden below the surface. When changes occur in the proportion of readily apparent severe cases of PCM one can assume that more substantial changes are occurring in the numbers of mild to moderate cases hidden below this peak.

2. Nutritional Anemia

Nutritional anemia is a condition in which the hemoglobin or iron content in the blood is lower than normal as a result of a lack of one or more essential nutrients. [6, P.118]. Iron deficiency anemias are extremely common in Central America and affect virtually all age groups, although they are predominant in children and in women of childbearing age. A considerable percentage of maternal mortality associated with child bearing has been found to correlate strongly with anemia. Anemia is likewise a factor known to be associated with low birth weight. Iron deficiency can occur not only from lack of various nutrients as a result of inadequate dietary intake, but also from poor absorption or from excessive loss (as seen in infectious diarrheas, malaria and severe hookworm), or from a combination of these.

The principal sources of iron can be found in both animal and vegetable foods. Meat and eggs are good sources of iron but are not very likely to be economically available to the average family in Central America. Dark green leafy vegetables and grain cereals are more likely to be within economic reach.

The main symptom of anemia, is pallor of the tongue and conjunctiva. If anemia is prolonged and severe, the child or adult will be tired, listless and breathless. The measurement of iron deficiency anemia depends not simply on clinical examination but on biochemical measures of the iron content in the blood. Stool examinations are likewise effective in determining causality.

An effective solution to iron deficiency anemia must take into consideration: (1) the provision of a diet adequate in iron; and (2) an attack on intestinal parasites by improving living conditions, latrines and particularly water supply.

3. Vitamin A Deficiency

Vitamin A is a fat soluble vitamin and thus has the advantage of being stored in the liver. In a well fed individual the storage of Vitamin A may suffice for months even if the diet is lacking in this nutrient. Vitamin A is principally required for the normal functioning of the epithelium (surface cells) of the skin and eyes, including the retina. A deficiency of Vitamin A is, therefore, not only characterized by various forms of dry and roughened skin, but its main detrimental effects are on the eye, causing different degrees of blindness.

Vitamin A deficiency in Central America is predominantly a problem of early childhood. It is particularly likely to occur in children whose mothers are on a diet poor in Vitamin A, who have transferred only a small quantity to the fetus during pregnancy and whose breast milk is also poor in this nutrient. Vitamin A deficiency not only frequently accompanies Kwashiorkor but is often associated with attempts to rear infants on formulas of dried or condensed skimmed milk which are lacking in this fat-soluble vitamin.

Vitamin A is obtained from animal foods, particularly in liver, egg yolk, milk and its products, and in liver oil from cod and other fish. These sources of food are only rarely available to the average population in Central America, primarily because of economic purchasing constraints. Alternatively, however, Vitamin A may be synthesized within the body from orange pigment foods containing carotene. Rich sources of carotene include orange colored fruits and vegetables, some of the most common to Central America being carrots, mangos, papaya, pumpkins, and yellow sweet potatoes. The consumption of these foods is primarily conditioned by the limited range in the basic dietary pattern common to this area (rice, beans, corn) and by the seasonal variation in the supply of fruits and vegetables.

Vitamin A deficiency is theoretically easy to attack because of recent proven technological advances in fortifying a widely consumed product, such as sugar.

4. Endemic Goiter

Iodine is a mineral required for the normal function of the thyroid gland. Deficiency leads to visible swelling of the thyroid gland (goiter). Fish and other sea food are rich sources of iodine, although iodine is also found in vegetables.

Endemic goiter, due to iodine deficiency, is a preventable disease that can be virtually eliminated without social, economic or health changes in the population. Endemic goiter has been found to be associated with cretinism, deaf-mutism and retarded mental development in children of iodine deficient women. It is well known that by means of iodized salt, endemic goiter can be effectively eradicated.

5. Other Deficiencies

Riboflavin, Niacin and Thiamine are three Vitamin B complex vitamins essential in small quantities for the maintenance of good health. Severe deficiency

results in various forms of clinical malnutrition. As with other forms of malnutrition, vitamin deficiency disease is much more likely to occur in children and pregnant or lactating women [4, P. 19].

Thiamine, which is required for the metabolism of carbohydrates in the body, is widely available in a variety of tropical foods, including cereal grains, legumes, green leafy vegetables, fish, milk and meat. Severe deficiency of thiamine in young children results in a clinical condition known as infantile beriberi. Beriberi is most commonly seen in areas of the world where rice is the principle source of food and is overmilled when prepared for public consumption.

Riboflavin is likewise widely distributed in a variety of foods, but is in especially high concentration in milk, green vegetables, blood organ meats, fish and eggs. In tropical diets, its main sources are usually dark green leafy vegetables, cereal grains and legumes. Lack of riboflavin produces ulcers at the corners of the lips and a generally red, sore mouth.

Rich animal sources of niacin include meat (liver), while plant sources most common in tropical diets are legumes and cereal grains. Cereal grains when overmilled lose their niacin. Clinical deficiency of niacin is known as pellagra, and is common in corn-eating communities especially if the corn germ has been removed by overmilling.

Other common health problems related to nutrition are dental caries and periodontal diseases. These indicate a lack of dental care, oral hygiene and a lack of adequate nutrition. Nutritional problems in those individuals with severe dental problems is compounded by the inability to consume solid foods.

II. EXTENT AND SEVERITY OF MALNUTRITION IN NICARAGUA

A. Sources of Information

The principal sources of data used here to document the extent and severity of the malnutrition problem in Nicaragua are the following:

1. The initial INCAP Study (1966) [16];
2. Small Community Studies (1969-1975); 1/
3. The Nicaraguan Agricultural Sector Assessment (1973-1974) [23]
4. The Nicaraguan Health Sector Assessment (1976) [9]; and
5. The update of the initial INCAP Study carried out in collaboration with the Government of Nicaragua (1975) [13]

The INCAP Study, the most extensive and representative study available, was undertaken in 1966, although it was not published until 1969. Then, in 1975, INCAP reviewed these initial findings and determined them to be still valid in view of current socio-economic and health data. To assess Nicaraguan nutritional status, both direct and indirect measures were used. The former included clinical examinations, anthropometry, and biochemical tests, while the latter consisted of a socio-economic and dietary survey. The survey sample consisted of two groups. The first group included 600 families containing over 6,000 individuals from 30 rural communities. The second group was made up of 100 families from Managua, the national capital, selected to represent the urban population of Nicaragua. It is interesting to note, however, that of the communities selected, none contained fewer than 500 inhabitants. Since slightly more than one third (35.4%) of the Nicaragua population lives in communities with fewer than 500 people [8, P.30], it is probable that the truly rural segment of the population was not fully represented in the sample. Thus, this study probably underestimates the incidence of malnutrition, as it does not adequately represent the rural population where other studies show incidence of malnutrition to be greater.

A number of smaller community studies have since been carried out in various areas of Nicaragua (Note Table No.3). These studies generally used direct anthropometric measurements of children five years of age and under to assess the nutritional status of a community. Although these mini-studies cannot be considered broadly representative of rural regions, when taken together, their findings

1/ See Table No. 3 and references [3], [13], [14], and [15].

have substantiated the results of the earlier, much larger study done by INCAP.

The Nicaraguan Health Sector Assessment, completed in early 1976, provides data on malnutrition in Nicaragua by means of indirect measures such as the distribution and extent of health and nutrition-related services along with morbidity and mortality data. In addition, numerous small studies conducted as part of the Health Sector Assessment expanded and up-dated information about nutrition-related patterns of health and disease.

The Agricultural Sector Assessment, completed in 1974, supplies a wealth of information on nutrition related factors such as food production, and income distribution and the behavior of producers and consumers. These data were tabulated and analyzed on a regional basis and are drawn upon in this paper to emphasize the multi-factor nature of the malnutrition problem.

The findings of the above studies are discussed below as they relate directly or indirectly to the four most critical nutritional problems in Nicaragua.

B. Protein Calorie Malnutrition

1. Direct Measures

Protein calorie malnutrition (PCM) is the most serious and widespread nutritional problem in Nicaragua. The 1966 INCAP study used anthropometric measure of weight in relation to age for young children in its approach to documenting the extent and severity of the problem. The findings of the study revealed that more than half (55.1%) of all Nicaraguan children four year old or less were suffering from mild to moderate (Grade I and II) PCM, and 1.5% had severe (Grade III) PCM. No significant differences by sex were found.

The investigations conducted after the 1966 INCAP study confirm the original findings. It is possible to project from the INCAP data that in 1975, 227,000 Nicaraguan children in the age group four years and younger have malnutrition in the form of PCM (see Table No.2). The geographical distribution of PCM documented by INCAP in 1966 and since analyzed by regions^{1/} is presented in Annex No. 1.

^{1/} In the 1974 Agricultural Sector Assessment Committee divides the country into eight regions based on socio-economic growth, development, and transportation networks. (Note Table No. 1, Map of Nicaragua).

TABLE NO. 2
MALNOURISHED CHILDREN* 0-4 YEARS, NICARAGUA, 1975

Severity of Malnutrition	Number Malnourished	Percentage Of Total 0-4 Years
Grade I (mild)	168,000	41.9
Grade II (moderately)	52,000	13.2
Grade III (severe)	7,000	1.5
TOTAL:	<u>227,000</u>	<u>56.6</u>

* Estimated on basis of INCAP 1966 findings.

The accompanying Table No. 3 summarizes data from other more recent studies.

TABLE No. 3

**SUMMARY OF NUTRITION STUDIES BASED ON WEIGHT AND AGE MEASUREMENTS, CHILDREN
0 - 5 YEARS OF AGE, NICARAGUA**

Study	Date	Region	Sample Size	Findings - Nutritional Status									
				Total		Normal		Mild PCM		Moderate PCM		Severe PCM	
				No.	%	No.	%	No.	%	No.	%	No.	%
INCAP	1966	All Regions	723	409	56.5	314	43.4	303	41.9	95	13.2	11	1.5
Division of Nutrition MOH	1969	Managua II	1500	851	56.7	649	43.4	679	45.3	152	10.1	20	1.3
CARE	1974	VIII Rural	156	130	83.3	26	17.0	71	45.5	46	29.5	13	8.3
Nutritionist MOH	1975	I (Rural)	1102	757	68.7	345	31.3	507	46.0	209	18.9	41	3.7
UNAN	1975	I (Rural)	42	26	62.0	16	37.8	16	37.8	8	20.0	2	4.4
Miskito	1975	VII (Rural)	2400	1502	62.5	898	37.0	870	36.0	568	23.0	64	4.0

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SOURCE: Unidad de Análisis del Sector Salud, Evaluación del Componente Nutricional dentro del Sector Salud, asesorados por INCAP, Diciembre, 1975

2. Indirect Measures

a. Childhood Mortality

Aside from direct measures of PCM, the magnitude of the malnutrition problem can likewise be appreciated by considering indirect measures such as child mortality and the relationship of malnutrition to mortality. Available child mortality data in Nicaragua do not adequately report infant deaths. CELADE, the statistical unit of PAHO, [9 P.26] estimates the infant mortality rate in Nicaragua during the period of 1970-1975 to be 120 per 1,000 live births and mortality of children 1-4 years of age to be 19.8/1,000. The great majority of deaths are believed to be caused by communicable, gastro-intestinal and respiratory diseases, many of which could be prevented by immunizations and improved environmental sanitation, and most of which are compounded by the deficient nutritional status of these children.

INCA² found that 32.3% of all deaths occurred within the 0-4 age group. This age group represents only 17.2% of the total Nicaraguan population [10]. Other sources estimate that 46% of all deaths occur in this group (11, Vol. VII, P.2). This rate of child mortality is extremely high when compared to child mortality rates in more developed countries of the world (4.8/1,000 in the USA, 7.8/1,000 in Canada [29]).

The five principal causes of death in children 0-4 years of age in Nicaragua in 1973 were: [12 P.16] (1) enteritis and other diseases causing diarrhea; (2) perinatal mortality; (3) tetanus; (4) pneumonia, bronchitis and other respiratory diseases; and (5) other viral and bacterial infections and parasitic diseases. A large number of these childhood diseases would not lead to death but for their aggravation by malnutrition.

Regional data revealed that Regions IV, I, II and VII had the highest rates of child mortality in descending order (see Annex No.1). The problem is necessarily more acute if one considers the under-reporting of deaths, especially in rural areas.

b. Morbidity

Another indirect measure of malnutrition is that of morbidity. The five most common diagnoses made in the MOH's network of ambulatory services in 1973 in descending order were: (1) diarrheal diseases from all causes except bacillary dysentery; (2) bronchitis; (3) influenza; (4) bacillary dysentery; and (5) anemia and

other forms of nutritional deficiency. [9]. Broken down by age groups, 54.5% of total diseases diagnosed in infants were nutrition-related and 40.5% of the total diagnosed for children 1 to 4 years. More recent morbidity data were obtained from a number of Nicaraguan health centers and hospitals. In a review of the records of 669 children [13 P.40] seeking ambulatory services in health centers, 495 children were under five years of age, 35.5% of these had been diagnosed as suffering from malnutrition. The records of another 54% of the children in this group reflected some degree of malnutrition when recorded weights were related to age on the Gomez scale.

A 1974 anthropometric study [14] of 156 children seeking outpatient medical services at a health center in two rural communities in Region VII revealed that 83.3% of all the children had some degree of malnutrition (see Annex No. 2).

In 1974, 12 hospitals were surveyed [13] to determine the extent of malnutrition in children under five years of age. Of the 225 children hospitalized at the time of the survey 17% had primary diagnoses of malnutrition. The great majority of the children had primary diagnoses of diarrhea and respiratory infections but no secondary diagnoses were recorded. It is probable that a high percentage of the infectious diseases diagnosed were complicated by PCM.

A hospital study [15] in Region I included a review of 66 clinical records of children less than five years of age. Relating recorded weights to age and based on the Gomez scale, 81.8% of all the children were found to have some degree of PCM, while only 25% of the clinical records registered a malnutrition diagnosis.

With all their limitations, the above data not only substantiate the extensive prevalence of PCM and the high demand for health services in relation to this nutritional disease, but they also suggest the need for increased awareness, better nutrition-related information, and a greater effectiveness on the part of the health care delivery system in relation to PCM.

c. Nutritional Anemias

The INCAP study revealed that nutritional anemias constitute a serious public health problem for the Nicaragua population. In a subsample of 826 individuals of all ages and both sexes, direct hematological measures and biochemical measures such

as hematocrit, hemoglobin and serum iron and folate levels ^{1/} were employed. Findings were related to age, sex, and altitude ^{2/} and then compared to the normal values for the population of Central America. INCAP categorized abnormal findings in terms of "low" and "deficient". Both terms refer to low values that require treatment with the latter constituting a more severe problem than the former.

Finding can be noted in Table No. 4.

TABLE NO. 4

INCIDENCE OF NUTRITIONAL ANEMIA, NICARAGUA

	<u>Population with % Low</u>	<u>Population with % Deficient</u>
Rural	17	7
Urban	25	11.5

In rural areas 40% of pregnant women, 38% of males between 12 and 17 and approximately 13% of children under 3 years of age had iron deficiency anemias as measured by hematocrits and hemoglobins. In contrast, the highest prevalence of iron deficiency anemias in the urban sample was in the age group of 45 years and older [13, P.50]. Regional analysis revealed that the highest prevalence of iron deficiency anemias is in Region VIII. (See Annex No. 1).

^{1/} Identification of a specific type of anemia requires many laboratory tests. Although the INCAP study used red blood cell counts and indices and iron binding capacities, percentage saturations and Vitamin B2 levels in addition to hematocrits, hemoglobins and serum iron and folate levels, for the sake of simplicity only the latter are included for discussion in this paper.

^{2/} Findings in relation to altitude are not discussed in this paper since very few people in Nicaragua live at elevations high enough to make altitude a significant variable.

These findings were supplemented by concomitant dietary surveys which documented that inadequate dietary intake of iron was widespread. Of those surveyed, the diets of 34% of the rural families and 55% of the urban families did not meet the Recommended Dietary Allowances for iron.^{1/}

The high prevalence of intestinal parasites was likewise consistent with the high prevalence of iron deficiency anemia. In the rural sample of 1948 stool specimens, over 65% of persons 2-25 years old were infested with one or more parasites, while more than 50% of the urban sample in this age group were infected.

Further investigations by INCAP revealed that serum folates were deficient in 36% of the rural and 18% of the urban samples. Pregnant and lactating women had a high prevalence as did both men and women over 45 years of age. Males aged 12-44 showed more deficiencies in folates than did non-pregnant, non-lactating women in the same age group. Children 1-11 years old showed the least incidence of folate deficiencies. These data suggest that the prevalence of iron deficiency anemias described previously may be greater than actually documented.

d. Vitamin A Deficiency

The primary source of data available on the nature and extent of Vitamin A deficiency in Nicaragua is the INCAP Study [16]. From the total population a subsample of 769 individuals from 30 rural municipalities and a subsample of 199 individuals from Managua was randomly selected. Clinical examinations and biochemical studies were the direct measures used to assess Vitamin A deficiency, while dietary surveys provided indirect measurements. The study revealed a high incidence of Vitamin A deficiency among the general population (approximately 10%) with the greatest frequency and severity being seen in small children. The data showed that nationally 19.8% of children under five years of age had either deficient or low levels of Vitamin A in their blood serums. Children aged 5 to 9 years were affected almost as badly (18.5%). On a regional basis, the population of Regions II and V showed the highest prevalence of deficient or low blood serum levels of Vitamin A - 16.7% and 9.1% respectively (see Annex No. 1).

Dietary surveys substantiated the biochemical findings by revealing that the consumption of foods rich in Vitamin A is generally low. Approximately 89% of rural families and 79% of urban families exhibited poor dietary intake. In 25% of

^{1/} See Annex No. 3 for Recommended Dietary Allowances.

the rural families studied, the consumption per capita was less than 13% of the recommended dietary allowance, and in 50% of the urban families, individuals consumed 30% or less.

In spite of the significant amounts of Vitamin A deficiency demonstrated in the biochemical and dietary studies, clinical signs of Vitamin A deficiency were rare. The fact that a fairly high percentage of children studied had concomitant protein calorie malnutrition - which decreases the need for Vitamin A - helps to explain the scarcity of cases of blindness and ocular lesions encountered. If nutritional status is improved through increased consumption of proteins and calories without a simultaneous increase in the consumption of Vitamin A, the incidence of blindness would increase as a consequence. Hence, in Nicaragua, Vitamin A deficiency must be treated concurrently with PCM.

Another factor which may have contributed to the relative absence of clinically apparent Vitamin A deficiency is that the blood serum samples were collected during the dry season when foods available in Vitamin A are scarce. Thus even though low blood serum levels and inadequate dietary intakes of Vitamin A were documented, the body's ability to store Vitamin A in the liver, and to release it in time of need probably accounts in part for the absence of gross clinical signs. Even so subclinical deficiencies should not be ignored just because they are not expressed in recognizable clinical syndromes. The body's ability to store Vitamin A is limited. An unusually long dry season might bring irreversible blindness to many, and the long-term effects of repeated short term Vitamin A deficiency is not known.

e. Endemic Goiter

The most prevalent type of mineral malnutrition in Nicaragua is iodine deficiency, which manifests itself clinically as Endemic Goiter. Using clinical examinations and tests for the urinary excretion of iodine, the 1966 INCAP [16] study documented that Endemic Goiter is a serious problem in Nicaragua. The World Health Organization considers a 10% prevalence rate of Endemic Goiter as indicative of a public health problem. The prevalence of Endemic Goiter found in the INCAP sample was 32% (37% for women and 25% for men). In addition, examinations of the urines of 3,302 persons from 30 communities were found to have below normal levels of iodine.

The greatest prevalence of Endemic Goiter found was among adolescents and young adults and particularly in females in these groups. Annex No. 1 illustrates the prevalence by region. There has been no systematic effort to reduce the problem of Endemic Goiter since 1966, so it seems unlikely that the situation has changed for the better since that time. Although the INCAP study made no mention of cretinism, there is strong epidemiological evidence that cretinism, mental deficiency, and dwarfism coincide geographically with Endemic Goiter [9, P. 191]. Given the high prevalence of goiter, the likelihood exists that cretinism does constitute a problem in Nicaragua.

f. Other Deficiencies

INCAP blood serum studies [16] revealed that 94% of the individuals examined had low levels of riboflavin in their red blood cells and 3% had deficient values. The inadequate consumption of riboflavin was demonstrated by both dietary surveys and urine analyses. In the rural sample only 25% of the families consumed the recommended dietary allowance. In contrast, the urban population demonstrated adequate dietary intake of this vitamin. Analyses of urine revealed that 28% and 5% of the individuals examined in the rural and urban samples, respectively, excreted low and deficient amounts of riboflavin. Once again children demonstrated the greatest deficiencies. Urinary excretion of riboflavin was low in 55% of the girls age 7-9 and 45% of the boys in the same age group. After the age of 9, the prevalence of inadequate excretion was inversely related to advancing age. Another indicated nutritional deficiency in the Nicaraguan population is a high percentage of dental caries and missing teeth.

g. Summary

In summary one can only reiterate that malnutrition is one of the most serious socio-economic problems in Nicaragua. The problem can be broken down into two basic parts: Protein-calorie malnutrition and three other major nutritional deficiencies (iron, Vitamin A and iodine deficiencies). Findings from the INCAP study reveal that PCM affects over half of all the Nicaraguan children under five years of age, and that at least 15% of all children suffer from moderate and severe forms of PCM. More recent studies show that the problem is more severe in rural areas where approximately 25% of children suffer from moderate and severe forms of PCM. The prevention and treatment of PCM, within the current socio-economic realities in Nicaragua, present difficult challenges.

Other nutritional deficiencies (iron, Vitamin A and iodine) are widespread within the general population. Among young children these deficiencies exacerbate the problem of PCM. These other deficiencies, especially anemias, represent serious problems among pregnant and lactating women.

III. DETERMINANTS OF THE NUTRITIONAL STATUS OF THE NICARAGUAN POPULATION

A. Conceptual Framework

Given a definition of the nutrition problem, appropriate planning is then based upon knowledge of associated factors and causes. Malnutrition has long been recognized as a complex, ecological problem determined by numerous overlapping and interacting factors in a community's physical, biological and cultural environment. Thus, determining its causes requires going beyond a mere isolation of malnutrition per se to a demonstration of its effects as it interacts with many variables in the total life setting.

Dr. Alberto Pradilla et al of INCAP [17] have developed a conceptual model which provides a useful framework within which to view the interrelated, logical, yet complex network of factors that directly or indirectly influence the nutritional status of any population. This conceptual model (note Table No. 5), is simple and linear, although it is known that the interrelation of the different factors are multi-directional and that the weight or importance of each factor will necessarily vary in different settings.

The model views nutritional status as primarily a function of two factors: (1) the amount and quality of food ingested; and (2) the efficiency with which the body utilizes the food consumed. In the first case, amount and quality of food consumed are determined by a series of interrelated factors, including the following:

1. Availability of food items and their relative prices.
2. Family income.
3. Food habits.
4. Level of education and information.

In the second case, the efficient utilization of food consumed is in part conditioned by the quality of the food eaten, but more strongly by the occurrence of infectious disease. The frequency and duration of such illness is largely an environmental matter determined by a series of interrelated factors among which are:

1. Availability of potable water, appropriate disposal methods for excreta and other waste, and safe hygienic dwellings.

2. Provision of preventive health services such as immunizations, family planning measures, etc.
3. Access to and affordability of curative health services.

Following is a discussion of the determining factors relevant to the nutrition problem in Nicaragua, along with efforts to demonstrate the role and significance of each factor in respect to that problem.

B. Factors Related to Amount and Quality of Food Ingested

1. Food Consumption

The nutritional status of a population is affected both by the quantity and quality of nutrients consumed. There has not yet been a comprehensive study on the consumption of nutrients by the Nicaraguan population and, on the whole, food consumption studies available are few and the data scanty. The four principal studies relied upon however, were: the 1966 INCAP Study that sample-surveyed the daily dietary intakes of 100 rural and 20 urban families [16]; the 1974 INFONAC Study which sampled 1,500 urban families [13]; the UNASEC (1973) household survey which sampled 1,200 rural households [23]; and the GAFICA Study (1970) [13] which estimated apparent consumption by analyzing the national production per capita of foods available and estimating potential consumption according to income distribution. The more recent studies, on the whole, indicate that the more detailed findings documented in INCAP's 1966 Study have not changed appreciably. Rather, the situation has probably remained static or worsened.

The principal food staples in the Nicaraguan diet are corn, beans and rice. These are complemented with bananas or plantains, and roots and tubers, which provide additional sources of energy but which are low in protein and other essential nutrients. It cannot be overemphasized that when a very limited number of foods constitute a major proportion of the diet's nutrients, the nature of these foods is of crucial importance to the overall nutritive value of the diet [18, P.119].

The INCAP dietary survey revealed that consumption of both calories and proteins was inadequate for large segments of the population. The average daily consumption per capita was 2,108 calories in urban areas and 1986 calories in rural areas. Using the minimum daily average requirement of 2,070 calories per person, 1/

1/ INCAP recommends a minimum daily allowance of 2,070 calories and 60 grams of protein.

urban Nicaraguans have diets barely above the minimum, while diets of those in rural areas achieve only 96% sufficiency. The average daily consumption of proteins per capita was 120 grams in urban areas and 80 grams in rural areas. Thus, the average person in both rural and urban areas met the minimum daily recommended allowance for protein if one ignores questions of protein quality.^{1/} The more recent studies in general reveal similar findings. (Note Table No. 6).

TABLE NO. 6
SUMMARY OF CONSUMPTION STUDIES, NICARAGUA
Grams/Person/Day

<u>Study</u>	<u>1966</u> <u>INCAP</u>		<u>1974</u> <u>INFONAC</u>	<u>1974</u> <u>UNASEC</u>	<u>GAFICA 1970</u>
	<u>Rural</u>	<u>Urban</u>	<u>Urban</u>	<u>National</u> <u>Average</u>	<u>National</u> <u>Apparent</u> <u>Avg. Availability</u>
<u>Food</u>					
Milk Products	243	377	312	212-294	154
Eggs	12	21	20	23	15
Meat	58	90	83	62	66
Beans	72	50	66	69	66
Vegetables	27	74	18	--	37
Fruits	41	52	43	--	104
Banana & Plan.	72	75	63	--	106
Roots	33	24	22	--	80
Tort.(Corn)	199	164	161	86	219
Bread (Wheat)	28	51	59	--	28
Other Cereals	28	33	12	--	10
Sugar	58	63	91	102	89
Fats	19	29	42	12	24
Rice	54	80	90	59	58
<u>Calories</u>	<u>1986</u>	<u>2108</u>	<u>2579</u>	<u>2141</u>	<u>2379</u>
<u>Proteins</u>	<u>64.4</u>	<u>72.2</u>	<u>74.8</u>	<u>73.2</u>	<u>64.2</u>

SOURCES: INCAP, Nicaragua Update, 1975

^{1/} INCAP Studies in Central America have shown wide variation in protein quality, which in many cases results in a significant lowering of utilizable protein.

Averages, however, give only a very general idea of the situation and can be misleading. Dietary consumption inequalities are evidenced not only between rural and urban populations, but also between different geographical regions, socio-economic classes, and even within given families. Furthermore, average caloric requirements do not take account of the additional calories necessary for sustained hard labor which is more likely to be required for productive employment in rural than in urban areas.

In Table No. 7 one can readily observe that large segments of the rural population did not meet the minimum recommended daily allowance for calories, proteins and other nutrients. Approximately 57% of the rural population do not have adequate calorie intake, and 40% do not consume protein in adequate quantity or quality. The problem of protein consumption is intensified when one considers that the principal source of protein in the rural diet is corn. Corn protein is lacking in certain amino acids, notably lysine, and presents problems of utilizability.^{1/} Only 37% of all protein consumed in rural areas is of animal origin. In urban areas 49% of protein is of animal origin.

^{1/} Proteins are composed of long chains of nitrogen-containing compounds known as amino acids. Of the 20 or so amino acids needed by man, all but eight can be synthesized by the body. These eight have been labelled "essential amino acids". The nutritional quality of a protein is determined by its quantitative and qualitative amino acid composition. The shortage of an essential amino acid limits the utilization of all other amino acids present. Corn is deficient in the amino acids lysine and tryptophan. This means that when all of the lysine and tryptophan have been used up in protein syntheses, the body cannot use the other amino acids that corn contains to form protein. The needed additional tryptophan and lysine, however, may be supplied by the other foods eaten with the corn. (20 P.24).

TABLE NO. 7
FOOD CONSUMPTION, NICARAGUA, 1966
(Rural sample findings)

<u>Item</u>	<u>% Consuming Less Than the RDA</u>	<u>% Consuming the RDA or More</u>
Calories	57	43
Proteins	40	60
Calcium	37	63
Iron	24	76
Retinol (Vitamin-A)	94	6
Thiamine	35	65
Riboflavin	73	27
Niacin	78	22
Vitamin C	59	41

SOURCE: INCAP: Evaluación Nutricional de la Población de Nicaragua, 1966

Other major nutritional consumption deficiencies were found. About 94% of the rural population was found to have diets inadequate in Vitamin A, while over 50% of the population revealed inadequate consumption of patterns in riboflavin, niacin and Vitamin C. Dietary habits, and problems of food availability appear to create these deficiencies. Vegetables are grown in small individual plots but are used as seasoning rather than dietary supplement. Fruit is not popular, and with the exception of oranges and mangoes, rarely enters the diet.

Geographically the situation appears critical in Regions II and VI, where only 33% of the population receive the recommended daily allowance for calories (note Annex No. 1). However, the situation is most severe in the Atlantic Coastal Area (Regions VII and VIII) where average consumption per capita is only 1069 calories per day. It is estimated that individuals in 7% of the families in these regions have daily diets of less than 1000 calories, and the source of 63% of these calories are fat, sugar and carbohydrates.

A disparity of consumption among socio-economic classes is likewise evident. GAFICA (Advisory Team of FAO for Central American Integration) estimated apparent consumption patterns based on an analysis of the Nicaraguan agricultural production for internal consumption during the 1960-1970 decade, weighted by income and expenditure patterns. In this manner apparent consumption for different income groups was estimated. Per capita consumption for the lower 50% of the population averages an estimated 1767 calories and 46.6 grams of protein per day, while the high stratum apparently consumes an average of 3931 calories and 111.9 grams of protein per capita per day (note Table No. 8), [9, P. 197]. This study further illustrates the magnitude of the nutritional consumption problem as it is compounded by income or purchasing power. In general the apparent consumption as estimated by GAFICA, is consistent with the results shown by actual consumption studies done by INCAP, INFONAC and UNASEC. (Note Table No. 6).

Disparities in consumption patterns are also seen between different age groups within a family. INCAP in their 1966 study, studied children 1 and 2 years of age and compared their dietary intakes to those of the average family member and of children 3 - 5 years of age. Age related dietary patterns were evidenced. Milk was found to be consumed three times as much by 1 and 2 year old children as by adults. In contrast, consumption of beans and meat increased with age, with children 1 and 2 years of age receiving the least amounts as a function of their growth needs. In general when comparing intakes with recommended dietary allowances for age, only 43% of the children received the recommended caloric dietary allowances. Greatest dietary deficiencies were seen in Vitamin A and iron. Furthermore, INCAP's biochemical studies indicate that 25% of the children 0 - 4 years of age and 16% of the children between 5 - 9 have non-essential amino acid ratios of 3.0 or more ^{1/}, suggesting that 130,851 Nicaraguan children have a serious quality protein deficiency problem. [21, P.266]. Part of this specific intra family distribution problem is due to a lack of nutritional knowledge on the part of family members, and the large number of dependent children per family.

^{1/} Essential amino acids are breakdown products of protein metabolism which cannot be synthesized in the body and hence must be supplied in the diet. The normal ratio of non-essential/essential amino acids should yield a quotient in the 1.2-1.9 range [21., P.266].

TABLE NO. 8

APPARENT CONSUMPTION OF FOODS, NICARAGUA, 1970

Food Products	Consumption Grains Per Person Per Day	Lower	Middle	Upper	Very	TOTAL
		Stratum (50%)	Stratum (30%)	Stratum (15%)	High Stratum (5%)	
1. Whole Milk		81	141	196	254	125
2. Skim Milk		6	8	10	13	8
3. Cheese		15	23	30	38	21
4. Meat, fish and shellfish		38	73	113	170	66
5. Eggs		6	14	29	63	15
6. Beans		57	70	82	94	66
7. Fresh Vegetables		17	45	70	96	37
8. Fruits		74	114	151	189	104
9. Bananas and plantains		122	100	80	59	106
10. Roots and Tubers		89	76	65	52	80
11. Tortillas (Corn)		164	288	272	205	219
12. Rice		42	64	85	106	58
13. Bread (wheat)		14	28	53	105	28
14. Other Cereals		16	6	2	1	10
15. Sugar		66	99	129	161	89
16. Fats		14	24	41	70	24
Ingested Calories		1767	2703	3255	3931	2379
Ingested Proteins		46.6	72.5	90.5	111.9	64.2
% Adequateness of Calories*		84	128	154	186	113
% Adequateness of Proteins**		85	132	206	255	117

* Total Population

** Based on requirements and recommendations

SOURCE: INCAP, Unpublished data on production figures with GAFICA, 1970
projections [13].

The source of most protein is beans. Additional protein is derived from meat and milk products, but the amounts consumed in various areas depend on their ready availability. Eggs are not a major source of protein for low income families because of very high prices. Often women in the rural area will trade eggs for less expensive foods at the market place. Fish and seafood are rarely eaten, although the oceans bordering the country could provide a plentiful supply. Two major factors inhibit fish consumption. First, the cash value of fish on the export market is much higher than its domestic cash value, so most of the products are shipped to foreign markets. Second, storage and shipment of fish products inland are restricted by the lack of refrigeration facilities. [9].

In summary, when one analyzes the overall distribution of foods consumed, it is apparent that large segments of the population do not receive adequate diets. Those most lacking are rural and or low income groups of the population.

2. Variables Affecting Food Consumption

The quantity and quality of food ingested depends basically on four major factors: (a) the availability of foods, (b) income or purchasing capacity, (c) food habits and, (e) education and information regarding food and nutrition.

a. Availability of Food

The availability of food is largely an agricultural question. Its quality and quantity is determined by numerous factors related to agricultural production and marketing. Following will be a discussion of agricultural production and marketing in Nicaragua and some of the factors relative to these. The primary sources for the subsequent discussion are: An analysis of Agricultural Production in Nicaragua (June, 1974), [19], the National Agricultural Committee Sector Analysis (August, 1974) [73] and SIECA's 1972 Statistical Information on Nutrition and Agriculture for Central America [26].

(1). Production

In Nicaragua, the staple food crops are corn, beans and rice; the basic livestock activities are beef and dairy with some swine and poultry production; and the basic export crops are cotton, sugarcane, coffee, tobacco and sesame. In these major agricultural production activities, the export sector dominates. For 1971, export crops alone accounted for 39.7 percent of total value of this production. Livestock accounted for 46.9 percent of total value of this production and about one half of it was exported. Thus, basic grains and domestic meat production accounts for only approximately 37 percent of these major agricultural activities [19, P. 67]. The adequacy of this relative proportion of agricultural production for domestic food purposes can be viewed by employing several analytical techniques.

Food Balance Sheets for Nicaragua prepared by GAFICA present the apparent per capita supply of food products available for national internal consumption for 1970. The methodology used is based on an analysis of each product, its national production and imports, minus exports and amounts utilized for animal, seed, waste and other domestic uses; arriving finally at amounts available for human consumption. From these amounts, daily per capita potential consumption figures were obtained. This daily per capita potential consumption is further analyzed as to the quality of the diet, for example, by calories, proteins, fats and other nutrients available. Annex No. 3 presents the latest Food Balance Sheets (1970) prepared by GAFICA for Nicaragua. This analysis shows that the average per capita availability

of food in Nicaragua provides for 2,356 calories, 64.1 grams of protein and 48.6 grams of fat daily.

INCAP has also prepared food balance sheets (see Annex 4). They compare required production levels for various food groups based on recommended consumption levels against past (1970) and estimated (1980) production levels. The INCAP analysis in this area while being somewhat limited, does provide approximate indications of shortages in a number of important food commodities, particularly fresh vegetables. The UNASEC analysis indicates that in the area of vegetables, the shortages are already apparent and resulting in rapidly increasing imports.

A third analytical technique which describes the adequacy of domestic food production is that provided in Table 9. Table 9 compares both GAFICA's apparent consumption levels for 1970 and INCAP's recommended consumption level by food category. The telling indicator of adequacy, if one accepts the INCAP recommended diet, is the third column which provides an indication of the necessary relative changes in consumption patterns and thus production and export policy.

Milk and dairy products, eggs, meat, vegetables, roots and tubers and wheat all require large increases in either production, imports or a reduction in export levels to satisfy consumption requirements. As important is the change in corn. The recommended diet calls for a two thirds reduction in this food commodity which currently makes up the bulk of the diet. The remaining food commodities are in relative balance or require small decreases in production or shifts in exports.

While the above techniques all have limitations it is obvious that agricultural policy is crucial to nutrition. While to date, most agricultural policy has been oriented to the producer, agricultural policy must orient itself to the consumer as well. Agricultural policy must address domestic consumption in terms of the quality and quantity of food available to the consumer. Thus, the GON must define what food consumption levels are nutritionally desirable, and the policies for agricultural production, exports and imports which will facilitate the changes needed over short and long terms.

TABLE NO. 9

COMPARISON OF GAFICA DERIVED AVERAGE LEVELS OF CONSUMPTION FOR
1970 AND INCAP RECOMMENDED LEVELS BY FOOD CATEGORY
 (KG/CAPITA/YR)

<u>Commodity Category</u>	<u>GAFICA Derived 1/ Levels of Consumption</u>	<u>INCAP Levels 2/ Recommended</u>	<u>Relative Difference</u>
Milk & Dairy Products	52.61	146.00	+177.5%
Eggs	5.39	8.76	62.5%
Meat & Fish	23.95	32.85	+ 37.2%
Beans	24.20	27.38	+ 13.1%
Vegetables	13.51	65.70	+386.3%
Fruits	37.75	36.50	- 3.3%
Bananas and Platanos	57.75	54.75	- 5.2%
Roots and Tubers	10.05	21.90	+117.9%
Corn	140.82	48.18	- 65.8%
Wheat	10.40	41.61	+300.1%
Rice	21.23	21.90	+ 3.2%
Sugar	32.76	21.90	- 33.2%
Fats and Oils	8.22	5.48	- 33.3%

SOURCE: 1/ Estadística Sobre la Alimentación y la Agricultura en Centro-
america, 1972, SIECA.

2/ INCAP, Evaluación Nutricional de la Población de Centro
America y Panamá: Nicaragua.

(2). Marketing

An efficient marketing system is of crucial importance if basic grains and other foods are to be made available to both the urban and rural populations. Two basic factors identified in the UNASEC analysis were those related to transportation and storage.

(i) Transportation

While there exists a recently completed trunk road network in the Pacific and Central area of Nicaragua that has enabled the country to open considerable new lands for agriculture and encourage greater commercialization of produce, there continues to be a significant number of small farmers who utilize inferior roadways requiring mules and oxcarts to get their produce to the larger transportation arteries. The long rainy season further compounds the accessibility of roadways in the rural areas.

(ii) Storage

On the whole, storage capacity in Nicaragua is favorable, providing for 57.3% of the total basic grains produced. However, access to storage for the small farmer, especially for beans and corn, continues to be a problem.

The GON through the institution INCEI has created 458 grain storage and distribution centers in order to provide a more accessible market for the producer at guaranteed prices, and to provide the consumer with reasonably priced commodities. These centers are currently limited to Regions I and II, and thus are not yet accessible to a great majority of small farmers.

b. Income and Purchasing Capacity

Income is a vital determinant of nutritional status, playing a key role in creating access to goods and services. Income has been found to correlate significantly with employment, education and land ownership. It directly affects diet -- the poorest fed children are usually found in families with the lowest income [1, p. 40]. In developing countries, it has been found that the poor spend a very high percentage of their incomes on food, and that marginal increases in income, mean better diets. Additional income also has been found to determine the pattern of what foods are purchased. The poor usually spend increased incomes partially on food grains, while the rich do so to a much lesser extent. The allocation for cereals declines, and that for milk and meat products increases, as families move into middle income levels. Also, the higher the income, the larger is the percentage of the increase spent on fruits, vegetables and other foods. The role of income in dietary improvement is thus a critical factor.

Inversely, poor nutritional status can reduce earning power for a family through mortality, morbidity and lowered productivity. Both INCAP [9 p. 27] and the World Bank [22, p. 26] data have shown that well-fed farm or industrial laborers are much more productive with an adequate diet and that the cost of their food is outweighed many times by the value of their increased production.

According to United Nations statistical information, Nicaragua's per capita income has steadily increased over the last 10 years, reaching \$595.62 in 1974 [29]. However, when one examines the distribution of income this figure is very deceiving.

The 1970 GAFICA study (Note Table 10) revealed that the lower half of the Nicaraguan population receives 15% of the total GNP with an average \$91.00 per capita, while the next 30% of the population receive 25% of the GNP representing on the average \$248.00 per capita. Thus, the remaining 20% of the Nicaragua population enjoys 60% of total GNP or a per capita income of more than \$875. The lowest 80% average less than \$145.00 per capita.

TABLE NO. 10
DISTRIBUTION OF GLOBAL INCOME IN NICARAGUA
ESTIMATION^{1/}, 1970

		Average Per Capita Income ^{2/} (US\$)	% Total Income
Low	- 50% of the population	91	15
Middle	- 30% of the population	248	25
Upper Middle	- 15% of the population	627	32
Upper	- 5% of the population	1643	28
<hr style="border-top: 1px dashed black;"/>			
Total	- 100% of the population	295	100

A per capita income of \$91 per year, if spent entirely on food, would provide a food budget of only 25 U.S.^{3/} cents per person per day. Since rural incomes are somewhat lower than urban incomes for this lower half of the population, even taking on-farm consumption into consideration, we can say that daily food budgets in rural areas (including the value of home-produced food) are probably much less than this.

^{1/} Source: GAFICA, based on national data sources.

^{2/} Based on 1960 rate exchange.

^{3/} \$91.00 ÷ 365 days.

A more recent income study was carried out by UNASEC in 1973 [23]. In this survey, total monetary income for the lower half of the population was \$210 per household. (The value of on-farm consumption was not measured). Studies in other Central American countries, notably Guatemala and Honduras, have shown the value of on-farm consumption to vary from 10 or 15 percent of total income to as much as 65 percent. This range certainly is plausible for Nicaragua. Taken into consideration in terms of the UNASEC survey, it implies that average farm income for the lower half of the rural population, including on-farm consumption, is probably somewhere between \$247 and \$600 per household. This means that total per capita daily income is between 11 and 27 ^{1/} U.S. cents. Since not all income can be considered to be spent on food, actual per-person daily food budgets are probably much less.

These two studies, although using quite different methodologies, produce similar food expenditure estimates, given the assumptions necessary in order to make them comparable.

In the GAFICA study, a diet which represents apparent consumption for the lower half of the population was produced. In Table 11 this diet has been costed out at 1976 prices. Total cost comes to \$0.44 per person per day. Table No. 12 shows INCAP's recommended daily diet. This diet, which meets recommended daily allowances for all nutrients, costs 87 cents per day at 1976 market retail prices.

The average food price increase in Nicaragua has been 95 percent over the period from 1972 to 1975 while the total inflation rate has been reported to be 56 percent for the same period [24]. Thus, in average terms food costs have escalated almost twice as fast as have total costs. (Much of the rise in total costs, however, has to be attributed to these very food price increases.) Since average food expenditure is about 45 percent of total income in Nicaragua, this means that other consumer goods have, in average terms, increased by only about 24 percent ($0.45 \times 1.95 + 0.55 \times 1.24 = 1.56$). Viewed in average terms, food costs have thus escalated almost four times as fast as have the costs of other consumer items. Since the poor spend a much greater percentage of their total income on food than do other segments of the population, they have been hit much harder by inflation than anyone else.

^{1/} Assuming an average family size of 6.2

$$\frac{\$247.00}{6.2 \times 365} = 11; \quad \frac{\$600.00}{6.2 \times 365} = 27$$

TABLE NO. 11

APPARENT FOOD CONSUMPTION AT CURRENT RETAIL PRICES

NICARAGUA, 1976

Consumption Grains per Person/Day	Apparent Food* Consumption 1970 Lower 50% Stratum	Retail Cost** 1976 Cordoba
<u>Food Products</u>	<u>Grams</u>	<u>Cost</u>
Milk	87	0.50
Cheese	15	0.30
Meat	38	0.25
Eggs	6	0.08
Beans	57	0.26
Fresh Vegetables	17	0.04
Fruits	74	0.05
Banana	122	0.17
Roots	89	0.07
Tortilla (Corn)	164	0.67
Rice	42	0.16
Bread	30	0.17
Sugar	66	0.16
Fats	14	0.18
TOTAL:		C\$ 3.06
Ingested Calories	1767	US\$.44***
Ingested Proteins	466	

* GAFICA 1970 Study.

** Estimated retail costs of food in Nicaragua. Prices on fruits and vegetables vary greatly with seasonal availability. (March, 1976)

*** Rate of exchange US\$ dollar equals C\$7 cordobas.

TABLE NO. 12
RECOMMENDED CONSUMPTION (GRAMS PER DAY) ^{1/}

	GMS/DAY	PRICE ^{2/} C\$/100G	TOTAL COST
Milk	400	0.58	C\$2.32
Eggs	24	1.33	0.32
Meat	90	0.66	0.59
Beans	75	0.46	0.35
Vegetables	180	0.24	0.43
Fruits	100	0.07	0.07
Banana	150	0.14	0.21
Roots	60	0.08	0.05
Corn	132	0.41	0.54
Wheat	114	0.57	0.65
Rice	60	0.38	0.23
Sugar	60	0.24	0.14
Fats	15	1.29	0.19
			C\$6.09 Córdobas
			US\$0.87 Dollars
		Family of 6.2 -	\$5.39 per day
			1,968.81 per year

Source: ^{1/} INCAP, Evaluación Nutricional de la Población de Centro América y Panamá, Nicaragua, 1969.

^{2/} March 1976 Retail Prices, Nicaragua.

The rural poor who produce a significant percentage of their own food are not exempt from these forces. The costs of food which they do purchase are often higher than for other families because of added transportation costs and the fact that they often purchase in small quantities. Furthermore, in many cases, the need for cash forces the sale of food (at farm-gate prices) at one point in the season, and the repurchase of the same food items (at retail prices) for consumption at a later date.

Income considerations as discussed above are of critical importance to nutrition and can only be addressed through productive sectors of the economy. For poor rural families this means the agricultural sector which provides both employment and income from the sales of production.

Employment

The Analysis of Agricultural Production in Nicaragua /197 revealed very serious employment problems in the Nicaragua rural sector. The 1971 population census reported that some 52% of Nicaragua's population resided in rural areas or towns of less than 2500 people. (Note Annex No. 1 for Regional variances). Of the nation's total work force, nearly 47% are found in the agricultural sector and within this sector, the work force constitutes 24% of the total population. Since 1963, Nicaragua's population has grown at a rate of 3.2% annually while the total work force has expanded at a 3.4% annual rate. Given that the rate of real economic growth has not been sufficient to accommodate rapid growth in the labor force, unemployment levels have increased markedly during the past few years. The 1971 census reported 189,000 people in the national work force as unemployed. Of this total, 63% resided in rural areas. Although unemployment rates are subject to a number of limitations, it is estimated that nearly 119,000 people are unemployed in the rural areas, almost 30% of the available work force in agriculture.

Considered by regions, only the North Pacific region had a rural unemployment rate less than the national average. In all other regions, unemployment exceeded 35% and was estimated as high as 50% in the Central Interior Region /197.

The rural work force is composed of several different groups as defined by the 1971 census: (1) employer or patronos who make up 3.3%; (2) self-employed (32%); (3) laborer or empleado (46%); (4) the unpaid family laborer (17%); and (5) others (1.4%). Aside from the 3% of employers, about half of the rural work force is either self-employed on farms or is a non-remunerated family laborer. Virtually all the rest of the work force are empleados, landless laborers

employed by others for agricultural work. It is upon this group that the burden of unemployment and poverty falls most heavily. An estimated 50% of all laborers are underemployed, with the employed drawing salaries amounting to less than a dollar a day. The UNASEC analysis estimated that empleados receive about 7.5% of the nation's net agricultural income compared to 29.4% for self-employed and family farm labor and 63.1% for agricultural employers. Not surprisingly the total agricultural work force has declined during the past decade due to rural to urban migration [23].

Land Distribution

Land is the most important capital resource in Nicaragua agriculture. Of the 13.7 million manzanas within the country's borders, 5.9 million manzanas ^{1/} or 43% of the total area was in farms in 1971. Of the land in farms, about 30% was devoted to cropping with the remainder in pastures and other uses. The 1971 census reported a total of 104,000 farms in the country with average farm size being 68 manzanas. About 82% of all farms were located in the Pacific and Central areas of the country (Regions I through VI). These six regions accounted for over 84% of the total land area used for agricultural purposes in the country. [19, p. 83].

In Nicaragua there exists a skewed land distribution and a resulting skewedness in the distribution of production. About 32% of all farms occupy one percent of the farmland and account for only 3% of the nation's value of agricultural production. Similarly, 75.5% of all the farms are less than 50 manzanas in size, occupy 13.4% of the farmland, and produce one quarter of the nation's production value. [19, p. 75] It is among the 32% of all farms constituting only 1% of all farmland, that major constraints to producing greater quantities of food and adequate levels of income exist. Average farm size for this population is 1.88 manzanas (3.2 acres). Studies in Costa Rica and other Central American countries have indicated that on land holdings of less than three manzanas it is almost impossible to attain self-sufficiency in food production let alone an adequate income.

^{1/} One manzana equals 1.7 acres.

Modern Technological Inputs

The agricultural sector in Nicaragua can generally be described as composed of two tiers: (1) a large number of small to medium size farms which produce basic food crops for internal consumption and (2) a relatively small number of medium to large commercial farms which produce export crops. In general, the Nicaraguan food crop sub-sector has not modernized over time. The rate of modernization has slowed overtime especially on smaller holdings. While planted area rose at a rate of 4.4% per year between 1960-1971, yields increased at a rate of only 1.8%.

The use of modern inputs such as organic and chemical fertilizers, insecticides and improved seed is greatly needed by, but generally inaccessible to, the small farmer. Nicaragua needs significantly larger inputs in new technology if it is to improve yields.

Credit

Credit has been a main instrument of public agricultural policy, promoting growth and diversification of the agricultural sector. A number of new institutions have been created during the past two decades to assist the Ministry of Agriculture and the National Nicaraguan Bank in developing the sector. These institutions are INFONAC, INCEI, IAN and FED. Appendix C provides a more detailed description of their respective objectives and functions. While these institutions have made some effort to assist the traditional sub-sector of the rural economy, the majority of resources provided to the agricultural sector for credit, technical assistance and research have, in fact, been dedicated to mostly export crops (cotton, beef, coffee, sugar, irrigated rice, the latter is used internally) cultivated on large and medium size farms. Efforts by the Ministry of Agriculture and others thus far have not been enough to bring the majority of the rural agricultural population into the development process. Activities directed to this segment have been plagued by the inefficiencies of both a financial and operational nature.

Recent Efforts to Increase Rural Incomes

The UNASEC assessment addressed the issue of rural income in depth. As a result attempts are being made to offset the problems in employment, land distribution, credit and technology. INVIERNO represents the major effort. INVIERNO is a rural development bank directed towards the welfare of the campesino. It is currently initiating its agricultural credit operation in Regions II and V. This

current operation provides credit in basic grains to purchase modern inputs and hire labor. Next years operations will expand into land credit and livestock credit to small farmers. This effort is being supported by A.I.D. and can be reviewed in depth in the Capital Assistance Paper.

The GON is also initiating other efforts to improve the income situation of rural areas. These include fiscal instruments: exclusions under both property and income taxes and exemptions for non traditional export crops where small producers have an advantage. A.I.D. and the GON are also involved in promoting small industries rural credit to increase employment opportunities.

c. Food Habits

Existing attitudes, beliefs and practices are a factor closely related to food consumption influencing the nutritional and health status of a population. Especially important to nutrition are beliefs and behaviors regarding choice of foods, eating practices and methods of food preparation. Some of those most prevalent among the Nicaraguan population will be described simply to highlight the fact that they must be taken into account when planning measures to improve nutritional status. Previously (see III B. 1, P. 20) it was mentioned that problems of food distribution within families are observed in Nicaragua, with young children receiving less than their fair share of food consumed. This is largely a problem of food habits at the family level.

Breast feeding is a practice crucial to preventing early malnutrition. In 1975 the Health Sector Analysis Committee randomly surveyed 1,500 households in urban and rural areas in the eight regions throughout the country. While the majority of women, especially in rural areas breast feed their infants, (see Table No. 13) it is suspected that there is a growing tendency to use bottle feeding among urban and higher income groups of women.

A recent study of low socio-economic mothers residing in the capital revealed that 68% breast feed their infants while a study of mothers with social security benefits (thus of higher socio-economic status) likewise residing in the capital revealed that 57% practice breast feeding. [31 P.41]. The practice of breast-feeding needs to be encouraged by every possible means. Medical professionals and para-professionals must play a significant role in the education of child bearing women. Mass-media, formal and informal educational efforts likewise can impact on this aspect.

The belief in "hot and cold" qualities inherent in nature and specifically in foods and illnesses, is a common phenomenon among the Nicaraguan population. Almost every food is considered to be "hot or cold" (regardless of actual temperature) and thus has the potential to alleviate or worsen illness. This belief especially affects the diets of postpartal and lactating women, as well as the diets of small children when sick. For example, many women believe they should not eat "hot" foods for 40 days after giving birth. Thus, protein rich foods such as beans and beef are eliminated from the diet. In addition, the traditional post partum diet, (a cold diet), is limited to tibio (a corn and sugar drink), cuajada (a white milk cheese) and tortillas. This nutritionally inadequate diet especially for a lactating woman is often followed religiously in rural areas. [3].

TABLE NO. 13
PERCENTAGE OF MOTHERS WHO BREAST FEED INFANTS
NICARAGUA, SEPTEMBER, 1975

Region	Mothers Who Breastfeed			Mothers Who Breastfeed More Than Six (6) Months		
	Total %	Urban %	Rural %	Total %	Urban %	Rural %
I.	84.21	70	91	68	51	86
II.	73	61	91	61	58	67
III.	83.3	100	76.4	67	57	71
IV.	100.	100	100.	100	75	64
V.	91	81	95	73	31	78
VI.	75	50	82	72	85	69
VII.	57	50	62	23	33	57
VIII.	74	50	71	60	71	58

SOURCE: Household survey carried out by the Health Sector Assessment Committee, 1975.

Common childhood illness such as diarrhea and respiratory infections are likewise believed to be alleviated by absence or presence of a hot or cold food. For example, citrus fruit, considered a cold food, is withheld during respiratory infections. Thus, a source of Vitamin C, as well as potential fluids and calories is withheld because of such a belief.

d. Education and Information

While it is difficult to define the precise relationship between education and malnutrition, there is considerable information linking nutritional deficiencies to disease, slow learning and low productivity. Many school students do not attend school at all because they feel weak, sick or lethargic, and lack the will to do school-work. Many get behind because of absences and fail the year. Drop-out rates climb when illness in a family is prolonged and the need for education is perceived to be unimportant.

Education is a resource in Nicaragua limited to favored segments of the population. It is estimated that only 48% of the population attend primary school, 21% secondary and or vocational schools, and 2.2% university. [8] Studies have repeatedly demonstrated the inaccessibility of education in Nicaragua, especially to large segments of the rural population and to lower socio-economic groups. The lack of educational opportunities, and the ability to take advantage of them, tends to exacerbate income inequalities. (Note Education Sector Assessment [25] for greater detail).

Illiteracy has been found to correlate significantly with high rates of infant mortality. While correlation does not prove causation, meaningful causal interpretations are possible. Literacy rates further confirm the inadequate and insufficient educational system in Nicaragua. Although the illiteracy rates in Nicaragua have improved in the last 15 years, from 62.2% in 1959 to 47% in 1974, progress is slow and the number of illiterates still very high. The urban-rural disparity is again very evident; 24% of the urban population and 68% of the rural population are illiterate.

There is a growing interest in utilizing mass media communication mechanisms to provide education and information, especially to the rural population. In Nicaragua, radio is the medium that cuts across all classes and areas. Although no studies have been done of rural radio or television ownership in Nicaragua up to now, conversations with rural people suggest that more than half of the people have personal radios, and that everyone can certainly listen to someone's radio.

Furthermore, there are 74 radio stations listed in the government statistics, two television stations and 16 short-wave outlets [25].

A number of efforts are currently being carried out to reach rural populations with educational and practical information. Although there is no nutrition related educational program per se, health, agriculture and educational spots which occasionally include a nutrition component, are transmitted on radio by numerous institutions.

Manoff International Inc., with A.I.D. assistance, is initiating a pilot mass media nutrition-health education project expected to reach about 80% of the rural population. Short radio advertisements will be used as a means of educating and changing behaviors of low-income rural families. The initial spot to be tested concerns the prevention and treatment of infant diarrhea.

C. Factors Related to Biological Utilization

1. Infectious Disease

The efficiency with which consumed food is utilized depends upon the quality of the food eaten, but more strongly upon the occurrence of infectious diseases. Measles, whooping cough and the diarrheal syndrome are the most important illnesses which influence the efficiency of food utilization [17, P.4], but any febrile episode increases the requirements for nutrients.

In Nicaragua, some 42% of all deaths are related to infectious and parasitic disease, exacerbated by endemic malnutrition [12]. Enteritis and other diarrheal diseases are by far the leading cause of death, accounting for 23.6% of all diagnosed causes. More than 90% of these diarrhea caused deaths occur in children under five years of age and it is obvious that marginal nutritional status plays a significant role in the great majority of them. Taken together with marginal nourishment, the severe and widespread impact of enteric disease places a tremendous strain on the body's immunological defense system, thus lessening its capacity to resist other infectious disease agents. Deaths from pneumonia, tetanus, and measles account for more than 10% of all deaths; again the great majority occurring in children under five. Many of these deaths might have been prevented by appropriate health care and vaccination programs for both young children and pregnant women. Even more important, however, is the potential of proper nourishment for reducing fatalities from these diseases. Not surprisingly the morbidity rates associated with these diseases remain unnecessarily high [12, P. 15].

The reported infant mortality rate (IMR) for Nicaragua in 1973 was 53.2 per one thousand live births, but the results of a CELADE survey show that the IMR is more likely in the neighborhood of 120 per thousand live births. The effects of poor nourishment on children begins before birth. During pregnancy an expectant mother's metabolic needs for various nutrients increase up to as much as 60 percent. In a woman suffering from inadequate food consumption, these increased needs cannot be met. Children born under these circumstances tend to exhibit low birth weight and evidence signs of mental and physical retardation. Most of the infant deaths in Nicaragua are directly attributable to low birth weight and poor environmental conditions, causing a high susceptibility to infection. Almost 20% of deaths among infants in the first year of life occur during the first month. If expectant mothers were given proper prenatal and postnatal care as well as adequate diets, it is likely that a significant percentage of these deaths could be averted [12, p.23].

Parasitic infections are another rampant disease debilitating large segments of the Nicaraguan population. The INCAP study showed between 57 and 94 percent of the rural population to be affected, depending upon age and location [16].

2. Variables Affecting Occurrence and Duration of Infectious Disease

a. Environmental Sanitation

The frequency of occurrence of above mentioned infectious disease is largely an environmental matter, with the availability of potable water and means of environmental sanitation playing key roles.

In Nicaragua only 28% of the total population receives internal water from a public or private system. It is estimated that another 9.7% of the population has faucets outside their dwellings connected to a public system, while 31.5% of the total population carries water from wells. Water from rivers, streams and other natural sources is carried to the house for personal use by an estimated 30.1% of the total population [23]. In geographic terms, 64% of the urban population has access to potable water, whereas in rural areas only 6% have this service.

A regional analysis of the availability of potable water reveals that the greatest proportion of urban population serviced is in Region II (83.6%) with the lowest proportions in Regions VII and VIII (35.36%). The availability of potable water is especially deficient in rural areas ranging from 15.32% in Region II to 1.6% in Region VI (Note Annex No. 1).

Another factor determining the health status of the population is the condition of dwellings. Housing conditions have been found to be directly associated with the frequency of cross communication of diseases [17, P.6]. The precarious housing situation existing in Nicaragua has been determined through a close examination of dwellings, according to the quality of building materials used in their construction. The study was complemented with observations made on numbers of people per room. The 1971 census classified dwellings into three categories. ^{1/} The criteria of classification includes construction materials used on walls, roof and floors [23, P.149]. Some 10% of the country's total dwellings were considered excellent (Type A) due to the quality of construction materials. Another 21% of the total dwellings were categorized as Type B, while 69% of all dwellings in the country were considered to be of Type C caliber. These latter houses were considered sanitarly and hygienically inadequate because of the condition of their walls, roofing and dirt floors.

The housing problem is further compounded when one considers that 67% of the general population live in crowded conditions. These dwellings have only one or two rooms and average four persons per room.

b. Preventive Health Services

Another factor associated with the frequency of illness and thus with nutritional status, is the provision of preventive health services such as immunizations and family planning measures. Once again it is children under five and pregnant and lactating women who are in particular need of these services.

^{1/} Type A dwellings: roofs of zinc, asbestos, slabs; walls of bricks, block cement, wood, quarry; floors of cement, brick.

Type B dwellings: roofs of zinc, tile, asbestos, slabs; walls of brick, block cement, wood, quarry; floors of cement bricks, clay bricks, concrete and wood.

Type C dwellings: roofs thatched or of other materials; walls of wooden poles, taquetzal, adobe and others; floors of dirt.

In Nicaragua immunization rates are very low [12]. Incidence of poliomyelitis, diphtheria, pertussis, tetanus, tuberculosis and measles are relatively high. However, there is no systematic vaccination program, and effective immunization coverage is very low. In 1974 immunization statistics reported 51% coverage with BCG for those under one year of age, 6% coverage for ages 1 to 4, and 5% coverage in ages 5 - 14 years of age [12].

The Ministry of Health estimates [9] that Nicaraguan health agencies presently cover approximately 20% of mothers with prenatal visits (at least one). Of that proportion only 33% are before the 5th month, and two-thirds of this percentage are in urban areas. Using 1974 MOH statistics, it was calculated that approximately 49% of children less than one year of age make at least one visit to a Nicaraguan health agency (60.6% urban, 39.4% rural). Approximately 11.3% of preschool children make such visits (58% of these urban and 42% rural), as do 4% of school age children [9]. However, the great majority of visits are motivated by illness and thus probably do not make use of available preventive services.

The limitation of family size and the spacing of children contribute to improved nutrition and infant survival [1, P. 37]. In Nicaragua, the birth rate is high; population is growing at an annual rate of 3 percent, which yields an average household size of 6.1 persons, and a dependency burden which exceeds 50% [25, P. 24].

Simple arithmetic from diet surveys demonstrates that protein availability per child is greater in smaller families. Studies have likewise shown that the number of children also has a direct bearing on the nutritional well-being of the mother. Nutritional anemia, a major cause of illness and death during pregnancy, becomes more virulent as a mother has more babies. One study showed that three times as many pregnant women with four or more children suffer from severe anemia as do mothers with smaller families. Likewise, the spacing of children has been shown to foster better nutritional and physical status in the mother and thus in the fetus as well.

According to the Central Bank study [9, P. 108], it is estimated that approximately 14% of Nicaraguan women in the fertile age group are practicing continuous birth control and that 30% of sexually active women are trying not to conceive and presumably want family planning services.

Health statistics not only demonstrate that the provision of preventive health services is drastically insufficient in terms of coverage, but is likewise inaccessible to large segments of the population most at risk.

c. Curative Health Services

Duration of illness, when it does occur, is a function of nutritional status itself, as well as of access to and affordability of curative health services. In Nicaragua the formal system of health services is comprised primarily of two public institutions: (1) the Ministry of Health (MOH), with primary responsibility for preventive health care, and (2) the National Board for Social and Medical Assistance (JNAPS), responsible for public curative services. The JNAPS has overall responsibility for the 39 national hospitals which provide 4,610 hospital beds to the Nicaraguan population. Of these, five are private hospitals. In addition, Nicaragua has approximately 5.8 physicians, 2.27 nurses and 10.0 nurses aides per 10,000 inhabitants [9].

Over 50% of all hospital beds, and approximately 60% of health manpower are located in the metropolitan area of the capital. Furthermore, although 57.6% of the population is estimated to live in localities of less than 2,000 inhabitants; only 2.3% of hospital beds and 29% of health centers are located in these localities. While attempts are being made to make health services accessible to the entire Nicaraguan population (see Health Sector Assessment for greater detail) [9], the fact remains, that for a large segment of the rural population, health services are geographically and economically inaccessible. These people obtain curative health care from an informal system of health services which consists of widespread utilization of pharmacies, parteras empiricas (lay mid-wives) and curanderos (lay healers).

The use of commercial establishments as a primary source of health care is a thriving business. It is estimated that there are over 300 pharmacies throughout the country. Although by law every pharmacy is required to be under the management responsibility of a trained pharmacist, it is estimated that only about 20% have trained pharmacists dispensing medications. Furthermore, pharmacies are permitted to dispense all medicines, with the exception of barbiturates and narcotics, without a physician's prescription. Thus, any anti-diarrheal, anti-histamine, analgesic or antibiotic, can be obtained without a physician's prescription. In addition to pharmacies there also exist a much more extensive network of pulperias (small miscellaneous shops) which carry a large assortment of prescription-free medicines for treatment

of common illnesses. A survey carried out in 1972 by one of the largest pharmaceutical companies in Nicaragua revealed that only 15% of consumers purchased medicines prescribed by a physician. Another 30% asked medical advice of the dispensing clerk, while 55% prescribed medications for themselves [30].

It is estimated that only 25% of all births are delivered in hospitals and another 3% in health centers [9]. Thus, over 70% of all births are delivered in homes, with the great majority believed to be attended by mid-wives. The mid-wife is most frequently an older woman of the community respected for her years of experience, although never formally trained to deliver infants. It is estimated that about 4,000 mid-wives practice in Nicaragua. An AID funded project is currently underway to train mid-wives.

The utilization of the curandero as a primary source of health care is likewise well accepted. The practice of medicine by a curandero is usually a conglomeration of traditional Indian folk medicine, Spain's medical practices brought over at the time of the Spanish conquest and a pinch of modern medicine. In Nicaragua, the practice of neither the mid-wife nor the curandero is regulated by law.

D. Summary

In summary the extent and severity of the malnutrition problem in Nicaragua is closely associated with numerous determinant factors affecting both the amount and quality of food ingested and the efficiency with which the body utilizes the food consumed, while malnutrition is pervasive in both rural and urban populations with pregnant and lactating women and young children constituting the most vulnerable groups, numerous detrimental factors interacting with and exacerbating the malnutrition problem are most prevalent in rural areas and or low income families. Perhaps the most significant factor affecting malnutrition is the inequality of income distribution which significantly limits the purchase of adequate quantities of high quality food. This factor is further compounded by poor environmental sanitation, low levels of education and limited access to preventive and curative health services.

IV. POLICY, PROGRAMS AND ALTERNATIVE INTERVENTIONS

A. Current Government Policy

Up until now there has been no formal national food and nutrition policy adopted by the Government of Nicaragua, although the April 1976 Nutrition Seminar sponsored by the MOH and the OAS concluded that such a policy was needed. Because of the fact that nutrition spans various sectors and areas of the economy, the Government's overall developmental policy and the policies of various sectors must be analyzed to determine their implications for impacting on the nutritional problems which exist in Nicaragua.

The overall national development goals as expressed by the National Planning Council in the National Reconstruction and Development Plan, 1975 - 1979 [11] are:

1. Reactivate the (economic) growth process until the same or better rate of growth in GDP of the preceding five years is achieved;
2. Strengthen the independence of the country through diversification of exports;
3. Improve the personal and geographic distribution of income, stressing increased employment and regional development programs;
4. Reconstruct Managua and eliminate the human and economic dislocations caused by the earthquake; and
5. Strengthen connections with the Central American integration movement.

In the National Plan, goals for each sector are set forth in fairly general terms. These are shown in Appendix B. A number of these stated policies, if adequately implemented, have considerable potential for improving nutritional status. Some of these are:

- (1) Improved income distribution.

- (2) Emphasis on education for the poor, concentrating on agricultural education.
- (3) Increased opportunities for employment.
- (4) Expansion of health and nutrition service coverage into rural areas.

Other policies hold the potential for negative nutritional impacts, if not implemented in the light of a national food and nutrition policy. One such policy is that of export-oriented agriculture. Although a policy of export expansion and diversification need not have negative impacts on nutritional status, careful investigation of specific export policies and their relationships to domestic food availabilities and prices must be carried out on a continual basis to insure that such policies do not imply negative nutritional impacts.

Although many government agricultural policies have addressed the needs of the small farmer, almost all agricultural policies have been oriented toward production. When nutrition is brought into the picture it is the consumer, not simply the producer, who must be taken into consideration. A priority task in the design and implementation of a national food and nutrition policy is to discover appropriate ways for utilizing government policy instruments, in/or related to agriculture, to benefit the consumer. An example of such a policy instrument is the manner in which INCEI (Note Appendix C) has been used for price stabilization of basic grains.

Nutrition Policy

The 1975-1980 National Health Plan presents the MOH's position in terms of nutrition quite clearly. Recognizing the nutritional problems identified by the 1966 INCAP survey and the recent INCAP review in 1975, the priorities proposed by the MOH in the National Health Plan and recently reiterated in the second National Seminar on Child and Family Nutrition held in Managua March 29 - April 3, 1976, is as follows:

1. Incorporate activities of nutritional attention of mothers and infants into the MCH program.
2. Strengthen the activities of supplementation for pregnant and lactating mothers and children 0-4 years of age with mal-nutrition.

3. Improve the productivity of SERN and amplify its coverage.
4. Reinforce the contents of nutritional education through the Health Centers and schools.
5. Promote the organization of rural nutrition centers.
6. Encourage the development of a low-cost vegetable mix rich in proteins.
7. Enforce the law concerning the iodination of salt.
8. Supply pregnant mothers registered in the MCH Program regular quantities of iron sulfate for a period of not less than three months.
9. Promote the enrichment of sugar with Vitamin A and establish the correct legal regulation.
10. Push for the establishment of massive programs of nutritional education.
11. Encourage a training program in nutrition to health personnel in accordance with future needs.
12. Coordinate the activities in the nutrition fields with other institutions and organizations concerned with nutrition and foods [9 P.195].

Conceptually, the strategies are sound. Yet the real limitations are that these priorities represent the public health sector's policy alone and not the variety of sectors concerned with nutrition. Similarly, they touch upon areas beyond the MOH's powers. Thus, one must bear in mind that these priorities are primarily an expression of intentions. Viable strategies for their implementation have not been outlined nor have funding sources been determined. In addition, it is apparent that to implement these priorities would require a multi-sectoral effort.

The 1976 Health Sector Assessment was carried out by a GON task force with INCAP assistance. This task force continues to work on the nutrition problem. Recognizing the multi-sectoral nature of the malnutrition problem, the GON has

recently expanded this group to include representatives from the Central Bank, National Planning, and DIPSA thus forming a Nutrition Coordinating Commission. This represents the first step in the process of creating a capacity for multi-sectoral analysis and planning regarding the nutrition problem.

B. Programs

Going from policy statements to program realization is a large step. At the present time there exists in Nicaragua the following nutritional programs:

1. Ministry of Health (MOH) Nutrition Programs.

The MOH is structurally organized at three levels: a central level responsible for national policy formation, program planning and administration; a regional level responsible primarily for inservice education and supervision; and a local level responsible for the direct delivery of patient and community health care.

At the central level the MOH is organized into numerous technical divisions, who often plan and program in isolation from each other. Ideally, the regional level is staffed by a multidisciplinary team (doctor, nurse, administrator, etc.) stationed in the region and responsible for inservice educational programs and supervision of health centers and health posts. However, due to budgetary and other limitations, only one health region functions in this manner, and even there, only partially so. The evaluation and implementation of a system of regional supervision has recently been initiated with the assistance of USAID.

At the local level the MOH delivers its services primarily through its 129 health centers dispersed throughout the country (note Table No. 1, Map of Nicaragua). By and large, the basic health center team is composed of a part time physician, a full time nurse aide and a sanitary inspector. In addition about 50% of the health centers have full time nurses. The larger health centers, located in the various departmental capitals have additional number of resources, often including a health educator, other doctors, nurses and nurses aides, and in a few, a nutritionist. The basic preventive and curative services offered in a health center are: morbidity care for common illnesses, preventive health services for children, prenatal care, immunizations and control of communicable diseases, health education and sanitary environmental assistance. Family planning services are available in about one-half or 64 of the centers. In addition, the MOH has 29 rural health posts (simple community

based rural health stations staffed by local volunteer or a nurses aide who provides health education and diagnosis and treatment of common and minor illnesses or a sanitary inspector who assists in environmental sanitation projects) and 11 mobile units which make medical visits to over a 100 rural communities and/or health posts once every two to three weeks. The services at the local level are frequently hampered by lack of material resources and inadequate supervision, both frequently due to poor transportation and communication facilities.

In many of these local health facilities, information about infant/child care, nutrition, sanitation, parasite control, vaccinations, and the use of health facilities is disseminated through community meetings, mother's clubs, health-week programs, educational campaigns, seminars, demonstrations and group discussions. The MOH estimates that about 24,000 people are reached through their health education efforts in which all the disciplines participate. These efforts in a large measure are confined to the health facility and do not launch out into the wider community.

The technical-administrative structure of the MOH includes the Direction of Health Promotion, under which a Division of Nutrition is located. The technical areas of responsibility of this Division are to:

- 1) Investigate the nutritional status of the population.
- 2) Participate in the planning of national nutritional programs.
- 3) Define and establish guidelines for the services of supplementation, SERN, and nutritional education.
- 4) Evaluate the regional nutritionists and public and private institutions that carry-out nutritional activities.
- 5) Administer the Division's annual budget, maintain the Division of Health Promotion and regional lines informed of programs and guidelines developed and to coordinate nutrition activities with other national public and private agencies.

Although theoretically the areas of responsibility are broad, in fact, the Division of Nutrition does not effectively carry out these responsibilities, in great part due to its limited administrative structure and capacity, as well as, its inadequate human and financial resources. The Division of Nutrition has an annual

budget of C\$857,000 which represents 1.7% of the total MOH budget (C\$49,000,000). Of its budget, approximately 48% goes to personnel costs while another 30% goes to materials and equipment, leaving 13% to the operation of its SERNS ^{1/}. Furthermore there is a lack of clearly defined program goals and the appropriate information systems to measure the attainment of these goals. Thus, in reality the Division of Nutrition primarily concerns itself with setting nutritional guidelines for use in the health centers and rural health posts, with somewhat limited efforts of supervision and nutrition education. Of the 59 personnel employed by the Division of Nutrition, seven are trained nutritionists. The remaining personnel are either fulfilling administrative functions or are providing simple logistic support (see Annex No. 6).

The specific nutritional activities which the MOH undertakes are:

a. A program of surveillance of infant and child growth and development which ~~lies within the activities~~ and guidelines of the Division of Maternal and Child Health (MCH) and is coordinated with the Division of Nursing. This program utilizes nurses and nurses aides in the detection of malnutrition by taking height and weight measurements of the children seeking services in the health centers and occasionally in health posts; and nutritionally classifying them according to the Gomez scale. However, specific program goals, procedures, information systems and budgetary resources are lacking for these activities. Health intervention for the malnutrition cases is minimal, limited primarily to nutrition education, distribution of food supplements when available, and referral to one of the 14 SERN centers. In addition, limited supervision and nutrition training for nurses and nurses aides is a further constraint to the effective execution of this program.

b. Supplementation. This program distributes food supplementation through a number of health centers to pregnant and lactating mothers and children under five years of age. Food is provided by the PL-480 Title II Program channeled through CARITAS. The rationale for the program is based on the 1966 INCAP study results, which demonstrated a high prevalence of PCM. While certain operational guidelines have been defined, no specific objective has been stated for this program. Supervision of the program lies with the regional nurse supervisors, rather than with the division's regional nutritionists. The PL-480 Title II Program will end in June,

^{1/} Note Page 56 for discussion on SERNS.

1976. Without these food supplements, and barring increase in budget, the nutrition program of the MOH will only be capable of providing nutrition education to families.

c. Nutritional Education and Recuperation Centers (SERN). This program is designed to assist in the recovery of children suffering from Grade II and III PCM and to extend nutrition education to the child's family. Children are given daily meals, and mothers are included in food preparation and nutrition education activities. There are 14 SERN centers throughout the country with space for 405 children (Note Table No. 1, Map of Nicaragua for regional distribution of the SERNs). Financial support is provided through the MSP's Division of Nutrition and JNAPS. Food is obtained from CARITAS and from local suppliers. Organizationally the 14 SERN centers fall under the Division of Nutrition and are supervised by the regional nutritionists. In 1973 an evaluation of the SERN centers revealed an extremely low coverage with very little participation of the affected families. Once again the termination of the PL-480 Title II Program in June, 1976 will affect this program.

d. Regional Centers of Community Nutrition (CRNC). This program distributes a daily breakfast or the equivalent to pre-school children living within the target area of the center. The object of the program is to prepare community members so that they can positively benefit from nutrition education and can better their standard of living through their own efforts. The immediate goal is to provide supplementation and education to 35,000 pre-school children and to 10,000 pregnant mothers. Administrative support is provided by CARITAS while technical supervision is the responsibility of the Division of Nutrition. Community participation plays an integral part of the program's success or failure.

No specific evaluation has been carried-out to determine if programmatic goals are being met. However, defined indicators do exist, so that such evaluation could be accomplished fairly simply.

2. Other Nutrition-Related Programs

a. JNAPS. The National Board for Medical and Social Assistance is responsible for overall hospital policy and the supervision of the 34 public hospitals throughout the country. The national hospital system naturally provides for treatment and recuperation of the malnourished. However, there is no specifically defined nutrition program. (See the Health Sector Assessment for greater detail (97)).

b. Nicaraguan Social Security Institute (INSS). INSS provides comprehensive medical services to about 8% of the Nicaraguan workers and their families, the great majority of which reside in the capital or in the larger urban cities of the Pacific Coast. These services include comprehensive nutrition care to the families of participant workers and a food supplementation program. During 1973, 17,755 children took part in the INSS food supplementation program, representing approximately 5% of all children aged 0-4 years in Nicaragua. Of that number 11,107 resided in Managua, which clearly reflects INSS urban orientation. (See Health Sector Analysis for greater detail [97]).

c. Asociación Demográfica de Nicaragua (ADN). This organization provides maternal-child health and family planning services through six Managua clinics. In addition, it arranges seminars and radio campaigns on family planning to broaden public awareness and acceptance of family planning concepts and methods. This program is an A.I.D. assisted one.

d. CARITAS. Coordinates the development programs in which the Catholic Church is involved. The main emphasis is placed on programs dealing with the health of the young. CARITAS works closely with the MOH providing a number of health centers with some supplementary food. The prime objective of this program is to improve the nutritional status of the pre-school children and pregnant and lactating mothers. In addition CARITAS also provides supplementation in the form of food for work (70,000 beneficiaries), school lunches, (540 national schools reaching approximately 6,000 children) and nutrition education and bi-monthly lunches for 343 women's clubs reaching over 10,000 mothers throughout the country. Geographically the entire country, except the Atlantic Coast, has functioning CARITAS programs. The distribution of food is slated to end with the phase-out of the PL-480 Title II program in June of 1976, although nutrition promotion will continue in the communities.

e. World Food Program/Nicaragua. The objective of the World Food Program (WFP) in Nicaragua is similar to programs elsewhere: to satisfy the nutritional needs of the project beneficiaries through supplementation and to promote community cooperative action in order to achieve improved development and higher levels of health. Organizationally, the program resides within the MOH as a separate entity with the director responsible to the Ministry of Health. This program was launched in early 1973 as a result of the severe drought in 1972 and the December earthquake of that same year, and is currently phasing out. Its primary objective was to provide

food for work. Numerous sectors were involved in projects such as the production of basic grains, communal works and services for small farmers, public help for communal cooperation, and the settlement of farmers in 24 newly opened agrarian colonies near the Pacific Coast. Data is lacking on the pattern of world food program distribution.

f. OXFAM. The objective of this program is to decrease the prevalence of malnutrition, improve the nutritional status of the infant population-at-risk, and to educate the mothers of these children in basic concepts of alimentation and hygiene. The target population is limited to those children with Grade II and III malnutrition and their pregnant or lactating mothers in the Managua area. Recuperation of the malnourished is accomplished through two SERN centers with space for 60 children. Supplementation and nutrition education is extended through the health centers with locally available and CARITAS donated food and with technical assistance from the Division of Nutrition. A nutritionist is responsible for the administration of the project, although reports are sent to the MSP. Total annual financial expenditures come to C\$165,860 (US\$23,694), of which approximately half is spent for personnel costs. Approximately 300 families annually receive some benefit from the OXFAM program. Although measurable criteria are present, there is no information concerning program results.

g. INCAP. Nutrition Institute for Central America and Panama. This Institution located in Guatemala provides technical advisory services and nutrition education to the GON.

3. Multi-Sectoral Development Programs

a. PLANSAR (Plan Nacional de Saneamiento Basico Rural) is a rural health demonstration program of the MOH being initiated in five municipalities in Region V. Its basic objective is to improve the environmental sanitation in rural areas. This program will concentrate on potable water, latrification and housing improvement activities. In addition there is a promotion-education component being developed to prepare and encourage community participation. This organization will be a key implementing unit for the A.I.D. Rural Health Loan Program, and will be receiving technical advisory services from UNDP and PAHO.

b. PRACS (Programa Rural de Acción Comunitaria en Salud) is a rural health program underway initiated by the MOH with A.I.D. assistance in Region V. It will receive national extension under the PLANSAR program. Its central objective is to improve the quality of health care to the rural population and to stimulate active community participation in the delivery of health care. Some of the program's activities include: training of 20 health educators, organization of community

leadership committees, training of community health workers, development of community projects such as basic sanitation, immunization campaigns, health and nutrition education etc., development of health education programs in rural schools, and the implementation of a new radiophonic health education system which will focus on maternal child health and community leadership education. This program is currently being initiated in 15 communities and is expected to expand its efforts to 45 communities over the next three years.

c. PRODESAR, Programa de Desarrollo Rural, is a joint program of the Ministries of Public Education, Health and Agriculture and receives technical and financial assistance from UNICEF, UNESCO, FAO, and WHO. The GON has contributed US\$2,949,700 to the program over a three year period.

The goal of PRODESAR is to promote community development in the rural sector; currently work is going on in 16 communities in the Departments of Carazo, Granada and Masaya (Region II). PRODESAR trains teachers in local schools to become community development leaders. From 1972-1974, participants worked in six communities with 44 agricultural groups, 34 community development groups, 43 housewife groups, 45 4-H Clubs, and eight agricultural cooperatives, reaching a total of 2,610 people. In addition to ongoing non formal education programs, the MPE wants to initiate a radio school program to reach students who have had no access to a school and to reinforce the adult education centers.

Specifically, in the health and nutrition sectors, the program hopes to provide 100% coverage of oral rehydration to infants suffering from diarrhea, to install 10,000 latrines, 50 wells, and improvements of 2,000 homes and waste disposal system; and to provide general overall health care to the population.

Financial resources from UNICEF and the Nicaraguan Government for the five (5) year period (1975-1980) will amount to US\$3,691,428. An executive committee oversees the project and consists of persons representing education, nutrition, sanitation, agriculture, home economics and health. There is some community input at the local level, although, generally, direction and supervision is provided centrally. In a 1973 evaluation of the project revealed a limited coverage of the designated communities and only a semi-functional administrative structure.

d. The Institute for Campesino Development. INVIerno is the new autonomous government agency established to provide development services to small farmers, agricultural workers, and the rural poor. Assisted by a US\$14 million loan-from

A.I.D. over a period of four (4) years, its overall goal is to improve the standard of living and the quality of life of the rural poor of Nicaragua. The loan was signed on September 27, 1975, and the work is just getting underway at this writing.

INVIERNO will work in two selected areas of Nicaragua, Regions II and V, which include 55% of the country's population. Furthermore, these regions have the lowest rural family average income. The objectives include integrated agricultural development programs, construction and improvement of access roads, credit and technical assistance to rural communities to improve marketing systems, and rural small-enterprise development programs. It is expected that through this effort, INVIERNO will develop model rural development projects and delivery systems that can progressively be expanded to all rural poor of Nicaragua.

While improved incomes and production for the rural poor should have a direct impact on their nutritional status, one project specifically related to nutrition will be a vegetable garden promotion project.

Summary

In summary, one can say that the GON is aware of the overall income disparities and their concomitant effects on the nutrition problem in Nicaragua. In the National Development Plan 1975-1979 emphasis is placed on improving the personal and geographical distribution of income through measures designed to increase overall employment opportunities, especially for the most disadvantaged rural population. Up until the present however, there has been no formal national food and nutrition policy adopted by the GON, nor has any multi-sectoral policy definition or administrative mechanism been developed to effectively confront the extensive malnutrition existing in Nicaragua. The recently formed Nutrition Coordinating Committee is a first step in the process of creating a capacity for multi-sectoral analysis and planning in nutrition.

While there are numerous efforts being carried out to impact on the nutritional status of the Nicaraguan population, efforts are fragmented and their impact and effectiveness are not known. A few multi-sectoral efforts in planning, evaluation and implementation of various developmental activities is a trend currently being experienced in Nicaragua. Programs such as INVIERNO, PRODESAR, PLAN SAR and PRACS are examples of such integrated rural development activities designed to improve agriculture, health and education aspects of rural target populations.

C. Alternatives for Intervention

1. Planning Constraints and Issues

Prior to a discussion of alternative interventions a number of planning constraints and/or issues need to be addressed. The prevention of malnutrition and the promotion of optimal nutritional status pose some unique and difficult problems.

A first constraint (in time, though not in importance) and one of the highest priorities related to planning, implementation and evaluation of nutrition-related programs, is the lack of an adequate base of information. Data in many areas related to nutrition is scanty, outdated or inaccessible. For example, existing information on income distribution, food expenditure patterns and dietary consumption need to be updated. Recent income studies in rural areas have not included determination of on-farm consumption, thus reducing their value for nutrition planning purposes. There is currently no coordinated effort to monitor either nutritional status, or to provide indicators (such as morbidity and mortality statistics) which point indirectly to changes in nutritional status. Another information gap crucial to planning is the need for an evaluation of the cost-effectiveness and impact of existing nutrition programs.

A second constraint is the fact that nutritional status is the result of the interaction of numerous social, biological and physical factors, none of which respect organizational or administrative boundaries, but cut across several sectors. This phenomenon is a critical issue which complicates nutrition planning and policy formation and later program implementation and coordination in a traditional bureaucratic setup.

A third constraint to effective nutrition planning and implementation is the thinness of existing management capability and institutional capacity (see other Nicaraguan Sector Assessments). Thus, one needs to consider the design of programs that not only can impact on the nutritional status of the population, but programs that can strengthen, and be implemented and integrated into, existing operational structures. The need for nutrition-manpower training is important in this respect.

A fourth constraint to nutrition planning and program implementation is the spatial nature of the problem. As demonstrated, the problem of malnutrition in Nicaragua is accentuated in rural areas where the problems of malnutrition are further compounded by scant and dispersed health, education and agricultural resources and gross income inequalities.

Finally, a fifth constraint is budgetary. An objective of bringing every Nicaraguan up to an adequate nutritional level is likely to be extremely expensive. Thus, the nutrition program should be tied in with efforts to increase food production and income such as are being carried out by INVIERNO.

Taking into account the aforementioned planning constraints, an overriding need must be addressed---the development of a multi-sectoral strategy that can aid in the definition of a national nutrition policy, and an administrative mechanism capable of stimulating the implementation of such policy.

The force which gives direction and meaning to both the institution and program intervention, is a National Food and Nutrition Policy. This multi-sectoral policy is needed to provide both the political support and the conceptual and philosophic framework to guide and sanction the different implementation strategies of the various sectors impacting on nutrition. How this policy should be devised and implemented is a Nicaraguan decision and steps in this direction are now underway. Although numerous alternatives are possible, it is advisable to have participation from those sectors which will have to implement policy and those individuals and organizations with experience in the nutrition field. In order to provide a measure of continuity and an identifiable body responsible for national food and nutrition, a high level permanent committee with decision making power should be formed.

While a high level committee will satisfy many policy needs, there is also the need for a mechanism for continual analysis and discussion of nutritional concerns. Such a mechanism would require a group of analysts to be responsible for the collection and analysis of information, evaluation of programs and the preparation of policy and program recommendations on a broad scale. Such a staff group should be attached to the above high level committee performing the nutrition coordination function. This group could perhaps be located in the National Planning Office, which, by its nature, cuts across all sectors impacting upon nutrition. Staff might include specialists such as a nutritionist, an epidemiologist, an agricultural economist, and an information specialist, among others. The provision of an overall food and nutrition policy and an ongoing planning mechanism would thus lay the ground work for continuous evaluation and rational planning.

Basic to facilitating the definition and implementation of a food and nutrition policy is the concomitant need for a nutrition surveillance or information system. Such a system could provide ongoing data about the nutritional status of

the population and, on a periodic basis, data about associated variables and program effectiveness. Thus, periodic studies on consumption patterns, demand for and supply of food products, price inflation, income distribution, and program effectiveness, could provide the inputs needed to diagnose areas of need and facilitate rational planning and evaluation of activities impacting on nutritional status. Once again such an information system would require a multi-sectoral design and implementation mechanism.

2. Potential Alternatives for Intervention

While an overall multi-sectoral policy and implementation mechanism is crucial to providing direction and meaning for effectively impacting on the nutritional status of the Nicaraguan population, it is clear that the implementation of such policy must be carried out by sector-specific institutions. Thus, potential alternatives for intervention are discussed within the context of separate sectors. Based on findings of this nutritional assessment, a number of priority areas are highlighted. Each will need to be analyzed further to determine more specifically its feasibility and cost-effectiveness within the current Nicaraguan realities. In addition, a list of projects currently being reviewed by the Nutrition Coordinating Committee are listed in Appendix D.

a. Education Sector

(1) Analysis of Formal Education Curriculum and Improvement of Nutrition Component.

A careful analysis of primary school nutrition curriculum is needed to determine curriculum content needs, potential methods for improving content and strengthening didactic methods. It is envisioned that this can be accomplished through a review of the curriculum, technical assistance in the development of new curriculum, textbooks, audiovisual aides, seminars for the teaching faculty, pilot projects in new educational techniques oriented towards nutrition, and in the development of new courses for students preparing to become teachers.

(2) Improvements in Non-Formal Education Techniques

The potential for mass-media nutrition education is likewise a clear-cut priority. In the education sector, a mass-media radio communication pilot program

(funded by AID/W) is being tested (note P.44). This strategy has potential for considerable impact on nutrition if extended to other nutrition themes. Such programs if expanded could create greater public awareness of symptoms, causes and practical solutions to nutritional problems. In addition such a system of nutrition education would complement and reinforce other nutrition education efforts.

b. Health Sector

(1) Improvement of Capabilities for Nutrition Prevention and Treatment Through Existing Health Care Delivery Network

The Nicaraguan health sector currently carries out the most explicit approaches to nutrition problems. The extensive (MOH) system of preventive and ambulatory care facilities (129 health centers, 29 staffed health posts and 14 SERNS), as well as the outpatient service facilities of 40 national hospitals, provide a network directly interfacing with the population, thus having potential to impact on nutritional status. This network could provide basis for improved detection and treatment of nutritional deficiencies, as well as for nutrition education and prevention of malnutrition through more effective immunization and family planning efforts. Concomitant with the utilization of this network of health facilities is the need for a wide range of activities in the area of nutrition education for health manpower and the public.

(2) Improvement in Environmental Sanitation Coverage

The frequency and duration of infectious diseases associated with malnutrition are exacerbated by the lack of potable water and sanitary facilities for the disposal of excreta, especially in rural areas. Thus, another clear-cut priority is to expand existing potable water and environmental sanitation projects (as will be done under the upcoming GON-AID sponsored rural health program) and to integrate nutrition education into such projects. The appearance of a new or renovated water facility or sanitation facility creates a change in the equilibrium of the community and presents an opportunity which can be used to advantage for educational purposes.

c. Agricultural Sector

The agricultural sector most specifically makes its impact on nutritional status by producing the foods available for internal domestic consumption, and providing employment and income sources for over half of the Nicaraguan population. While

agricultural policy needs to be re-examined in the light of consumer needs, overall production of agricultural products does not appear to pose a significant problem in Nicaragua. On the other hand, the role of the agricultural sector in providing employment, income and - perhaps most important of all - more quality foods produced and eaten by marginal farm families, are areas where potential interventions could affect nutritional status.

While income is perhaps the most important determinant of nutritional status, overall increases in income and income distribution - which bring with them numerous changes having a positive effect on nutritional status - come slowly. One of the central objectives stated in the current National Development Plan is to "improve the personal and geographical distribution of income". Thus, the GON is stressing increased employment and regional development programs.

(1) INVIERNO - Strengthening Food Production and Consumption of Small Farmers

Within the agricultural sector, such nutritionally related factors as increased on-farm production, credit, technical assistance, marketing assistance, community leadership training and land tenure, are being addressed by the INVIERNO program. These programmatic efforts will have a medium to long term impact on real income levels and thus on nutrition. The explicit integration of nutrition concerns into many of these activities could significantly increase the impact upon nutritional status. Other efforts being made within the agricultural sector to provide credit extension and technical assistance to small farmers in an attempt to increase production and income levels for this population group will likewise continue (see Appendix C). Once again, the integration of health and nutrition components into these programs is a viable and probably cost-effective mechanism for impacting upon the nutrition problem.

(2) Improvement of Quality Content of Widely Consumed Products

There are two nutrition problems directly related to the quality of food availability that can be addressed with specific interventions. These are iodine and Vitamin A deficiencies. In 1969, Nicaragua passed a law requiring the iodination of salt which to date has not been implemented. The technical assistance and potential costs of fortifying salt with iodine and sugar with Vitamin A are discussed in the Nicaraguan Health Sector Assessment [9]. These two interventions will necessitate the active participation of the agricultural sector.

d. Summary

In summary, potential and priority areas for intervention have been briefly outlined. Each will need to be analyzed further to determine more specifically its feasibility and cost-effectiveness within the current Nicaraguan realities. The vital importance of a multi-sectoral nutrition planning and decision making body and a concomitant information system cannot be under-estimated in the determination of an overall food and nutrition policy, and in the subsequent direction of institutional and program interventions.

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ANNEX NO. 1

REGIONAL DISTRIBUTION OF NUTRITION RELATED VARIABLES, NICARAGUA

INDEX	TOTAL	REGION 1	REGION 2	REGION 3	REGION 4	REGION 5	REGION 6	REGION 7	REGION 8
Population	2,113,600	344,500	824,900	83,400	145,000	333,500	217,700	70,100	88,500
% of total population	100	16.3	39.0	4.0	6.9	15.8	10.3	3.6	4.1
% rural population	52.2	51.4	26.6	65.5	76.7	77.4	77.4	77.5	76.4
Density per Km ²	17.8	37.9	121.7	38.8	26.6	20.7	12.5	1.9	4.1
Population under 5 years of age	436,880	70,280	159,680	16,380	31,280	73,560	48,320	17,030	19,850
Female Pop. (15-44 years of age)	473,330	75,240	198,590	17,340	31,110	71,080	45,330	16,000	18,640
% PCM in 0-5 Years	56.6	56.5	63.6	63.4	61.4	46.7	42.5	31.8	59.5
% Child Mortality (5 years)	32.3	37.6	31.5	26.4	45.6	25.6	15.4	28.3	30.7
% Pop. with low or def. Hgb.	9.56	6.8	14.2	2.6	5.3	8.8	12.6	2.5	21.8
% Pop. with low or def. Vit.A plasma	9.96	8.09	16.6	4.1	8.4	9.1	5.6	23.1	3.0
% Prevalence Endemic Goiter	32	32-48	31-42	45	34	22-34	14-34	13	13
% Pop. with RDA for calories	96	66	33	50	100	100	33	0	0
Avg. Per capita rural income		\$225.00	112.70	181.80	151.17	89.86	222.86	N.I.	N.I.
% Rural Literacy	30.3	34.6	42.2	44.3	25	23.1	23.3	24.1	24.1
% Mothers' who breastfeed	79	84.2	72.2	83.3	100	91.5	74.6	57.1	73.9
% urban pop. with potable water	71.9	52.8	83.0	42.0	55.9	70.4	54.1	35.3	35.3
% rural pop. with potable water	5.52	5.5	15.3	3.7	1.4	3.8	1.6	1.9	1.9
% Urban pop. with sanitary disposal excreta	92.01	90.8	96.3	94.2	76.1	82.7	75.3	83.1	83.1
% Rural pop. with sanitary disposal excreta	39.1	30.6	45.4	55.9	17.1	19.7	21.7	27.1	27.1
No. physicians	1,292	269	792	25	31	91	45	39	39
No. Hospital beds	4,610	925	2,324	129	156	575	181	162	158
No. Outpat. amb. services*	187	26	59	12	20	19	24	16	1

*Includes: Outpatient facilities of INSS, JIAS, Health Centers, MOH, PUMAR, ADN Clinics

Source: UASS, Evaluación del Componente Nutricional del Sector Salud, con asesoría INCAP, December 1975.

ANNEX NO. 2
DAILY RECOMMENDED ALLOWANCES

Sex and Age	Weight Kg.	Calo-ries	Pro-teins g	Cal-cium mg	Iron mg	Act. Vit. A mg	Tiamine mg	Riboflavin mg.	Equivalent Niocin mg	Acid Ascorbico mg
Small Children										
0 - 6 months *										
7 -12 months	9.3	1020	25	550	6	0.4	0.4	0.6	7.0	20
1 - 3 years	12.6	1100	25	450	7	0.6	0.4	0.7	7.3	25
4 - 6 years	18.8	1500	30	450	8	0.8	0.6	0.9	9.9	35
7 - 9 years	25.3	1900	40	450	10	1.0	0.8	1.1	12.5	40
Males										
10 - 12 years	34.2	2400	50	650	12	1.1	1.0	1.4	15.8	50
13 - 15 years	48.0	3000	70	650	15	1.3	1.2	1.8	19.8	60
16 - 19 years	62.5	3200	80	550	13	1.3	1.3	1.9	21.1	65
Females										
10 - 12 years	34.7	2200	50	650	12	1.1	0.9	1.3	14.5	50
13 - 15 years	48.3	2500	70	650	15	1.3	1.0	1.5	16.5	50
16 - 19 years	53.5	2100	70	550	13	1.3	0.8	1.3	13.9	50
Adults										
Males	55	2700	65	450	10	1.3	1.1	1.6	17.8	50
Females	50	2000	60	450	10	1.3	0.8	1.2	13.2	45
Pregnant Women (2nd and 3rd trim)		2200	70	1100	14	1.6	0.9	1.3	14.5	65
Lactating		2800	85	1100	14	2.1	1.1	1.7	18.5	95

* For small children 0 - 6 months, breastfeeding is recommended as the most satisfying to its nutritional needs.

INCAP, 1965

ANNEX No. 3

NICARAGUA HOJA DE BALANCE DE ALIMENTOS - 1970

Población 1970: 2 021,000

Producto		Tasa de extracción	Utilización de producciones primarias o semielaboradas	Producción	Cambio en las existencias	Comercio exterior		Disponibilidades para el abastecimiento	Aprovechamiento de las disponibilidades para el abastecimiento					Consumo per cápita						
Primario o semielaborado	Elaborado					%	Producción		Importación	Exportación	Consumo animal	Semilijas	Consumo humano	Uso industrial	Desperdicia	Consumo humano	Anual	Diano	Calorías por día	Proteínas por día
								Cien toneladas métricas					kg.							
1. CEREALES																				
Trigo		-	-	-	-	312	-	312	-	-	306	-	6	-	-	-	-	-		
Trigo	Hojas de trigo	75.0	306	230	-	20	-	250	-	-	49	-	-	201	9.95	27.3	36	3.1	2.3	
Trigo	Afrecho de trigo	20.0	306	61	-	-	-	61	61	-	-	-	-	-	-	-	-	-	-	
Trigo	Productos elaborados	100.0	49	49	-	9	49	9	-	-	-	-	-	9	0.45	1.2	4	0.1	-	
Trigo	Semolina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Avena en granza		-	-	1 077	-	1	16	1 082	-	40	932	-	110	-	-	-	-	-	-	
Avena en granza	Avena en oro	62.0	932	578	-	133	-	445	-	-	16	-	-	429	21.23	58.2	272	4.2	0.3	
Avena en granza	Afrecho de avena	8.0	932	75	-	-	-	75	75	-	-	-	-	-	-	-	-	-	-	
Avena en oro	Cerveza	600.0	16	95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
								Véase rubro 12, "Otras productos"												
Melz		-	-	2 305	-	29	150	2 184	280	54	1 617	-	233	-	-	-	-	-	-	
Melz	Harina de melz	98.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Melz	Tartilán	174.0	1 617	2 846	-	-	-	2 846	-	-	-	-	-	2 846	140.82	385.1	75	17.0	5.9	
Maicillo		-	-	749	-	-	44	725	565	6	77	-	77	-	-	-	-	-	-	
Maicillo	Harina de maicillo	95.0	77	73	-	-	-	73	-	-	-	-	-	73	3.61	9.9	34	0.9	0.1	
Cebada	Malta	-	-	-	-	24	-	24	-	-	24	-	-	-	-	-	-	-	-	
Malta	Cerveza	600.0	24	144	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
								Véase rubro 12, "Otras productos"												
2. TUBERCULOS, PLATANOS Y BANANOS																				
Papa		-	-	12	-	36	-	48	-	2	-	-	5	41	2.03	5.6	4	0.1	-	
Yuca		-	-	171	-	-	-	171	-	-	-	-	9	162	8.02	22.0	22	0.1	-	
Plátano		-	-	612	-	70	-	682	34	-	-	-	102	546	27.07	74.0	12	0.5	0.1	
Guineo		-	-	1 536	-	-	-	1 536	384	-	-	-	708	384	19.00	52.1	29	0.3	0.1	
Banano		-	-	630	-	66	-	564	138	-	-	-	109	237	11.73	32.1	9	0.2	-	
												Total cereales			33	25.1	9.8			
												Total tubérculos, plátanos y bananos			28	1.2	0.2			
3. AZUCARES																				
Caña de azúcar		-	-	15 556	-	-	-	15 556	-	550	14 850	-	156	-	-	-	-	-	-	
Caña de azúcar	Azúcar crudo	10.0	14 030	1 400	-	-	710	693	-	-	693	-	-	-	-	-	-	-	-	
Azúcar crudo	Azúcar refinado	93.0	693	644	-	-	-	644	-	-	-	-	-	644	31.87	67.3	25	-	-	
Caña de azúcar	Melaza	3.0	14 030	421	-	48	323	50	-	-	50	-	-	-	-	-	-	-	-	
Melaza	Alcohol de melaza	24.0	50	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Caña de azúcar	Panela	5.0	820	41	-	-	-	41	-	-	23	-	-	18	0.89	2.4	9	-	-	
Panela	Alcohol de panela	40.0	23	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
												Total azúcares			28	-	-			
4. FRIJOLES, NURCES Y OLEAGINOSAS																				
Frijoles		-	-	549	-	25	38	534	-	24	-	-	23	487	24.20	64.3	23	15.1	1.1	
Mani		-	-	3	-	-	2	1	-	-	-	-	-	1	0.05	0.1	-	-	-	
Caca		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Caca	Copa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Copa	Acetate de caca	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Copa	Torta de caca	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
								Véase rubro 10, "Aceites y grasas"												
Ajonjolí		-	-	74	-	2	3	79	-	-	-	-	-	-	-	-	-	-	-	
Ajonjolí	Acetate de ajonjolí	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
								Véase rubro 10, "Aceites y grasas"												
Palma		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Palma	Acetate de palma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Palma	Almendras de palma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Almendras de palma	Acetate de almendras palma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
								Véase rubro 10, "Aceites y grasas"												

NICARAGUA HOJA DE BALANCE DE ALIMENTOS - 1973 (continuación)

Producción 1970 2 021,300

Producto		Tasa de extracción	Utilización de producciones primarias o semielaboradas	Cambio en las existencias	Comercio exterior Importación	Comercio exterior Exportación	Disponibilidades acumuladas al inicio del período	Aprovechamiento de las disponibilidades para el abastecimiento					Consumo					
Primario o semielaborado	Elaborado							Producción	Consumo animal	Semillas	Consumo humano	Uso industrial	Desperdicios	Consumo humano	Anual	Diario	Por habitante	Por hectárea
		%	Cien toneladas métricas										kg.	g.	ha.	ha.	g.	
I. PRODUCTOS LACTEOS																		
Leche de vaca		-	2 006	-	11	-	2 317	-	-	1 045	-	101	871	43,10	3,1	77	1,7	3,1
Leche entera	Crema	8,0	791	63	-	-	63	-	-	33	-	-	30	1,48	4,1	4	2,1	1,5
Crema	Montequilla	55,0	33	18	Véase rubro 10, "Aceites y grasas"			-	-	-	-	-	-	-	-	-	-	-
Crema	Leche descremada	45,0	33	15	-	-	12	-	-	12	-	-	-	-	-	-	-	-
Leche entera	Leche semidescremada	92,0	791	728	-	-	728	-	-	728	-	-	-	-	-	-	-	-
Leche semidescremada	Samidescr. en polvo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leche semidescremada	Cuajada	18,0	728	131	-	-	131	-	-	47	-	-	84	4,15	4	17	1,1	1,9
Cuajada	Queso fresco	91,0	47	43	-	-	41	-	-	14	-	-	27	1,34	1,7	6	2,8	0,5
Leche semidescremada	Queso fresco	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Queso fresco	Queso curado, semidescr.	81,0	14	11	-	-	11	-	-	-	-	-	11	0,54	1,5	4	1,1	1,1
Leche entera	Montequilla	-	-	-	Véase rubro 10, "Aceites y grasas"			-	-	-	-	-	-	-	-	-	-	-
Leche entera	Leche descremada	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leche descremada	Descremada en polvo	11,0	12	1	-	5	6	-	-	-	-	-	6	0,30	0,8	3	2,3	-
Leche descremada	Queso curado, descr.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leche entera	Queso seco	12,0	188	23	-	-	23	-	-	-	-	-	23	1,14	3,1	14	2,9	1,1
Leche entera	Queso kraft	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leche entera	Entera en polvo	12,5	56	7	-	4	11	-	-	-	-	-	-	-	-	-	-	-
Leche entera	Leche conl. y evap.	49,0	10	5	-	3	8	-	-	-	-	-	8	0,40	1,1	2	2,1	0,1
	Otros productos lácteos	100,0	-	-	-	3	3	-	-	-	-	-	3	0,15	0,4	-	-	-
Leche descr./queso curado	Suero	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-
Leche entera/queso seco	Suero	88,0	188	165	-	-	165	111	-	-	-	54	-	-	-	-	-	-
Leche semidescremada	Suero	82,0	728	597	-	-	597	400	-	-	-	197	-	-	-	-	-	-
												Total productos lácteos			149	5,5	9,3	
II. ACEITES Y GRASAS																		
Palma	Aceite de palma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Almendra de palma	Aceite de almendra de palma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Semilla de algodón	Aceite de algodón	14,4	903	130	-	125	5	-	-	-	-	-	-	-	-	-	-	-
Capra	Aceite de coco	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ajonjolí	Aceite de ajonjolí	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Otros aceites vegetales	-	-	65	-	9	73	-	-	-	-	-	-	-	-	-	-	-
Total aceites vegetales			-	-	195	-	9	126	78	-	-	-	78	3,81	10,4	92	-	10,4
Total aceites vegetales Margarina			-	-	-	-	2	-	2	-	-	-	2	0,10	0,3	2	-	2,2
Total aceites vegetales Mantecas veg. y mixtas			74,5	-	-	-	30	2	28	-	-	-	28	1,39	3,8	32	-	3,7
Total grasas vegetales			-	-	-	-	32	2	30	-	-	-	30	-	-	25	-	3,9
Crema	Montequilla	55,0	33	18	-	1	2	1	-	-	-	-	17	0,84	2,3	14	-	1,5
Leche de vaca	Montequilla	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cama en canal	Saba de res	8,0	561	45	-	74	-	121	6	-	-	109	6	0,30	0,8	7	-	0,7
Cama en canal	Manteca de cerdo	44,0	82	36	-	-	-	36	-	-	-	-	36	1,78	4,9	40	0,1	4,4
Total de grasas animales			-	-	99	-	77	2	174	6	-	-	59	-	-	61	0,1	6,6
												Total aceites y grasas			188	5,1	21,9	
III. PESCADOS Y MARISCOS																		
Crustáceos		-	-	5 439	-	-	5 439	-	-	5 439	-	-	-	-	-	-	-	-
Crustáceos	Crustáceos congelados	63,0	5 439	3 380	-	1	3 328	53	-	-	-	-	53	0,03	0,1	-	-	-
Pescados (mar y agua dulce)		-	-	3 300	-	4	79	3 225	-	-	-	-	3 225	1,60	4,4	4	2,4	2,1
Moluscos		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pescados	Pescado enlatado	-	-	-	-200	485	-	45	-	-	-	-	485	0,24	0,9	-	-	0,1

NICARAGUA: HOJA DE BALANCE DE ALIMENTOS- 1970 (continuado)

Población: 1970- 2 021.000

Producto		Tonos de extracción	Utilización de producciones primarias o semielaboradas	Producción	Cambio en las existencias	Comercio exterior		Disponibilidad para el abastecimiento	Aprovechamiento de las disponibilidades para el abastecimiento					Consumo per cápita							
Primario o semielaborado	Elaborado					Importación	Exportación		Consumo animal	Socios	Consumo humano	Uso industrial	Desperdicios	Consumo humano	Consumo anual	Consumo diario	Calorías por día	Proteínas por día	Grasas por día		
		Cien toneladas métricas										kg.		g.		No.		g.			
12. OTROS PRODUCTOS																					
Cacao		-	-	6	- 1	1	4	4	-	-	-	-	-	4	0,20	0,5	2	0,1	0,2		
Cacao en polvo		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Cacao		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
															TOTAL (incluyendo bebidas)		7 315	63,0	47,4		
Café		-	-	371	- 8	1	299	80	-	-	15	-	4	61	3,02	8,3	19	1,0	1,7		
Café soluble		33,0	15	5	- 1	-	4	2	-	-	-	-	-	2	0,10	0,3	1	-	-		
Azúcar en grano		600,0	16	95	-	-	-	95	-	-	-	-	-	95	4,70	12,9	5	-	-		
Cerveza		600,0	24	144	-	-	-	144	-	-	-	-	-	144	7,13	19,5	7	0,1	-		
Pan de azúcar		48,0	23	9	-	-	-	9	-	-	-	-	-	9	0,44	1,2	4	-	-		
Alcohol de caña		24,0	30	12	-	-	-	12	-	-	-	-	-	12	0,59	1,6	5	-	-		
Alcohol de caña		-	-	22	-	3	5	20	-	-	-	17	3	-	-	-	-	-	-		
Kassaf		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Manapán		-	-	4	-	-	-	4	-	-	-	4	-	-	-	-	-	-	-		
															TOTAL (incluyendo bebidas)		2 356	64,1	48,6		

a/ "Pescado y Mariscos" expresados en toneladas métricas

b/ Peso en onza (kilogramos)

c/ Peso de huevo (kilogramos) por animal durante

d/ Producción de huevos (kilogramos) por gallina en postura

e/ Asitas vegetales expresadas en términos de asitas refinadas

f/ Incluye comercio exterior de aceites hidrogenados.

Fuente: Elaboraciones de GAFICA en base a estadísticas e informaciones nacionales.

ANNEX NO. 4

FOOD BALANCE SHEET - NICARAGUA, 1970 AND 1980

Foods	Year	Recommended Consumption (g/day)	Required Production (1,000 T)	Estimated Actual Production (1,000 T)	Availability (%)	Shortage (tons)
Milk	1970	400	230	332	144	102*
	1980	400	308	425	138	117*
Eggs	1970	24	14	6	41	8
	1980	24	18	7	40	11
Meat	1970	90	52	26	50	26
	1980	90	69	34	49	35
Beans	1970	75	43	32	73	11
	1980	75	58	41	72	17
Fresh Vegetables	1970	180	103	14	14	89
	1980	180	139	19	14	120
Fruits	1970	100	57	33	58	24
	1980	100	77	44	57	33
Bananas & Plantains	1970	150	86	81	94	5
	1980	150	115	106	92	9
Roots & tubers	1970	60	34	23	65	11
	1980	60	46	30	64	16
Corn	1970	132	76	116	152	40*
	1980	132	102	152	149	50*
Wheat**	1970	114	66	33	51	33
	1980	114	86	43	49	43
Rice	1970	60	34	28	79	6
	1980	60	46	36	78	10
Sugar	1970	60	34	64	186	30*
	1980	60	46	84	78	38*
Fats	1970	15	9	20	228	11*
	1980	15	12	26	224	14

* Excess

** In grams of imported wheat

Source: Instituto de Nutrición de Centro América y Panamá, Evaluación Nutricional de la Población de Centro América y Panamá: Nicaragua

ANNEX NO. 5

NICARAGUA: VALUE OF PRODUCTION PER FARM AND MANZANA,
ACCUMULATED PERCENTAGES OF FARM NUMBERS, AREAS,
AND PRODUCTION VALUES, 1971

Farm Size Strata	Value of Production		Accumulated Percentages		
	Per Farm	Per Mz.	Farm Numbers	Area in Farms	Value of Production
0-1	637	1,270	5.81	.05	.19
1-5	2,058	848	31.67	1.00	2.98
5-10	3,900	580	43.81	2.23	5.41
10-20	8,732	650	57.02	4.89	11.33
20-50	13,961	452	75.51	13.36	24.54
50-100	21,195	330	87.77	25.07	37.82
100-200	41,369	325	94.34	37.44	51.73
200-500	95,772	338	98.08	53.19	70.15
500-1000	177,023	269	99.20	64.23	80.40
1000-2500	305,254	210	99.78	76.77	89.42
2500+	1,000,119	130	100.00	100.00	100.00

Source: Censo Nacional Agropecuario, 1971.

ANNEX NO. 6

BUDGET FOR NUTRITION DIVISION
MINISTRY OF HEALTH, NICARAGUA, 1975

<u>Expense</u>	<u>Cordobas</u>
<u>PERSONNEL COSTS</u>	
1. Director	66,000
1. Central Nutritionist	26,400
1. Supply Chief	16,560
3. Nutrition Educators	37,260
1. Typist	11,040
1. Clerk	9,660
1. Doorman	4,836
<u>9</u>	<u>191,756</u>
<u>Regional Sections</u>	
1. Regional Nutritionist	33,000
1. Regional Nutritionist (Estelí)	33,000
1. Nutrition Educator (Granada)	16,560
1. Regional Nutritionist (Leon)	29,040
1. Typist	6,900
2. Drivers	13,800
3. Regional Nutritionist	99,000
10. SERN Chiefs	117,000
10. Child care attendant	42,000
10. Cooks	42,000
10. Domestics	36,000
<u>50</u>	<u>463,300</u>
<u>NON-PERSONNEL</u>	
General Funds	25,892
Travel Costs	10,690
	<u>36,582</u>
<u>MATERIAL AND SUPPLIES</u>	
General Funds	172,000
Fuel and lubricants	19,052
	<u>191,052</u>
Total	857,000

Source: Nicaragua National Budget 1975, Managua 1974.

APPENDIX A

ACRONYSMS

AID	-	Agency for International Development
BNN	-	National Bank of Nicaragua
CARE	-	Cooperative for American Remittances Everywhere
CEDOC	-	Communication and Documentation Center for Rural Development
CEFER	-	Centros Familiares de Educación Rural
CEICA	-	Centro de Educación Integral Campesina
CEPA	-	Centro de Educación Promocional Agraria
CEPAD	-	Comité Evangélico Pro-Ayuda al Desarrollo
CRS	-	Catholic Relief Service
DIEEN	-	Departamento de Investigación y Evaluación Educativa Nacional
EAP	-	Economically Active Population
ECLA	-	Economic Commission for Latin America
FAO	-	Food and Agriculture Organization
FUNDE	-	Fundación Nicaraguense de Desarrollo
GDP	-	Gross Domestic Product
GON	-	Government of Nicaragua
HRD	-	Human Resource Development
IAN	-	Instituto Agrario Nicaraguense
IBRD	-	International Bank for Reconstruction and Development
IDB	-	Interamerican Development Bank
ILO	-	International Labor Office
INA	-	National Apprentice Institute
INCAE	-	Instituto Centro Americano de Administración de Empresas
INCEI	-	Instituto Nicaraguense de Comercio Exterior e Interior
INDE	-	Instituto Nicaraguense de Desarrollo
INFONAC	-	Instituto de Fomento Nacional
INPRHU	-	Instituto de Promoción Humana
INVIERNO	-	Institute for Campesino Development
IPPF	-	International Planned Parenthood Federation
JNAPS	-	Junta Nacional para Asistencia y Prevención Social
MAG	-	Ministry of Agriculture
MOH	-	Ministry of Health
MPE	-	Ministry of Public Education
NEDP	-	National Educational Development Plan
NFE	-	Non-Formal Education
NPO	-	National Planning Office
OAS	-	Organization of American States
ODECA	-	Organización de Estados Centro Americanos
PEMEN	-	Programa de Extensión y Mejoramiento de la Educación Nacional

**Appendix A
Achronyms
Page 2.-**

POLI	-	Instituto Politécnico
PREALC	-	Programa Regional de Empleo para América Latina y el Caribe
PRODESAR	-	Programa de Desarrollo Rural
PROVEDENIC	-	Proyecto de Vacunación y Desarrollo Comunal en Nicaragu
RAC	-	Regional Agricultural Center
ROCAP	-	Regional Office for Central America and Panama
UCA	-	Universidad Centro Americana
UNAN	-	Universidad Nacional, Autónoma de Nicaragua
UNASEC	-	Unidad Agrícola Sectorial
UNDP	-	United Nations Development Program
UNESCO	-	United National Educational, Scientific, and Cultural Organization
WHO	-	World Health Organization
WFA	-	World Food Program
PRACS	-	Programa Rural de Acción Comunitaria en Salud
PLANSAR	-	Plan Nacional de Saneamiento Básico Rural

APPENDIX B

POLICY GOALS FOR THE VARIOUS SECTORS / 117

Industrial Sector: To develop ways to alleviate the balance of payments problems; to decentralize industry; to rebuild and develop small and medium sized industries damaged by the earthquake; and to expand and develop such industries as chemicals, plastics, vegetables, fruits and textiles.

Construction Sector: To expand the construction sector in order to provide new jobs; to build houses, as well as roads and energy plants; to expand the production of basic materials needed in the construction industry.

Infrastructure: To expand the electric infrastructure in order to promote the resettlement of industry; to cooperate with neighboring countries in the production of electricity; to expand the irrigation system; to build up the road system; to open up the Atlantic Coast; to improve the ports of San Jorge, Moyogalpa, Corinto and the new Port of Managua, and to improve the coast ports; to rehabilitate the Rio San Juan for navigation and study the possibilities on the Rio Tipitapa, to renovate the rail system and to improve and expand the telecommunications system.

Education: The following current priorities, have been expressed by the Ministry of Public Education: (25)

1. A greater emphasis on education for farming and ranching without downgrading the moral, physical, and intellectual development of young people.
2. The promotion of the private sector in agriculture and the collaboration of citizens in school construction and related activities.
3. An emphasis upon education for the poor.
4. Coordination with other governmental programs, particularly in technical education.
5. More efficient administration of schools, and new incentives for preparation of teaching and administrative personnel.
6. Continued review and evaluation of educational content and process.
7. Expansion of technical education at all levels to promote the economic development of the country.
8. Continued study of the feasibility of educational television, using national and international funds.
9. Rebuilding of schools in Managua and other departments.

10. Initiation of educational reform.
11. Improvement of quality of personnel currently in the system, through in-service education.

Agriculture: The National Agricultural Committee in their recent analysis of the Agricultural Sector (23) explicitly state that:

The objective of agricultural development is the improvement of living standards of the rural population. In view of the above, they further state that, it is necessary to achieve the following instrumental objectives, in the given order of priorities:

1. Improvement of income distribution of high social sensitivity, as a tool to assure the rural mass an access to goods and services of the economic system.
2. A widening of opportunities for productive employment, as a more dignified form by which man can contribute to raise his income and participate in the developmental processes.
3. A strengthening of the growth of agricultural production as a way to assure availability of goods and services to the rural sector and a greater growth of the general economy.
4. A higher contribution of the rural sector to the balance of payments to procure resources needed to support the general economic development of the country.
5. An allowance of provisions for constant supplies of food and raw materials for domestic use, as a means to assure price stability and, the development of relations of the rural sectors of the economy, which in conjunction with foreign relations, allow for a self-sustained economic growth.
6. Responsibility of the rural sector for the generation of financial resources that the public sector will need for the execution of the National Rural Development Plan.

Rural Development: The overall goal of the rural development sector program [27] is to improve the general living standard of the rural population, with priorities being:

- a. To improve rural distribution and bring the benefits of the Nation's economy to the rural masses of the population.
- b. To create new productive rural employment opportunities as the basic means for improving income and participation in development.
- c. To stimulate the growth of agricultural production of small farmers as a form of ensuring greater availability of goods and services to the rural population and greater growth of the economy in general.

Health Sector: To determine Nicaraguan health policy, it is necessary to review the statements and goals of several government agencies. The policies and priorities of the hospital and curative medicine sector are principally in the hands of the National Social Service and Welfare Board (JNAPS), the Local Social Service and Welfare Board for Managua and other departments, and the Social Security Institute (INSS). While the INSS is actually a formal part of the National Hospital System (JNAPS), its independent source of financing and budget allocation provides it with some autonomy in their operations. (See Health Sector Assessment).

However, the Minister of Health is the legal authority and representative of the health sector and the strategies for the health sector include the following priorities: [9]

1. Direct Nicaraguan Government health resources at the major health problems facing the population, especially enteritis, malaria, and communicable diseases in the rural areas through community health projects and education in addition to reinforcing the activities of traditional health programs and facilities.
2. Extend the coverage of health services to groups with high morbidity and mortality rates with emphasis on women and children and the rural poor through the utilization of para-medical personnel and improved coordination, utilization of health services and the development of a rural health school.
3. Improve the administrative, physical, and technical capacity of the health agencies to utilize more fully the available resource through administrative reform and personnel training.

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4. Complete the regionalization of health services with decentralization of authority and responsibility for project planning and administration to include appropriate budgetary and fiscal controls.
5. Improve the integration of curative and preventive health service through coordinated activities of planning and implementation, now a matter of practice through the National Health Council and recent unified planning of the Health Sector Assessment Unidad.
6. Integrate family planning activities into the general maternal and child health activities of the Health Ministry and expand the coverage of both through the training and utilization of para-medical personnel, especially parteras.

APPENDIX C

PROGRAMS WHICH INDIRECTLY RELATE TO NUTRITION

Education Programs: Ministry of Public Education (MPE) - Aside from the MPE's responsibility for formal education programs, (see Education Sector Assessment for greater detail) it administers a number of non-formal education programs.

(a) Accelerated Primary School Program, which is considered to be an adult education program although it is administered by the MPE's Direction of Primary Education. The standard six-year primary program is compressed into three years. The program began in 1970, and in 1971 approximately 9,000 adults were enrolled in 31 schools with 210 teachers. By 1975, enrollment had reached 10,667. This effort has been oriented toward illiterates in the urban area, with a technical education component usually consisting of accounting and clerical skills training, but plans have been made to expand the program into rural areas.

(b) The Popular Culture Schools provide training in dressmaking, tailoring, and basic business management. In 1971, there were 27 different centers in Nicaragua with 2,197 adults being trained by 91 instructors. By 1975, there were 2,742 adults studying under 112 teachers.

(c) The Agricultural Institute Program, administered by the Office of Agricultural Education of the MPE, was established in 1966 to train agricultural extension workers for rural communities. Today there are six schools in Regions I, II, V, VI, and VII, with fifteen professors and eleven technical assistants training 220 students. The Institutes also provide informal training for housewives, peasant farmers, commercial salesmen, and other individuals wishing to upgrade their technical education, with courses lasting from five to ten days. In 1976, it is hoped that about 5,000 peasant farmers will be reached, through conversation and practical training in the fields.

(d) The Small Farmer Agricultural School Program, initiated in 1968, has now established 15 schools in Regions IV, V, VII, and VIII. The program objectives are to train peasant farmers in rudimentary agricultural techniques, provide technical assistance to communities, and train community leaders. Most students are literate farmers from 15 to 21 years of age. They usually study for one year, although there are also short seminars lasting one or two weeks. The basic curriculum is similar to that of other farm schools; the school combines classwork with practical farm experience. Students live at the school, receiving free housing and board, and go home only on weekends. In addition to basic education, students receive specialized training in zoology, veterinary practices, and animal/food production. In 1976, the MPE plans to expand this program adding to the present budget of \$118,000 per year. The program will become an integral part of the proposed World Bank loan for vocational education, but this will give assistance to only nine of the fifteen schools currently in operation.

(e) Since 1958, the Office of Educational Materials has provided such

items as films, pamphlets and slides to formal public schools, as well as to military groups, nurses, social workers, and health centers. The current annual budget is \$229,000. This office could serve as a source for the development and distribution of materials for rural education. The quality of product is high, but training is needed in the production of non-literate materials, expansion of themes, and techniques to discover the felt needs of peasant farmers.

(f) Liceos Agrícola, are agricultural schools under the Ministry of Public Education. It is a three-year program which supplies middle-level technicians for the National Bank of Nicaragua, the Ministry of Agriculture, IAN, INCEI, INVIERNO, and local farms. Courses run for nine months a year, from February through November, and follow an established curriculum of the MPE which combines 50 percent classwork with 50 percent practical work on plots owned by the Liceos. The curriculum includes biology, genetics, animal husbandry, animal production.

Agriculture Programs:

(a) The Ministry of Agriculture has Extension Services in almost all of the Departments with one or two extension agents. These agents work with farmers to disseminate information about agriculture and provide government subsidized products such as seeds, insecticides, and fertilizers.

(b) The Nicaraguan Agrarian Institute (IAN), an autonomous agency which serves as an agrarian reform institution, was established in 1964, and now reaches about 14,000 peasant farmers in 50 colonies. The objective of the education component is to train peasant farmers in various agricultural skills, social organizations, and basic education. About 50 agronomists and professors serve as extension agents to provide training through periodic cursillos in the communities, twelve of which have community centers.

(c) The Nicaraguan Institute for Interior and Exterior Commerce. INCEI is a semi-autonomous government organization whose primary objective is the increased national production and marketing of grains. It claims to be working with about 30,000 peasant farmers. Until 1967, INCEI worked only in the area of grain commercialization, but in 1967 it began its Basic Grain Project with agricultural centers in different municipalities. This project attempts to increase production and productivity of the small scale farmer with educational support from the National Bank of Nicaragua (BNN). It also conducts a rotating small credit operation supported by other organizations.

Credit Institutions:

(a) National Bank of Nicaragua. The BNN is an autonomous credit institution which was established in 1912 as a private bank and purchased in 1940 by the Nicaraguan Government. (It was reorganized in 1961 and the issue department became the Central Bank.)

The BNN operates throughout the country, with nine urban offices and forty-four rural branches and agencies. Within the Bank is a credit department, an agricultural technical assistance department, and an industrial technical assistance department; it has a regular credit program for large farmers and a rural credit program for small farmers. As part of its program, the Bank provides to small farmer groups requesting credit, technical assistance which includes visiting farmer plots, examining credit worthiness, and making reports to the central office. In some cases these are the only change agents with whom the peasant farmer has contact or whom he respects. In 1975, the BNN conducted 18 seminars, 148 meetings, 229 demonstration activities and 220 Field Days. It is estimated that about 32,000 families are being reached through its activities.

(b) FED – Fondo Especial de Desarrollo – is an institution created in 1972 under the auspices of the Nicaraguan Central Bank with the central objective to increase and diversify production and exports. The FED provides credit and financing to public and private institution active in agriculture and agriculture related activities.

(c) Fundación Nicaraguense de Desarrollo. FUNDE is a private entity established in 1969 as a development initiative of the private sector. Its activities are directed mainly at promoting cooperative organizations for the poor in marginal barrios, and rural areas. While the central office is in Managua, there is a regional office in Matagalpa.

In the urban areas, FUNDE works with housing cooperatives, market women, and small industry groups. In the rural sector the work is with agricultural cooperatives, to train peasant farmers in cooperative management techniques and a credit union for small merchants and artisans, to promote improved marketing and agricultural processing. During visits to rural cooperatives, FUNDE conducts short-term courses in achievement motivation, cooperative management, and accounting. Although the education component is limited, technical assistance through cooperatives is considerable.

(d) Centros Familiares de Educación Rural. Under the auspices of FUNDE, CEFER is a relatively new rural education project which currently operates seven centers in different parts of Nicaragua and plans to begin two more with an A.I.D. grant. With French technical assistance, monitors are trained in community development and applied education, to teach agricultural, home economics, health and other skills to rural children in a community supported school. This program has received teachers salaries from the MPE and financial assistance from the MPE, MAG, IAN and FUNDE.

(e) EDUCREDITO. EDUCREDITO, a private banking institution which provides low-interest credit for worthy students so they can complete their schooling. During 1975, eighty-one loans were approved, totalling US\$46,570.

Miscellaneous Programs:

(a) Ministry of Labor: There is minimal activity by the Ministry of Labor in either non-formal education or the rural sector. It is urban-oriented and its efforts are primarily directed to Managua, although the Ministry has sponsored sporadic seminars on cooperatives during the past two years. The major non formal education efforts are in assisting the Center for Development of Human Resources, the Msgr. García y Suarez Institute, and the National Apprentice Institute (INA). A new office of Women has been opened and is designing programs to improve women's condition including enforcing a law requiring facilities for breast feeding to be set up in places where more than 30 women work.

(b) The Center for Development of Human Resources is a private institution which receives financial support from the Ministry of Labor. It provides training in carpentry, electronics, welding, plumbing, and masonry to about 850 students annually. A small percentage of the nearly 400 graduates per year are women. Of the 150 students who board at the Center, most are from poor families in the rural areas, and thus in this sense, some training is provided for the rural poor.

(c) The National Apprentice Institute (INA) was formed as an autonomous institution to provide training in technical skills required to rebuild Managua after the earthquake, and has received US\$438,000 from ILO over a three-year period. Workers receive three months of basic training in construction, electricity, and carpentry and are then hired to work in government projects. While studying, they receive half of the minimum salary and are considered employees of the government.

(d) Comité Evangélico Pro-Ayuda al Desarrollo. CEPAD is a private, church-related organization formed in Managua after the earthquake to organize the relief services of eight evangelical groups, in order to provide food, housing, and medical services. According to CEPAD estimates, about 17,300 people were helped through this effort. After the emergency relief program was finished, the group established nine ongoing programs to provide for the welfare of children, to create health services, to promote human awareness, to build houses for people with minimal resources, to provide rehabilitation services to small businesses, and to provide material support in emergency cases. Briefly, the programs to date are:

- an emergency program to rebuild homes and provide low-interest loans to about 1,050 victims of the earthquake.
- a community development program to provide health services, nutrition courses, and literacy training in the urban areas.
- a social services program to provide care and social orientation courses to orphan children.
- a basic education program to train teachers in literacy techniques. To date, 745 teachers have been trained in forty-seven courses.
- a medical program to provide medical services to about 6,000 persons in three marginal sectors of Managua.
- a stack sack program in which twenty-five workers have been trained to build houses for 136 persons.
- a temporary housing program in which 297 houses have been built to benefit 2,100 persons.
- a worker training program for 14 to 20 year olds in carpentry, electricity, construction, and masonry.
- a communications technique program to train peasant farmer community leaders.

CEPAD, funded primarily by private, international religious groups, is one of the most important and impressive programs in Nicaragua designed to reach the marginal poor with relevant skills and knowledge.

(e) PROVADENIC. Proyecto de Vacunación y Desarrollo Comunal en Nicaragua, under the auspices of CEPAD, maintains health clinics, health and nutrition education, literacy and environmental sanitation programs in eleven rural communities with populations between 500-3000 inhabitants in Regions I and II. The clinics are run by trained local community health workers and sanitary inspectors. Clinical consultation cost about \$0.55 cents of which one fourth goes to the leader, one fourth to the community fund and one half for the purchase of medicines. The water well program provides drilling equipment and operator and the community is expected to feed the operator and provide labor. PROVADENIC also has a latrinification program. For this, they obtain the latrine seat from the MOH when possible and the community provides labor, lumber, etc.

(f) Centro de Educación Promocional Agraria. CEPA is a program sponsored by the Catholic Church to provide peasant farmer leadership training and promote community development. Peasant leaders are brought to CEPA headquarters in Managua to participate in short-term training courses.

(g) Instituto de Promoción Humana. INPRHU is a privately supported, social change institution financed by a Dutch religious group, U. S. Catholic groups, the Canadian Development Agency, and private sector contributions from within Nicaragua. It is directed toward the marginal peasant farmer who has little or no contact with other groups.

Founded in 1966, its work has gradually increased so that today it operates in about forty rural communities. INPRHU uses consciousness-raising techniques, encounter groups, Freire-based self-awareness training, and other social-psychological techniques presented through direct meeting. In addition, ten professionals give training in pre-cooperative and cooperative management, and accounting, marketing skills, and basic education. Community leaders have been trained in community development techniques.

INPRHU currently reaches about 2,000 heads of households. The program has progressed to the point where community leaders provide multiplier effects by motivating other communities to participate.

(h) Fé y Alegría. This is a private organization which provides training in basic education, artisan skills, sewing, and cooking to both men and women. About 200 people take short courses in these subjects at the Roberto Clemente Center in Managua.

(i) Acción Católica Rural is run by the Catholic vicar of Matagalpa (Region V) to train campesino leaders in conscientization, agricultural techniques, and rural community development. During the past ten years the program has worked in about sixty rural communities and has trained about 300 campesinos a year, holding three different week-long courses per year, with about 200 individuals per session. In addition to training, church leaders assist rural villages in the construction of schools, roads, and wells, and in establishing community centers. A.I.D. has helped finance some school construction project while CARE has given assistance to some health center projects.

The ACR has received technical and financial assistance from the German Catholic group ADVENIAT, as well as from CARITAS and from private donations. A new \$143,000 center is being built 5 km. from Matagalpa to train and house campesino leaders.

(j) Communication and Documentation Center for Rural Development. CEDOC was established in 1973 with technical assistance from France and with the collaboration of CEPAD, IAN, FUNDE, MAG, CEPA, and the Peace Corps, as well as with a US\$37,000 grant from the Inter-American Foundation. CEDOC collects experiences, monographs, pamphlets, and books about how to improve community development, and has also researched and published several studies on rural Nicaraguan life.

(k) About two years ago, in Estelí (Region V) the Centro de Educación Integral Campesino was formed. CEICA trains 40 to 45 campesino leaders a year in practical agriculture, carpentry, housing, and masonry. Students go to the center for instructions once a week and return to their homes the next, in a thirty-week cycle. After determining the needs felt by peasant farmers, a curriculum is developed which is responsive to the needs of campesinos in Estelí Department.

(l) The Escuela de Agricultura y Ganadería de Estelí. (EAE), (Region V) created in 1969, is a private agricultural school offering three years of middle-level agricultural training to high school graduates between the ages of 18 and 22 who are from Central American countries. Graduates receive a Technical Agronomist degree approved by the Ministry of Agriculture, which enables them to get jobs in agriculturally related offices.

In 1975, the school had 56 first-year students, 68 second-year students, and 46 third-year students. They came from El Salvador (38), Honduras (34), Guatemala (12), Costa Rica (7), Panama (2), and Nicaragua (77). Students live in dormitories on the premises. Classroom work is supplemented by practical

experience on the 150-manzana plot owned by the school. As part of their training, students work for two months in a private enterprise, a farm, or a government office to get practical experience.

The school has a \$60,000 annual budget, which is financed through registration. A.I.D. has provided buses, school equipment and scholarships through EDUCREDITO. Run by a Catholic priest and eight professional teachers, it is providing leadership in preparing the agricultural specialists so desperately needed in Nicaragua.

(m) CARE (Cooperative for American Remittance Everywhere, Inc.) CARE provides materials and administrative assistance for the construction of primary and vocational training classrooms. In addition, it helps construct water systems in rural villages, contributes construction materials, tools and equipment for the construction of schools, clinics and community centers and develops preventive and public health programs. Currently, CARE has a combined CARE-MEDICO program together with the IAN, MPE and JNAPS, called Proyecto Rigoberto Cabezas (PRICA) in two areas in Regions VII and VIII. CARE participates both in the provision of medical technical assistance and construction materials. CARE has studied the nutritional problems of these regions (14) and provides basic medical care and immunizations.

(n) Panamerican Health Organization (PAHO). PAHO is the health program division of UNDP, and primarily provides technical assistance to the CON in health related aspects. PAHO is currently providing Nicaragua with a permanent nurse and sanitary engineering consultant and numerous other short term consultants in specialty areas. PAHO provides scholarship assistance for professional and technical formal education abroad, and sponsors or participates in numerous health, and nutrition educational efforts within the country.

Nutrition Related Manpower Education Institutions

a. School of Nursing. There are four diploma schools of nursing in Nicaragua; one public under auspices of the MOH, and three private. The three year curriculum includes maternal-child content, normal growth and development, physiology and public health in addition to a nutrition component. In general, teaching methods and educational technology are limited. These schools graduate on an average of about 70 nurses a year. There is great demand for these programs. About four applications are received for each candidate enrolled.

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b. Nursing Aide Courses. Fluctuating from 7-9 courses per year, these nine month courses are given in general hospitals throughout the country. Although supervised by the JNAPS, they are intended to prepare a nurse's aide capable of functioning in either a hospital or public health setting. The curriculum includes a nutritional component. The teaching facilities and human resources are very limited. There is great demand for this training; usually four applications are received for every candidate enrolled. About 150-200 nurse's aides are produced annually.

c. UNAN. The National Nicaraguan University is responsible for the educational preparation of physicians, pharmacists, dentists, medical technicians, and social workers. There are no formal nutrition or dietary higher education courses offered in the country. A few students have been trained by INCAP in Guatemala.

APPENDIX D

NUTRITION INTERVENTIONS IDENTIFIED BY THE GON

(Nutrition Coordinating Committee)

The Nutrition Coordinating Committee has submitted a tentative list of potential projects to be studied and or developed. These are synthesized as follows:

1. Definition of a National Food and Nutrition Policy.
2. Development and implementation of an administrative mechanisms for analysis, planning, coordinating and training of nutrition related activities.
3. Development of Nutrition programs and projects:
 - a. The development of a project for the integration of nutrition concerns into the Rural Development Program.
 - b. Development of a National Nutrition Surveillance System.
 - c. Development of Nutrition Education Projects utilizing mass-media communication techniques and primary and secondary educational curriculums.
 - d. Fortification of sugar with Vitamin A.
 - e. Fortification of salt with Iodine.
 - f. Feasibility study for the production of a national protein food mix.
 - g. Evaluation of supplementary food programs such as PL 480 and WFP.
 - h. Development of programs to train professional and paraprofessional nutrition manpower.
 - i. Evaluation and strengthening of dietary hospital services.

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