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9. ABSTRACT

Nicaragua's major health problems are extensive malnutrition, high prevalence rates of infections and parasitic diseases, and rapid population growth. In developing Nicaragua's National Health Plan, officials have focused for the most part on those areas which create the most serious health problems and on the organizational and resource requirements necessary to alleviate them. The proportion of government funds allocated to health has increased steadily over the past decade, and unlike many other Latin American countries, Nicaragua has included the health sector in its National Socio-Economic Plan for public investment. Despite these efforts, most of the major health programs lack cohesion and direction. Recently proposed plans indicate that initial emphasis will be placed on reconstructing those health facilities destroyed in the recent earthquake. For this reason, it is even more important to make a detailed plan of action for the coming years. The actual need for treatment services must be reassessed thoroughly. It is possible that a greater impact on the health of the Nicaraguan population might be made by investments in preventive services or non-traditional treatment programs.

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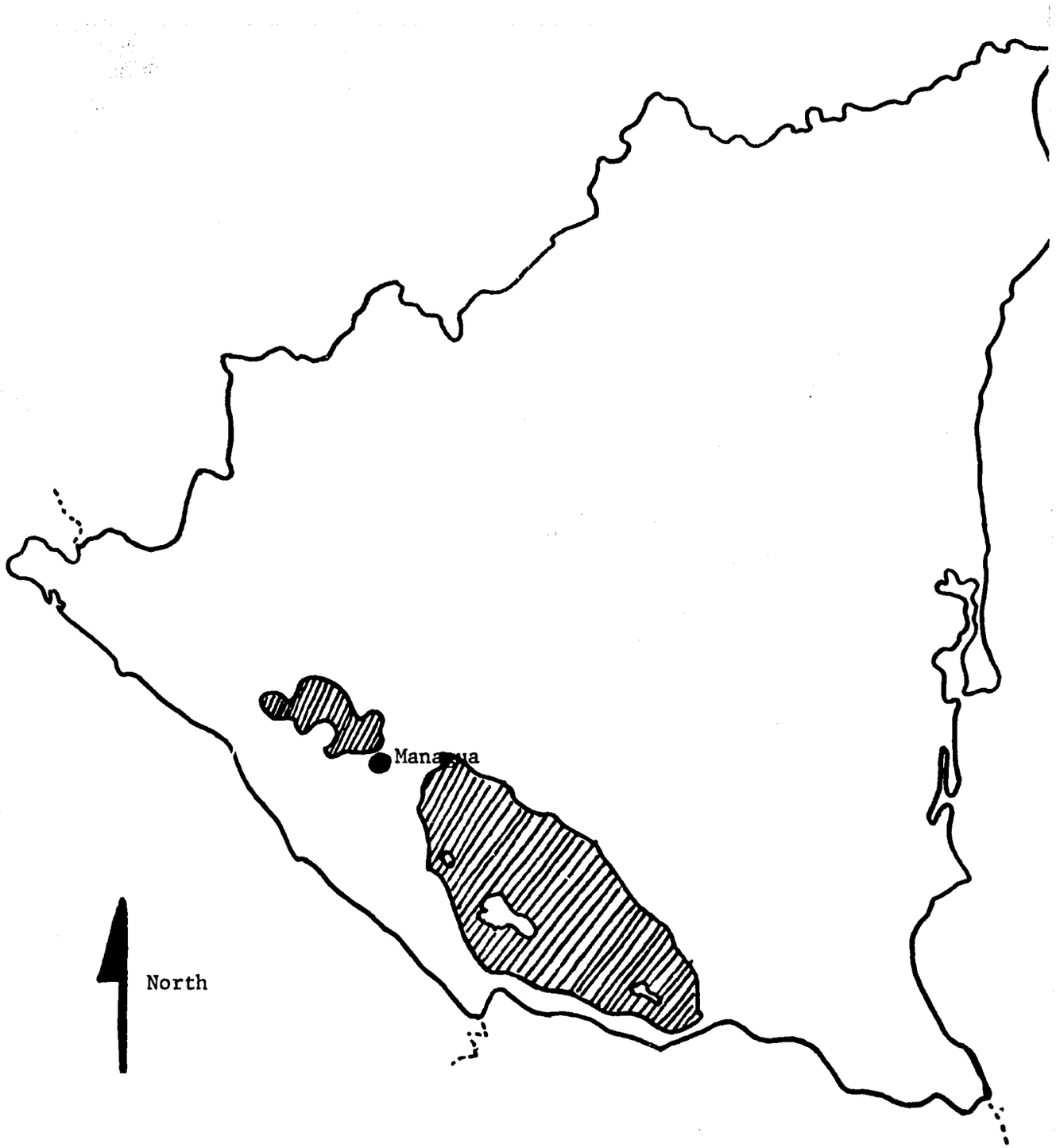
THE DYNAMICS OF HEALTH

An Analytic Series on the Interactions
of Health and Socioeconomic Development

XI: NICARAGUA

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

OFFICE OF INTERNATIONAL HEALTH
DIVISION OF PLANNING AND EVALUATION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S Y N C R I S I S

THE DYNAMICS OF HEALTH

An Analytic Series on the Interactions
of Health and Socioeconomic Development

XI NICARAGUA

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PREFACE

"...expenditure on public health is the only kind that produces real wealth since it protects human capital."

Calmette

"Studies comparing physical productivity of U.S. laborers vs. those in developing countries indicate that the health factor alone gives the U.S. worker a two-fold to three-fold advantage in pure physical productivity."

Logan

This country profile was prepared within the Office of International Health at the request of the United States Agency for International Development. It represents one of a series of profiles developed for the purpose of providing a study of the health conditions of a country and their impact on socio-economic development. The assumption underlying this series is that the achievement of a reasonable status of health, while having a social and personal value by itself, can significantly contribute to the social and economic development of a nation.

In general, the approach has been to review and analyze readily available data in order to identify the problem areas in disease patterns, delivery of care, and planning. Since much of this data suffers from inaccuracies and contradictions, it has been necessary to be selective in the utilization and presentation of the information. Therefore, the conclusions and recommendations are tentative and must be applied with caution. Obviously, some important considerations will be lost in this process, but it is hoped that the overall picture presented will be useful for decision-makers, planners, and educators.

Gratitude is expressed to the many people who provided consultation and advice during the preparation of this report. Special thanks are owed to Ms. Toni Porter for her assistance in researching much of the background information and Ms. Darlene Sullivan and Jessica Auerbach for their patience in typing the material.

Barbara J. Holland
Washington, D.C.

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LIST OF ABBREVIATIONS

AID	Agency for International Development
CACM	Central American Common Market
CIAP	Inter-American Committee on the Alliance for Progress
GDP	Gross Domestic Product
IDB	Inter-American Development Bank
INSS	Instituto Nicaraguense de Seguros Sociales
JNAPS	Junta Nacional de Asistencia y Prevision Social
MCH	Maternal and Child Health Service
PAHO	Pan American Health Organization
SNEM	Service Nacional de Eradicacion de la Malaria
WHO	World Health Organization

I. BACKGROUND INFORMATION

PHYSICAL SETTING

Nicaragua is the largest of the Central American countries. Lying between Honduras and Costa Rica, its land area is 139,000 square kilometers of which about 9,000 square kilometers are inland lakes. The Caribbean coastline is quite long, extending 544 kilometers, compared with 325 kilometers of Pacific coast. The climate is tropical, with an average annual temperature of 80 degrees Farenheit and moderate to very high rainfall throughout the year.

Tropical storms are not a significant factor affecting Nicaragua's weather, but they have had devastating effects on agricultural activity. Particularly in the Central Highlands where slash and burn agricultural techniques have destroyed much of the vegetation, the heavy rainfall causes a great deal of crop damage and soil erosion. Moreover, the first harvest at the end of the rainy season is vulnerable to a variety of molds brought on by the heavy humidity. "These early losses are estimated at 20-40 percent of the crop." (May, 1972) Finally, the heavy precipitation is combined with poor run-off creates an environment favorable to the breeding habits of malaria vectors. As a result, malaria, which reaches its peak incidence during and just after the rainy season, is one of the major health problems in the country, especially among agricultural workers.

Geographically, Nicaragua can be devided into three regions. The Caribbean lowlands, often referred to as the Miskito Coast (La Mosquita), make up the eastern third of the country. Desolate and sprasely populated, with only seven percent of the population, the lowlands fall within the wettest section of Middle America receiving between 100 and 250 inches of rain annualy. Vast tropical pine forests inland from the coast are thought to be fertile, although development of these areas would prove extremely difficult and costly.

Only one road has been built linking the east with the more developed Pacific Coast, and even this is impassable during the rainy season. As a result, development of the region has generally been limited to within a few miles of the numerous rivers, which provide the only economical means of transportation. Poorly drained lowlands not only provide an obstacle to adequate road building, but also create favorable conditions for a variety of health problems. Banana growing was essentially ended in the 1950's by plant diseases which forced owners to abandon their plantations. Malaria continues to be a problem, and spraying activities are made difficult because of the lack of transportation. Communicable diseases continue to be endemic in the area, and without adequate health facilities and programs to alleviate these problems, future settlement looks bleak.

The second region forms a large triangular area in the center of the country. These Central Highlands are an extension of the Central American chain which begins in Chiapas, Mexico and extends almost to the southern boarder of Nicaragua. The most fertile soils are found in the western part, where about 30 percent of the total population resides. Coffee, one of the major cash crops, is grown almost exclusively in this region, as are a significant amount of tobacco, corn, beans, and cotton. Pasture land has also been developed to improve grazing for cattle.

Although sparsely settled, the population of this region is less isolated than that of the east because of economic ties to the major urban centers of the Pacific Coast. Virtually all foods for domestic consumption are grown here and transported by rail or road to Managua. However, the rugged terrain of the Highlands makes transportation unreliable, causing food distribution problems and sporadic shortages. Even prior to the earthquake in December 1972, the Government planned to request food aid as a result of several dry seasons in combination with a high amount of food waste and spoilage.

The Pacific Coastal region is the most important geographic and economic area of the country. More than 60 percent of the total population, virtually all of the industry, and the most significant portion of agricultural activity are located here. "Cotton, Nicaragua's chief export crop, is heavily concentrated in the most fertile lowlands, and stockraising is a major activity along the coast and in the uplands." (May, 1972)

The most striking geological feature is known as the Great Rift, a depression formed by a settling of the land between two major fault lines running the length of the country. These fault lines pose a constant threat of earthquakes, the most recent of which destroyed over 60 percent of the capital city. The floor of the Great Rift contains the two largest fresh water lakes in Central America, Lake Managua and Lake Nicaragua. An active chain of volcanoes runs north to south in this region, and their peaks from several islands in Lake Nicaragua.

Soils dreved from the weathering of new volcanic lavas and ash, combined with the irrigation potential of the lakes, have made the area fertile for extensive agricultural development. However, most of the land is used for raising export crops. Domestic food needs suffer, as a result, since these crops are grown in the less accessible Central Highlands. In addition, the use of advanced agricultural technologies has encouraged the malaria problem in this area, since mosquitoes quickly develop resistance to agricultural pesticides. In consequence, this area of Nicaragua presents one of the most serious malaria control problems in all of Central America.

EDUCATION

Although education continues to be oriented towards classical education for the elite, changes are occurring as Nicaragua takes part in cooperative international programs to modernize its educational system. Particular emphasis has been placed on the development of secondary education.

The average age children enter school and the success they achieve relate to the social and economic status of their families. Although public education is tuition free, parents must pay for books and supplies. Unless a rural family can bear the financial burden, forfeit the child's work in the fields, and surmount transportation difficulties, it frequently withdraws the child after one or two years. Thus, the student drop-out rate is estimated at 80 percent in rural areas, and rural schools consequently offer only one or two grades.

In 1964 the average level of formal schooling attained was 2.5 grades for the urban population and 1.6 grades for the rural population. Roughly 40 percent of the children of primary school age are enrolled in school. Half the children are in the first and second grades. In 1964 less than 10 percent of children originally enrolled actually completed all six years of primary school. Therefore, only a small percentage (9 percent of the secondary school age group is eligible to enroll in secondary school (at a minimum age of 13 and after an entrance examination.) Only about half of those who register actually complete the 5 to 6 year cycle of secondary education. As a result, only an elite one percent can qualify for university education.

The most recent statistics indicate a literacy rate of 58.4 percent for the population of 10 years of age and older. The rate for ubran areas is nearly 85 percent and for rural zones less than 40 percent. This reveals that many rural children either never acquire or do not retain skills in reading and writing.

Unlike many other developing countries, public education in Nicaragua accounts for 90 percent of the educational institutions and some 80 percent of the students. Government expenditures for education in 1971 increased 50 percent over those in 1960. However, the percentage of the total national budget allocated to education (nearly 19 percent in 1971) was less than the average of 20.5 percent in all Latin American countires.

The growth in expenditures has not been able to keep pace with the growth of enrollments. These have risen at average annual rates of approximately four percent, five percent and seven percent for primary, secondary and higher education respectively. However, these percentages do not equal the rate of growth of the student population. To help narrow this gap, the GON is taking advantage of international aid, particularly to expand secondary education.

ECONOMY

The economy of Nicaragua has been growing steadily, although unevenly, over the past decade. Between 1958 and 1967, the gross domestic product (GDP) averaged an annual increase of 6.2 percent with yearly rates fluctuating between -1.6 and 10.8 percent. Performance was sluggish over the next two years, but in 1970 the GDP rose 5.1 percent and continued to rise in 1971. During this same period, per capita income was able to maintain an average growth rate of 2.9 percent and attained the equivalent of U.S. $350 in real per capita income. (Conversion factor is seven cordobas to one U.S. dollar.)

Agriculture is the most important activity in Nicaragua's economy. In 1969, this sector employed 55.7 percent of the labor force, provided 26.8 percent of the GDP and produced some two-thirds of the total value of exports. Coffee, cotton, and rapidly expanding beef exports account for more than half of the total. Minor agricultural exports include shrimp, cotton by-products, and sugar.

During the first Five Year Development Plan (1965-1969), efforts were made to reduce the heavy dependence on cotton and coffee in the face of widely fluctuating markets and international quotas. As a result, major emphasis was placed on improving cultivation methods for the expansion of other exportable cash crops, such as tobacco, sugar cane and bananas. In addition, the Plan initiated a price-support program in an effort to stabilize consumer prices of basic food crops and encourage their production. Output of staple grains, principally corn, rice, and beans, has risen steadily reflecting increases in the area planted and, in the case of rice, a significant improvement in yields. (Rice is both a food and a cash crop and benefits from irrigation and other technology accorded cash crops.)

Despite these attempts to expand the agricultural sector, Nicaragua must continue to import two-thirds more from its major trading partners (the Central American Common Market) than it exports to them. Only 10 percent of the total land area is presently under cultivation. The major portion of this land is dominated by large export-crop farms averaging nearly 2,000 hectares each. An estimated 100,000 farms producing crops for domestic consumption average less than 26 hectares each. Consequently, imports are necessary to meet domestic food requirements.

The availability of cultivatable land is not the problem, since a significant portion of the total land area is unused but potentially productive. Some of this land is located in areas with serious disease problems and consequently is not economically viable for development. Other areas, however, can be developed. The government has made attempts to encourage this development through a colonization program whereby title is granted to farmers for unused but cultivatable land. This program, combined with the growth of credit unions and cooperatives, gives promise of greater production of food in the future. Yet, unless greater incentives are developed for increasing domestic food products, Nicaragua will have to continue to import much of its food supply.

The recent development of the manufacturing industry has not met growth expectations. The small domestic market and the severe shortage of trained manpower preclude economies of scale in many industries. Government agencies, primarily the Central Bank and the

Evolution of Per Capita Gross Domestic Product*
Over the Past Five Years

Year	Population (in thousands)	US$ equivalent	National Currency	Gross Domestic Product US Dollars (**)	Per capita (**)
1966	1.715.4	US$ 1 = 7	4.033	576.1	336
1967	1.776.9	" "	4.246	606.6	341
1968	1.841.7	" "	4.445	635.3	345
1969	1.909.2	" "	4.641	663.0	347
1970	1.978.0	" "	4.850	692.8	350

** US Dollars at the official rate of exchange on 31 December of the corresponding year

Source: The information in this table was compiled from a variety of National and International sources.

National Development Institute, have tried to encourage production by supporting industries which use local raw materials, fuel and equipment rather than imported products. Because agriculture is the most important economic activity, food processing represents half of all industrial output. The market for most processed food items is in Central America, but lack of capital and skilled labor combine to produce small volume and uncompetitive prices.

The greatest portion of the GDP is contributed by the social services sector. Only 27.7 percent of the labor force in 1969 was engaged in this sector which contributed 49.9 percent of the GDP for that year. This sector is dominated by women employed as teachers, nurses, health auxiliaries, etc. The tremendous growth of this sector in recent years has been reflected by an increased awareness of the importance of social services in a developing economy.

The labor force has grown from 475,000 in 1963 to 540,000 in 1971. As a percentage of the total population, however, it has dropped from 31 percent to 27 percent. The female component has grown slightly from 20 percent to 22 percent while the percentage of wage and salary earners has remained constant at 56 percent of the labor force. According to a 1963 figure, 80 percent of wage earners work only 44 weeks a year. The most striking change in the labor force is the loss of agricultural workers who represented 60 percent of the labor force in 1963 and only 46 percent in 1971. The only evidence of serious unemployment has been on the Caribbean coast, which has experienced two long periods of economic disaster due to the slowdown of lumbering activities in the 1960's and the decline of the banana industry in the 1940's. Unemployment is also quite high in urban areas where the demand is for skilled labor.

Rather than unemployment, the problems are underemployment and seasonality of employment. The demand for labor is dependent upon the world demand for cotton, coffee, and sugar. Since these crops are harvested from November to April, time of activity and idleness are the same for all agricultural workers. Because of high seasonal demands, even subsistence farmers cultivating their own holdings habitually supplement their resources with cash income from the harvest of commercial crops. As a result, migratory movement within the country has been an established tradition, and the Nicaraguan worker is responsive to the monetary incentives offered.

In contrast to some other Latin American countries, no significant part of the population can be identified as belonging to non-monetary economy. Subsistence agriculture plays an important, stabilizing role, providing a base to the large portion of the agricultural work force which is only seasonally employed.

A Labor Code passed in 1945 is similar to most labor legislation in Latin America. The emphasis is on protecting the rights of workers through law rather than through collective bargaining. The Labor Code sets no precise standards for health conditions at work places but requires employers to provide protective equipment and clothing and to implement other measures prescribed by labor inspectors, the Mine Vigilance Board, the Ministry of Labor, the National Social Security Institute, and the Ministry of Public Health. Rural employers beyond a three kilometer radius of towns must provide both food and housing for agricultural workers. Some employers meet and exceed standards while others fall below, particularly in sanitation. The best health and safety conditions are generally found in the newer industrial enterprises and in work places covered under collective labor agreements.

The recent improvement in surface and air transportation has been critical to the growth of agriculture and the general economy. The government is committed to improving the system as a way to stimulate the economy generally and particularly in the least accessible rural areas. The international airport at Managua has been vital for exports (mainly frozen beef) and food imports, while six domestic airports have helped open up isolated areas. Three seaports on each coast carry a large portion of foreign trade.

Basic Data Concerning Certain Features of the Population Structure of Selected Latin American Countries

Country	Total	15 years (%)	5 years (%)	1 year (%)	Births[b] 1970-1975	Life expectancy[a] 1970-1975
Argentina	24,352	29.7	12.2	1.6	22.9	68.4
Bolivia	4,685	42.5	16.9	3.9	44.0	46.8
Brazil	93,244	42.6	16.2	2.8	36.9	63.0
Chile	9,780	39.3	14.1	3.0	31.1	63.6
Colombia	22,160	47.1	18.8	3.6	43.9	60.8
Costa Rica	1,798	48.0	18.9	3.6	45.1	69.4
Cuba	8.341	44.3	14.8	2.5	26.1	69.0
Dominican Republic	4,348	47.3	18.4	3.7	48.1	54.6
Ecuador	6,028	46.9	18.8	4.2	43.5	59.6
El Salvador	3,441	47.1	19.4	4.3	46.9	58.2
Guatemala	5,179	47.6	17.7	4.1	41.6	54.0
Haiti	5,229	41.5	16.8	3.7	43.6	45.5
Honduras	2,583	46.7	18.9	4.1	48.5	51.4
Mexico	50,718	46.4	18.7	3.1	42.1	64.6
Nicaragua	2,021	48.0	18.9	4.4	46.8	52.5
Panama	1,406	43.5	17.3	3.9	39.2	55.8
Paraguay	2,419	45.5	17.7	4.2	44.6	61.5
Peru	13,586	45.0	17.4	3.8	39.8	62.0
Uruguay	2,889	28.0	10.0	2.1	20.9	70.1
Venezuela	10,755	49.0	18.9	4.2	40.3	66.3

Sources: [a] Latin American Center for Demography (CELADE). Boletin Demografico, Year II, No. 3, 1969.

[b] CELADE. Boletin Demografico, Year II, No. 4, 1969.

There is still a need for more farm-to-market roads and a network of surface transportation as a base for any future development of the eastern coast.

Nicaragua's Planning Office was created by decree in 1962 to develop plans for future economic and social development. The Planning Office, seriously understaffed and underfunded, has the status of a technical department serving the Coordinating Committee for National Planning. One National Development Plan (1964-1969) was developed, and by 1972 it was to have prepared a preliminary version of a plan for 1972-1976. It would then begin preparation of annual operational plans for key sectors, such as public investment, agriculture, and industry with the technical assistance of the OAS.

CHARACTERISTICS OF THE POPULATION

The population characteristics of Nicaragua are similar to those of other developing countries in Latin America. Although estimates vary, most sources set the total population figure at approximately two million. The sex distribution is evenly divided, but the age distribution is highly skewed toward the younger age groups. Almost 45 percent of the total population is under 15 years of age. This is also the segment of the population most affected by endemic disease problems. The existing social services, however, are in too short supply to cover such a large disease-ridden population group.

The rapid population growth will place an added strain on already over-burdened resources. A comparison of preliminary data from the 1971 census with data from 1963 reveals an average annual growth rate of 2.9 percent. However, this figure does not reveal the wide difference between rural and urban growth rates. While the rural population grew 1.1 percent annually during this period, the population of Managua, the capital, grew 6.8 percent annually. At present, the urban population represents 48 percent of the total population, and this proportion is expected to continue to increase.

The major reason for the more rapid growth rate of urban areas has been the influx of individuals from the rural areas. Because the cities offer better jobs, higher wages, and more educational opportunities, the rate of internal migration to urban areas has been high. By the same token, these migrants have brought to the cities the problems of overcrowding, slums and unemployment, and have created favorable conditions for disease vectors. These factors cause lower productivity in the labor force, which in turn slows economic development.

In spite of this rapid growth rate, there is no great concern on the part of the government with overpopulation. It is felt that economic growth should increase sufficiently to counterbalance population growth. In addition, the overall population density is only 16 inhabitants per square kilometer, lower than any other Central American country except British Hondura. Yet, because of the disparity between urban and rural areas in growth rates, departmental differences exist in density patterns. The most heavily populated area is the urban Pacific Coastal region, where densities range up to 113 persons per square kilometer in the department of Managua, and 185 persons per square kilometer in the department of Massaya. On the other hand, the population concentration in the more isolated rural Atlantic Coast region is only two persons per square kilometer.

The government has encouraged some colonization within the Central Highlands and Caribbean lowlands. After the Second World War, farmers settled in the northern portion of the Central Highlands. Migration to the Caribbean lowlands, however, has made almost no headway.

The ethnic composition of Nicaragua has been estimated at 70 percent mestizo (mixed Caucasian and Indian), 17 percent Caucasian, 9 percent Negroes, and about 4 percent Indian (1969). Social class differences, however, are more a function of linguistic-cultural

differences than ethnic differences. The majority of the population is ladino, totally hispanicized Caucasians and mestizos. The ladinos predominate in the Pacific Coastal area and the Central Highlands. The Spanish-speaking Indians of the Pacific region are not included among this group because of their relatively greater retention of Indian characteristics. Relations between the ladino majority and the rest of the population are strained, partly because of cultural differences and partly because of minority resentment toward ladino political dominance. Difficulties have been magnified by the geographic and cultural isolation of the minority groups on the Atlantic Coast. Their uniqueness is exemplified by the diversity of language. English and Miskito languages, as well as Spanish, are used equally, sometimes together in the same sentence. These factors originally prevented assimilation into the Spanish settlements of the west, resulting in British control of the area into the 19th century. New efforts to provide communication and transportation between east and west will help overcome the geographic and cultural separation.

The majority of the population belongs to the lower class which includes landless rural peasants and tenant farmers, day laborers, and unskilled urban laborers. The upper class consists of old established families, wealthy landowners and merchants, and powerful political and military figures. Mestizos, perhaps more than in most Central American countries, have achieved wealth and upper-class status usually reserved for the European-descended minority alone. The upper-class controls most of the country's wealth and political power. Although they own only 2 percent of the farms, the total land area of these farms occupies about 30 percent of the nation's agricultural land. There is little contact between the upper and lower classes. Mobility from lower and middle class is possible through education and government or National Guard service. Mobility from middle to upper-class, however, is possible only through selective acceptance by the upper-class.

IMPACT OF THE EARTHQUAKE December, 1972

The following information was excerpted from a variety of reports submitted by U.S. Government personnel assigned to evaluate disaster relief needs.

At approximately 1:30 A.M. (EST), December 23, 1972, Managua was struck by an earthquake measuring 6.25 on the Richter scale. Approximately 60 percent of the city was destroyed including four major hospitals and most of the health centers. Estimates of numbers of deaths varied but the most reliable figures ranged between 2,000 and 5,000 deaths, and about 20,000 individuals were injuried. Martial law was immediately declared, and the city was evacuated. Of the 200,000 refugees who left the city, most relocated to the cities of Massaya, Leon, Granada, and Jinotepe. The remainder were housed in evacuation tents set up outside of Managua.

Immediate health needs were for emergency services capable of dealing with injuries sustained from falling buildings. The U.S. Army established a nine-physician outdoor hospital on the grounds of the General Hospital 11 hours after the earthquake. Twenty-four hours later this was supplemented by a 24 bed staging hospital which soon was filled with 105 beds. On December 26, an additional 120 bed army evacuation hospital in tents began operation. Within Managua, a system of 14 out-patient treatment centers was established on day three. Later this was expanded to 23 centers largely located at pre-existing health structures and food distribution points.

On day four, a National Health Coordinating Committee was established. Particularly important was the need to relocate hospital physicians and patients. In addition, there was the problem of distribution of supplies and medicines to hospitals. Large amounts of these materials were received at the airport, and from there distribution was not coordinated.

Overall hospital and medical needs had reverted back to essentially pre-earthquake requirements by the end of the first week. Unfounded reports of epidemics of rabies, typhoid fever, diarrheal disease, and tetanus appeared in local and international press. The presence of decaying bodies trapped in collapsed buildings furthered these fears. Many felt that contagion from this source by air, insect vectors, or contact was an established fact. There were, however, no atypical reports of cases of infectious diseases.

The water pumping station was not functionally damaged and was able to run at full capacity during the entire period. On the other hand, structural damage did occur to the foundation of the water intake plant at a large volcanic lake. Although still functional, this plant and its associated intake are in danger of being disrupted by land slides. Repair of this damage will be a long term project. Contingency plans call for the use of mobile tankers and temporary water pumps if the existing source should fail before a projected city well field is completed.

For several days following the earthquake, food supply was not a major problem because outlying communities were able to draw on their own resources to provide food for most refugees. By the sixth day, efforts to distribute food began in earnest. The need for food assistance was compounded by a severe drought in Nicaragua in 1972. Even before the earthquake, it was estimated that approximately 150,000 persons would need supplementary food in 1973 due to crop losses. Adding the 400,000 persons from greater Managua left without sustenance resulted in a total of about 550,000 persons in need of food after December 24. The distribution of 150,000 rations to departments and 300,000 to 400,000 rations to Managua continued until the middle of February. After this time, the departmental program continued unchanged, but the distribution in Managua was made on a food-for-work basis reducing the amount distributed to under 150,000 rations.

About 80 percent of the industry in Managua was left intact by the earthquake, and the agricultural and livestock base of the economy was not directly affected. Estimates of total economic loss to Nicaragua as a result of the disaster approach one billion dollars.

In an effort to counteract these losses, several measures have been taken. AID has announced that it is granting a special multi-purpose loan of $15 million to help re-employ survivors, relieve pressures on the strained economy, and restore vital public services. Part of these funds will be used for the construction of two 250 bed temporary general hospitals in Managua before the start of the rainy season in May. A third 400 bed specialty hospital is being planned by the Mexican group assembling the overall city plan for Managua. To cope with the housing problem, a plan for 25,000 semi-permanent housing units was developed. They would house approximately 125,000 persons at a cost of U.S. $150 per unit. An additional grant of $3 million from the United States will be used to finance 15,000 of these projected housing units. Finally, the Government of Nicaragua has instituted the following policies:

1. Imposition of a ten percent export tax on the FOB value of agricultural commodities and products. The products enumerated include all of Nicaragua's principal agricultural exports and should raise between $13 and $14 million per year. It is estimated that about 80 percent of this export tax will be paid by about 25 wealthy families.
2. Authorization of a decree authorizing the Treasury to deduct one month's salary from the wages of all public employees each year for two years. This does not appear to cover National Guard officers or enlisted men.
3. Suspension for a two year period of all exonerations of import duties, consular fees, and fiscal taxes. The decree also suspends tax exonerations on the consumption of foodstuffs and lubricants for all governmental agencies. This decree apparently will affect the National Guard which had enjoyed very liberal duty free import privileges.

II. HEALTH STATUS

GENERAL INDICATORS

The health problems found in Nicaragua are typical of a country characterized by a tropical climate and a population living in conditions related to an annual per-capita income of U.S. $350. High death and sickness rates, lack of availability or accessibility of health services, high rates of absenteeism due to illness, and a significant portion of the population suffering from malnutrition are among the indicators of a generally sub-optimal health level.

The annual crude death rate in Nicaragua is estimated to be approximately 16.4 per 1,000 population, compared with a U.S. rate of 9.3 per 1,000. It can be assumed that the age-adjusted death rate is even higher since such a large portion of Nicaragua's population is under 15 years of age. The greatest variance in age-specific death rates from more developed countries is found in the 0-1 year age group in which 146 out of every 1,000 live born children die. The largest portion of these deaths are from communicable diseases which could be prevented with modern health sector technology. The absence of such services, at least for the majority of the population, is an indication of the inferior development of the health system itself.

Yet, even when modern technology is available, it is not always used. Less than 20% of the population utilized medical services of the Ministry of Health in 1972, and only 12% of the population were affected by hospital services provided by the National Board of Social Welfare. These utilization rates reflect not only the lack of availability of services, but also the preference of the Nicaraguan populace for more traditional practitioners and community midwives. This basic distrust of modern medical practice and ignorance of good hygiene, combined with poor sanitation and lack of safe water, adds to the magnitude of endemic disease problems.

DATA QUALITY

Before turning to a discussion of health indicators in greater detail, some mention must be made of the quality of the data available for analysis. Generally, the quality of statistical information on mortality and morbidity in Nicaragua is poor. Not only is there gross underreporting, but the reports that are available tend to be inaccurate because sources of information are often laymen and paraprofessionals with limited medical training.

Part of the problem can be traced to the lack of good organization. There is no agency primarily responsible for the gathering of all statistical information. Within the Ministry of Public Health, the Department of Epidemiology is responsible for obtaining data concerning the Ministry's programs. The accuracy of their sources varies, with very reliable data from the Malaria Eradication Program, to scanty and often inaccurate data from health centers. Information on hospitalizations is compiled by the statistical divisions of the National Board of Social Welfare and the Social Security Institute, the two agencies responsible for hospital coverage. These data tend to be more consistantly reliable but are difficult to obtain by other agencies.

The quantity of information is also insufficient to make precise judgements on the health situation. In a population as dispersed as that of Nicaragua, a great number of people never come into contact with any part of the health care system. Information that is reported is based only on those people who do manage to get into the system through health centers, hospitals, or contacts with paraprofessionals. Who these people are and whether they are representative of the population as a whole is unknown, but it can be assumed that the statistics are biased toward the urban, literate, adult, middle class.

Table 3

Success Achieved in Reducing Death Rates for Children Under 5 Years of Age in Relation to the Goals of the Charter of Punta del Este in Selected Latin American Countries, 1968

Country	Infant Mortality (per 1,000 live births)				Mortality 1-4 Years (per 1,000)			
	Average 1960-1962	1968	Target 1968	%Reduction Achieved	Average 1960-1962	1968	Target 1968	Reduction Achieved
Argentina[a]	61.0	60.6	42.7	2	4.3	2.6	3.0	131
Barbados	65.9	45.4	42.8	89	3.7	1.8	2.4	146
Chile	117.8	86.8	76.6	76	8.2	3.2	5.3	172
Colombia[a]	92.8	78.3	65.0	52	15.4	11.7	10.8	80
Costa Rica[a]	66.1	62.3	46.3	19	7.5	5.3	5.2	96
Cuba	38.0	40.8	24.7	--	2.3	1.6	1.5	94
Dominican Republic	94.1	72.6	61.2	65	10.4	7.1	6.8	92
Ecuador	99.4	87.3	69.6	41	22.2	14.7	15.5	112
El Salvador	72.5	59.2	47.1	52	17.1	10.1	11.1	118
Guatemala	89.3	93.8	58.0	--	32.4	27.6[b]	24.3[b]	59
Honduras[a]	48.4	35.5	33.9	89	14.1	10.9	9.9	76
Jamaica	49.1	34.7	31.9	81	6.8	5.4	4.4	58
Mexico	71.4	64.2	46.4	28	13.8	9.8	9.0	83
Nicaragua	63.1	53.2	41.0	45	8.6	8.2	5.6	13
Panama	51.1	39.2	33.2	66	7.9	7.3	5.1	21
Paraguay	89.7	102.8	58.3	--	9.4	11.3	6.1	--
Peru[a]	92.9	75.3	65.0	56	15.7	9.0	11.0	143
Trinidad and Tobago	42.9	35.8	30.0	55	2.5	1.7	1.8	114
Uruguay	44.6	49.8[a]	31.2[a]	--	1.3	1.4	0.8	--
Venezuela	52.1	44.3	33.9	43	5.7	5.2	3.7	25

[a] 1967.

[b] 1966.

Source: Health Conditions in the Americas (1965-1968), Scientific Publication PAHO 207 (1970), p. 27.

Compounding the data quality problem is the lack of standards for medical certification of death and an information coding system. What may be placed under one diagnostic category in one hospital or health center, may be reported under an entirely different category in another. The effects of these differences in reporting are difficult to assess. Certainly differences in diagnoses according to physician and/or hospital preference will always exist, but the absence of uniform guidelines and standard reporting procedures further invalidates already questionable information.

Attempts are being made to improve the information system. Stimulated by demands for accurate statistical data for the Pan American Health Organization and the World Health Organization, Nicaragua has realized that accurate information is a necessary prerequisite to meaningful health planning. Recent increases in cases of notifiable diseases in spite of greater coverage by immunization and treatment programs is more likely indicative of a better reporting system than a rise in morbidity per se.

In 1965, PAHO, and WHO, in collaboration with the Ministry of Public Health, initiated a program of technical advisory services to assist the Ministry in the use of statistical data in national health planning and in the preparation of project proposals. As a result, in 1967 a Committee on Vital and Health Statistics was established to develop an improved statistical information system. Telegraphic reporting of data on communicable diseases was initiated, and a course was given for 52 auxiliaries for training in data analysis. The most important effect of the program, however, was the drafting of legislation to introduce the use of standard medical certificates of cause of death. As mentioned above, the lack of such uniformity presents serious difficulties in data accountability and accuracy.

To further improve the system, a strong recommendation was made at the 1972 Ministers of Health Meeting in Chile for the establishment of an independent statistical agency. This agency would be responsible for the gathering of comprehensive demographic and health statistics from all relevant health sector institutions. In order to function properly, the statistical agency would require highly skilled personnel trained in statistical methods for projection and planning. Although no concrete plans were developed at that time, the Nicaraguan Government established its intent to follow this recommendation by incorporating the need for specialized personnel into the goals for the next decade.

Following the earthquake of 1972, the lack of a system for comprehensive data collection became even more obvious. Most of the information collected for reconstruction planning purposes had to be done on an ad hoc basis since no accurate and comprehensive background data was available. Because of this lack one of the recommendations of the PAHO consulting team in March 1973, was for the establishment of a Center of Investigations on Health Services. This agency would provide professionals with information on community profiles and measurable standards of health care to be used in determining appropriate investments and in the execution of various program alternatives. Since that recommendation, little visible progress has been made.

MORTALITY DATA

Despite their inaccuracies, available health data do provide insight into the relative importance of various health problems. The high incidence of diseases which are at least treatable if not preventible in other parts of the world are directly related to the problems of rural poverty and a low standard of living. Poor environmental sanitation, crowding, and malnutrition are the greatest contributors to the waste of human resources through premature death and disability. Lack of health program coverage, either through ignorance of the population or through unavailability or inaccessibility of services, increases these risks.

Table 4
Proportion of Deaths in Specific Groups

Year 1968

GROUPS	Number of Deaths	Percentage
GRAND TOTAL	15.061	100.0
With medical certificate	7.227	48.0
Without medical certificate	7.834	52.0
Less than 5 years old	6.364	42.3
50 years old and older	4.043	26.8
Remainder	4.654	30.9
Ill-defined and unknown causes (Group F)	4.848	32.2
All causes excluding those in Group F	10.213	100.0
Group A causes - - - - - - - - - - - - - - -	4.965	48.6
Group B causes - - - - - - - - - - - - - - -	442	4.3
Group C causes - - - - - - - - - - - - - - -	428	4.2
Group D causes - - - - - - - - - - - - - - -	1.123	11.0
Group E causes - - - - - - - - - - - - - - -	3.255	31.9

Source: The information in this table was compiled from a variety of National and International sources.

In 1969, a total of 15,938 deaths were reported (Table 19), which would indicate a mortality rate of 8.2 per 1,000 population. However, a CELADE survey taken during that same year found a mortality rate twice the reported rate (16.4 per 1,000) and concluded that only one half of all deaths occuring in the country were ever officially reported. Compounding the problem, only 48% of the reported deaths were medically certified. The remainder were certified by non-professionals or health auxiliaries, often on the basis of scanty information supplied by family and friends of the deceased. As a result. it is likely that deaths from those diseases which are most familiar and produce obvious and unique symptoms are over-reported, while deaths from diseases evidencing vague or non-distinctive symptoms are under-reported. This means that less than one quarter of all deaths were reported with any degree of accuracy at all.

While the absolute numbers of deaths are not to be trusted, their rank order does provide some degree of information about the relative magnitudes of various diseases. Of the deaths which were reported, the ten leading causes of death in rank order are:

1. enteritis and other diarrheal diseases
2. heart disease
3. accidents other than motor vehicle accidents
4. other diseases of the digestive apparatus (including diseases of the oral cavity, oesophagus, stomach, intestines, liver, and pancreas)
5. homicides, acts of war, or other violent action
6. cerebrovascular disease
7. pneumonia
8. tetanus
9. malignant tumor
10. measles

Enteritis and other diarrheal diseases are by far the leading cause of death, accounting for 23.6% of all known causes. More than 90% of these deaths occur in children under five years of age. Poor sanitary conditions, unsafe water supply, and marginal nutritional status are associated with the great majority of these deaths. The absence of a Sanitary Code, including food handling regulations, to reduce the incidence and prevent the spread of these diseases adds to the problem.

The most severe impact of the enteric diseases occurs in conjunction with a marginally nourished young population. In combination, these two problems place a tremendous strain on the body's immunological defense system, thus compromising 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 occuring in children under five. Many of these fatalities might have been prevented by appropriate health care and vaccination programs for both young children and preganant women. Even more important, however, is the fact that in a properly nourished population, the fatalities from these diseases would be cut by one-half. For a full discussion of the nutritional and environmental factors contributing to the prevalence of disease, see Chapter III.

Accidents and homicides rank surprisingly high as the third and fifth-ranking causes of death, respectively. Even more significant is the fact that these two causes of death are almost exclusively confined to the population between 5 and 45 years of age. Because this represents the productive segment of the population, preventible deaths in this age group merit special attention. There is no information on the prevalence of alcoholism in Nicaragua, but evidence suggests that many accidents and homicides are directly related to excessive alcohol intake. Deaths from cirrhosis of the liver, which are usually taken to show some indication of the prevalence of alcoholism, represent 1.1 percent of all reported deaths. Since these deaths represent only a fragment of the number of alcoholics in the country, excessive alcohol intake may indeed play a large role in the high number of violent or accidental deaths.

A second factor contributing to this particular health problem is the fact that there are no occupational safety laws to guard against work accidents. Although the only specific data on incidence of work accidents are from the statistics of the Social Security Institute, these data do show that in 1972 the accident rate for INSS insurees was about 50 per 1,000 workers. Moreover, reports on incidence by occupation show that approximately 60% of the accidents occurred in the manufacturing industry, even though manufacturing employees constitute only 25% of the total number of those insured under Social Security. Since the majority of these accidents resulted from falls or falling objects, it would appear likely that legislation requiring certain working conditions to be maintained and periodic inspection of work premises would have a significant effect on reducing the magnitude of this particular health problem.

The appearance of heart disease, cerebrovascular disease, and malignant tumors among the ten leading causes of death indicates that once a person passes through the crucial first five years of life, his chances of surviving to a relatively old age are fairly good. However, the chronic nature of many of these diseases places an additional burden on the working segment of the population by contributing to a larger dependent population. The cost of long-term care for those needing institutional supervision must be borne by society in some way. Because of scarce public sector resources, the question should be raised as to whether these programs could be financed through the private sector, either through health insurance schemes or direct private payments.

For a clearer understanding of the patterns of mortality throughout the life cycle, the following lists of the five leading causes of death in each age group will be useful:

Under one year of age: 27.7% of all deaths

1. enteritis and other diarrheal diseases
2. perinatal mortality
3. tetanus
4. pneumonia
5. other respiratory diseases (including acute bronchitis, empyema and abscess of lung, pleurisy, pneumoconioses, etc.)

Ages one to four: 14.3% of all deaths

1. enteritis and diarrheal diseases
2. measles
3. other infectious and parasitic diseases (including poliomyelitis, rubella, viral encephalitis, infectious hepatitis and other helminthiasis)
4. bronchitis, emphysema, and asthma
5. avitaminosis and other symptoms of malnutrition

Ages 5 to 14: 4.5% of all deaths

1. accidents other than motor vehicle
2. homicides
3. anemias
4. enteric and diarrheal diseases
5. motor vehicle accidents

Ages 15 to 44: 17.8% of all deaths

1. homicides
2. accidents other than motor vehicle
3. other forms of heart disease (excluding rheumatic, ischemia and hypertensive)
4. other diseases of the digestive apparatus
5. complications of pregnancy and the puerperium

Ages 45 to 64: 14% of all deaths

1. other forms of heart disease
2. other diseases of the digestive apparatus
3. cerebrovascular disease
4. malignant tumors (including malignant neoplasms of the digestive, reproductive, and respiratory systems as well as neoplasms of lymphatic and haematopietic tissue)
5. accidents other than motor vehicle

Ages 65 and over: 16.3% of all deaths

1. other forms of heart disease
2. cerebrovascular disease
3. other diseases of the digestive apparatus
4. malignant tumors
5. other defined diseases

MORBIDITY DATA

Notifiable Diseases

As would be expected in a developing country, the morbidity rates for notifiable diseases are unnecessarily high. The 1970 data show morbidity rates per 100,000 population as follows:

1.	Malaria	1348.8
2.	Amoebic Dysentery	189.8
3.	Gonococcal Infection	121.6
4.	Tuberculosis	97.5
5.	Syphilis	73.1
6.	Bacillary Dysentery	63.9
7.	Measles	60.5
8.	Whooping Cough	19.6

Other diseases have morbidity rates of less than 10 per 100,000.

Lest these statistics are taken too literally, however, it is necessary to point out several reporting discrepancies. The available data on tetanus and measles cases indicate that they are greatly under-reported in notifiable disease records. These records report that there were only 15 cases of tetanus, while according to mortality data, tetanus ranks as one of the top five causes of death in children under one year of age. Likewise, the reporting of measles seems grossly inaccurate. The number of reported cases of measles was 1,223, yet measles ranks second among the leading causes of death in children from one to four. These discrepancies are particularly significant because of the deficient immunization programs for these two diseases. Given accurate vital statistics minimum morbidity rates would be sufficiently high to warrant sustained immunization procedures. A full discussion of this topic is included in the section Immunization Programs, Chapter III.

Also, mention should be made of poliomyelitis. Although the morbidity data for 1970 report only nine cases, the disease is endemic in Nicaragua with recurring epidemics every two to three years. The most recent outbreak occurred in 1971, when a total of 244 cases were reported to the Ministry of Public Health. The age group most susceptible are children under two years of age. Of the total number of cases, 76 occurred in children under one year of age and 120 in children between one and two. A total of 80% of the cases were in children under three years old, only 10% of whom had a previous history of vaccination. The number of cases and incidence rates were highest in the

Table 5
Morbidity for Notifiable Diseases

Year 1970

Disease	Number of cases	Rate per 100,000
Typhoid Fever (001)	174	8.6
Paratyphoid Fever (002)	63	3.1
Bacillary Dysentery (004)	1.291	63.9
Amebiasis (006)	3.835	189.8
Tuberculosis (010-019)	1.970	97.5
Plague (020)	--	--
Diptheria (032)	19	0.9
Whooping Cough (033)	396	19.6
Scarlet Fever and Streptococcus sore throat (034)	--	--
Tetanus (037)	15	0.7
Poliomyelitis (040-043)	9	0.4
Smallpox (050)	--	--
Measles (055)	1.223	60.5
German measles (056)	47	2.3
Yellow Fever (060)	--	--
Infectious Hepatitis (070)	148	7.3
Malaria (084)	27.260	1348.8
Syphilis (090-097)	1.477	73.1
Gonococcal Infection (098)	2.457	121.6
Other Venereal Diseases (099)	23	1.1

Source: The information in this table was compiled from a variety of National and International sources.

urban areas of the Pacific Coast, where accessibility to clean water inhibits the development of early immunity and increases the risks of paralysis or death.

The existance of data inaccuracies, however, does not obscure the fact that morbidity rates are high and are a direct reflection of the problems of rural poverty. As noted earlier, the enteric infections point up the deplorable sanitary environment in which Nicaraguans live. Unsafe water supplies, lack of effective food handling regulations, and poor personal hygiene contribute to the ever present danger posed by these diseases. The absence of operable refrigeration vehicles for transport of food exacerbates the problem. The high morbidity caused by tuberculosis is also a sensitive indicator of poverty level. The development of this disease and its spread are facilitated within the context of overcrowded living conditions characteristic of rural and urban slums of Nicaragua. In contrast, the malaria problem, once on the way to being controlled, has been increasing more as a result of economic improvements than as a consequence of poverty. Better agricultural technology and increased mobility between areas has resulted in higher vector resistance to pesticides coupled with increased spread. Unless malaria control measures keep pace with future developmental advancements, further economic progress will be impeded.

Increased population mobility has also played a role in another problem, namely the increase in rates of venereal diseases. Although gonococcal infection rarely proves fatal, in chronic form the disease can be severely debilitating. Likewise, early syphilis can go virtually undetected, but during latter stages the patient experiences slow deterioration of the nervous system, severly restricting his ability to function. Estimates of reduction of life expectancy from untreated syphilis are as high as 17%.

The increase in spread of venereal disease is quickly being recognized as a world-wide problem rather than simply a national one. A study prepared for the Technical Discussions at the 18th Pan American Sanitary Conference (October, 1970) reports that the number of cases of venereal diseases has been increasing throughout the Americas. "Changes in ethical, moral, and behavioral standards resulting from accelerated social, economic, and technological changes have been diffused with great rapidity and have, in turn, led to increased sexual activity. The transition from rural to urban life produces emotionally maladjusted adolescents and destroys basic social institutions, such as the family."

In Nicaragua, the rapid increase in the urban population has been coupled with a similar increase in prostitution. Although prostitution is tolerated, it has not been legalized and is considered to be one of the major contributors to the increase in venereal disease rates. The practice of self-medication aggravates the problem. Antibiotics are sold in Nicaragua without prescription, and the consequent misuse of antibiotics has created increasingly resistant strains of bacteria. This in turn, has led to reinfection of individuals in highly exposed groups, causing changes in the total number of susceptibles. Preventive measures through health education and the application of modern treatment regimens are necessary steps if the problem is to be curbed.

Hospital Discharges

In less developed countries where health services utilization is low and most people do not have access to primary care facilities, hospital statistics say very little about the patterns of disease which actually exist in the country. Rather, they provide insight into the reasons people turn to the hospital for help. In Nicaragua, evidence suggests that people seek hospitalization for those problems which drastically interfere with their ability to function normally. Severe pain, prolonged or intense diarrhea, pregnancy or other dramatic symptoms are more likely to motivate people to seek hospital care than mild symptoms or slowly developing diseases.

Table 6

Visits to Outpatient Establishments by Diagnoses

Diseases or Conditions	All Ages
Tuberculosis	1.870
Diarrheas and dysenteries	12.836
Measles	823
Whooping cough	619
Malaria	16.050
Syphilis and other venereal diseases	3.129
Helminthiasis	24.707
Other infectious diseases	--
Malignant neoplasms	--
Avitaminoses and other nutritional deficiencies	6.518
Anemias	8.540
Mental diseases	--
Diseases of the circulatory system	1.193
Acute diseases of the upper respiratory tract	13.913
Other respiratory diseases	12,814
Diseases of the digestive system	2.884
Abortions, complications of pregnancy delivery and puerperium	1.306
Symptoms only	--
Other diseases	--
Accidents and violence	1.144
Health examinations	11.401
Prenatal and postnatal examinations	35.398
Other examinations	2.498
Immunizations	--
Dental care and examinations	64.509

Source: The information in this table was compiled from a variety of National and International sources.

The category containing the highest number of hospital discharges is the group of functional disorders (Group E) which accounts for 74.5% of all discharges (Table 6). More than half of the discharges in this group are related to factors pertaining to pregnancy as classified under the title "complications of pregnancy, childbirth and puerperium." (38.8% of all discharges.) Within this group, 15% of the discharges are estimated to be from abortions. Except for well defined therapeutic reasons, abortion is illegal so that the majority of these procedures are performed after women themselves have made an unsuccessful attempt to terminate unwanted pregnancies. The resulting high risk of infection and possibility of permanent damage to the reproductive system through self-induced abortion is a constant danger.

The next largest category of hospital discharges is for enteritis, followed by digestive disorders, other infective and parasitic diseases, and disorders of the genito-urinary system. For most of the chronic diseases, discharge rates are very low. Likewise, discharges for major infectious diseases are low, reflecting the widespread acceptance of these diseases as part of life.

Outpatient Visits

Like data from hospital discharges, information from outpatient visits reveals more about kinds of utilization patterns than about the actual disease load carried by the population. The most surprising item in these data is the overwhelmingly high percentage of visits for dental care and examinations (approximately 30% of all visits). In a country which has such a high prevalence of diseases which cause death or permanent disability, dental care would not normally command such a high priority. Yet, 64,509 outpatient visits were made for dental care in 1969. More recent information indicates that most of these visits were for tooth extractions. According to the Ministry of Public Health report for 1972-73, 32,686 of the 34,545 total dental consulations in its health centers were for tooth extractions. This pattern reinforces the notion that it is the dramatic symptom that most often induces people to seek medical care.

The second largest category of visits is for pre- and post-natal examinations (35,398), although this number represents only about 15% of the eligible population. This is followed by visits for respiratory diseases, helminthiases, malaria, nutritional and diarrheal diseases. The high number of visits for problems that primarily affect the young population seems to indicate that clinic utilization is essentially dependent on the attitudes of mothers. They are the ones who bring the children into the clinic if they think this is warranted. Utilization is no doubt encouraged through the mothers clubs that operate out of the health centers and through the mobile health units. Lack of outreach, however, means that there continues to be a large segment of the population without ready access to health facilities.

III. SPECIAL PROGRAMS

MATERNAL AND CHILD HEALTH AND FAMILY PLANNING

High population growth rates have made it necessary for Nicaragua to institute maternal and child health and family planning programs in an effort to meet the needs of an increasingly young population. Like other Latin American countries, Nicaragua is coping with the effects of a declining mortality rate coupled with a rising birth rate. The resultant rise in the rate of natural increase requires a coincident increase in social services just to maintain the current level of population coverage.

The steady rise in birth rate is a direct result of the additional numbers of women of childbearing age and the increase in the number of children these women have. In 1970, the number of women in the fertile age group (15 to 44 years) represented 20.8% of the total population and 40.3% of all women. By 1980, the percentage of women in this group is expected to rise to 41.2% of all women in the population. This means that in ten years, there will be 170,000 more women of childbearing age. Likewise, the number of live births per thousand women in the fertile age group in 1970 was 201, but by 1980 this fertility rate is expected to rise to 235 live births per thousand women.

At the present time, the Government of Nicaragua does not consider overpopulation a serious problem. The average density of 16 per square kilometer is certainly low enough to accomodate some increase. Actual densities, however, vary from area to area with the largest concentration of inhabitants on the Pacific Coast. Masaya, the most heavily populated department, has a density ranging up to 185 inhabitants per square kilometer. At the present rate of natural increase, the total population is expected to double in 24 years with an additional increase in the proportion of women and children. According to available information, children under 15 and women between 15 and 44 years of age collectively represent 70% of the total population. Barring a drastic geographical redistribution of the population, this means that within twenty years the Pacific Coast will have severe population problems. Without efforts to limit population growth and to increase the coverage of health services, the health needs of a growing population will far outstrip the resource capacity to meet them.

The present lack of adequate services for women and children is indicated by the high rates of mortality and morbidity in these population groups. First, the reported infant mortality rate (IMR) for Nicaragua is 53.2 per thousand live births, but the results of a CELADE survey report that the IMR is more likely in the neighborhood of 146 per thousand live births. Since infant mortality rates are generally considered sensitive indicators of the quality of early infant care, the high rates of infant mortality in Nicaragua reflect the inadequacy of these programs. Most of the infant deaths are directly attributable to low birth weight and poor environmental conditions, causing a high susceptibility to infection without adequate biological mechanisms for defense. Almost 20% of those infants who die during the first year of life die during the first month. If expectant mothers were to receive proper prenatal and postnatal care, it is likely that a significant portion of these deaths could be averted.

A second indicator of the lack of adequate maternal and child health programs is the high percentage of deaths occurring in children under five. In Nicaragua, 42% of all deaths occur in this age group. Most of these deaths are related to infectious and parasitic diseases, exacerbated by endemic malnutrition. Access to preventive measures such as health education and immunization, as well as to treatment services, would do much to lower this excessive toll.

Finally, maternal mortality is severe enough to be ranked as one of the five leading causes of death among the 15 to 44 age population. The major contributing factors to this problem are lack of prenatal care and good obstetrical practices at the time of birth.

Table 7

Female Population in the Age Group 15-44 Years and Projections to to 1975 and 1980 (in thousands)

Years	Total female population	Females 15-44 Years Number	Percentage
1970	1.002.0	404.0	40.3
1975	1.176.0	483.0	41.1
1980	1.397.0	575.0	41.2

Table 8

Observed and Estimated Rates of Natality, Mortality, Fertility and Natural Increase per 1,000 Population

	Natality		Mortality		Natural Increase	Fertility
Year	Live Births	Rate	Deaths	Rate	Natality rate less mortality rate	Rate *
°1960	63.850	43.2	11.935	8.1	35.1	194.4
°1965	71.166	43.0	11.996	7.2	35.8	191.9
°1970	--	46.0	--	16.4	29.6	201.1
°1975	--	46.8	--	14.8	32.0	230.0
°1980	--	48.0	--	13.4	34.6	235.2

* Live births per 1,000 women in the age group 15-44 years

° Observed

Source: The information in this table was compiled from a variety of National and International sources.

According to a study conducted by Dr. Jorge Rosselot, causes of maternal mortality generally involve such problems as toxemia during pregnancy, hemorrhagic accidents, septic conditions at birth and induced abortion. The fatal consequences of these problems can be avoided with proper medical care.

Cultural attitudes

There are a number of factors affecting the success of maternal and child health and family planning programs, primarily revolving around education, religious beliefs, and economic conditions. Although within professional circles family planning is recongized as an increasing need, there has been no official declaration of policy on family planning from the National Office of Planning for Development. A major consideration is that over 90% of the country is Roman Catholic, and there is no official recognition of the value of limiting family size through the use of artificial means of birth control. In addition, the cultural tradition of machismo encourages the production of large numbers of children as a measure of masculinity. Status in the community is often related to the number of offspring a family can produce.

Women who do want to limit their family size often have difficulty doing so. Lack of education about birth control or even about how a woman becomes pregnant often makes it impossible to practice even the most commonly accepted form of birth control, the rhythm method. Moreover, many women who do have access to birth control devices do not know how to use them properly. Pills are taken indiscriminantly because of a lack of understanding of their relationship to the menstrual cycle. Often pills are given to friends and relatives who cannot benefit from taking only one or two a month. Many women who unwillingly become pregnant resort to self-induced abortions in an effort to terminate their pregnancy. This alone is sufficient justification for the need for family planning programs.

Unlike family planning, maternal and child health is recognized as one of the major problems in the country. Again, however, lack of sophistication and education of the population has presented barriers to program implementation. Many women in rural areas prefer midwives to physicians as attendants at childbirth. Although these midwives are untrained and do not practice aseptic techniques, they are usually well-known and trusted in the communities in which they practice. In more remote areas of the country, people frequently consult lay medicine men or "curanderos", rather than travel to the nearest health center. These preferences reflect the attitude of distrust toward modern medicine prevalent throughout the rural areas, and health agencies have neglected to incorporate these preferred practitioners into their programs.

However, lack of sophistication is not the only barrier to health service coverage. In many areas of the country, maternal and child health programs are unavailable. Even where appropriate facilities exist, the shortage of professional manpower in rural areas prohibits the operation of such programs. Finally, poor roads or financial constraints make it difficult for some families to utilize the services which are available.

Programs

Family planning activities are carried out by three separate agencies. Under its maternal and child health section, the Ministry of Public Health established the Office of Family Welfare in 1967 to be responsible for developing family planning programs in various health centers and to coordinate its activities with other agencies. In the education field, a National Council on Sex Education has been established to determine the extent and effectiveness of sex education in the public schools and to develop a comprehensive education program. The Ministry of Public Health cooperates with this Council by providing training

courses for program personnel. Finally, as a result of a study on induced abortion in 1969, the Social Security Institute began to develop family orientation programs for its insurees. Additional pressure was brought to bear on the Institute by beneficiaries who were too poor to pay for the services of private physicians but too wealthy to qualify for Ministry programs. As a result, the Institute now operates seven family planning clinics within its hospital system. At the present time, however, there is no information on the effectiveness of this program.

The family planning programs of the Ministry of Public Health operate out of 61 health centers throughout the country. Although the Ministry programs are directed to cover almost the total population, it is estimated that only 40 percent have access to centers with family planning clinics. Ten of these clinics were located in Managua and were considered adequate to meet the needs of its population. Most of the remaining clinics are located in departmental capitals, while activities in the rural areas have been minimal.

Maternal and child health programs are conducted as part of the health center services. Where family planning programs exist, the usual pattern is for MCH programs to operate during the morning hours and family planning clinics during the afternoon. Since the staff is the same for both programs, there is no problem of integration of services. Often family planning counseling is given to women coming in for prenatal or post-partum check-ups. Mothers Clubs have been established at many health centers in an effort to more completely integrate the educational activities in both areas by relating family planning to good maternal and child health. In 1973, 72 such Clubs were successfully established.

In spite of the availability of services, data indicate that utilization is low. Since its inception in 1968, family planning clinics have enrolled a total of 39,000 women. There is no reliable information on how many of these women continue to utilize the services but available data suggest that 6,000 have dropped out of the program completely. Consequently, the enrollees represent less than 8 percent of the female population of child-bearing age. If this program is to have any impact at all on reducing the rate of population growth, major efforts must be made to enroll more eligible women. Particular attention should be paid to the increasing urban population which will experience the effects of overcrowding most immediately. Since a large portion of the urban increase is the result of migration from rural areas, programs could effectively be directed toward the potential migrants in rural areas as well as the low income urban dweller.

Data from maternal and child health programs indicate that coverage of these services is also low. Statistics show that only 15.9 percent of all women receive prenatal care. In addition, the first visit for prenatal care is usually made after the fifth month of pregnancy. Only 36.3 percent of the pregnant women seen were enrolled before the fifth month. Follow-up is poor, with only 1.8 percent of the enrolled pregnant women returning for a postnatal check-up. In part, the explanation lies in the low educational level of the population who are not aware of the value of preventive care. Most women do not enroll in prenatal programs before the fifth month of pregnancy and it is likely that a large number of these women do not even know they are pregnant until they begin to show obvious signs.

The program check-ups for children reached 49 percent of all children under one year of age, 17 percent of those between one and four, and 11 percent between 5 and 15. As discussed earlier, most of these visits are for the enteric, respiratory, and nutritional diseases. However, it must be emphasized that the most vulnerable population is still not receiving any health care. The most remote areas of the country endure the greatest burden of morbidity and mortality because of lack of adequate water, poor nutrition, and lack of sanitation. Yet, these are the same areas that have little access to care. Poor transportation, low income, and ignorance in this part of the country make it difficult to undertake either the preventive or treatment measures offered by health centers. This is

compounded by the lack of personnel in the rural areas, limiting outreach. As a result, coverage of care at birth, if it exists at all, is mainly through midwives who have little or no training. The simple rules of asepsis are often not observed, resulting in high rates of maternal and infant mortality.

There are, however, some hopeful signs. Infant mortality has steadily dropped during the last decade. As noted earlier, the official figures grossly understate the actual situation, but the fact that they reveal a definite downward trend is encouraging. How much of this decline can be attributed to maternal and child health programs is unknown. Since early childhood mortality has shown little decrease in comparision to infant mortality, it is likely that much of the decline can be attributed to the limited training in prophylaxis some of the midwives have received.

NUTRITION

Malnutrition is one of the most serious public health problems in Nicaragua. Avitaminosis and other symptoms of malnutrition represent the fifth leading cause of death among children between one and four years of age. Anemias associated with nutritional deficiencies are ranked third among leading causes of death in children between five and fourteen years of age. An average of 32 percent of the national population is afflicted with endemic goiter. Finally, a 1966 survey conducted by the Institute of Nutrition of Central America and Panama (INCAP) found 42 percent of the children under five suffer from Grade I malnutrition, 13 percent suffer from Grade II, and 2 percent suffer from Grade III according to the Gomez scale.

Malnutrition to the degree where clinical manifestations are present, however, represents only a small portion of the problem. Food deficiencies in early childhood probably results in significant retardation of physical and mental development. Chronic malnutrition in adulthood causes apathy, listlessness, reduced productivity and low resistance to disease. Under these conditions, children have difficulty learning, and workers cannot meet the productivity requirements for sound economic growth.

Although it is difficult to define the precise impact of malnutrition on the population, there is sufficient information linking nutritional deficiencies to disease, slow learning, and low productivity. The effects of poor nourishment on children begin before birth. During pregnancy, an expectant mother's metabolic needs increase up to 60 percent for various nutrients. 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. The heights and weights of Nicaraguan children under five years of age are almost 10 percent lower than normal standards after age one. In addition, an article in Early Malnutrition and Human Development reports that deficient fetal nourishment may result in fewer body cells (including brain cells). If nutritional deficiencies continue through early childhood, the damage can be permanent.

Beyond its effect on development, malnutrition also has an impact on host resistance to disease. The recent Inter-American Investigation of Mortality in Infancy and Childhood found that in representative urban areas of Central America, nutritional deficiencies were associated with 60 percent of deaths from infectious diseases, 35 percent from respiratory diseases, and 30 percent from other causes. The assumption can justly be made that these rates would be higher for rural areas which have higher rates of malnutrition, more severe malnutrition, and lack of health facilities to diagnose and treat the problem. As a result, diseases which are considered minor in the United States, can have fatal consequences in Nicaragua. The resultant mortality from malnutrition both as an associated cause and as a primary cause of death in children under 15 years of age is higher than for any other disease entity.

Table 9

Average Daily Per Capita Consumption of Calories and Nutrients, by Health Region - Nicaragua, 1966

Nutrient	Unit	Health Region I	Health Region II	Health Region III	Rural Average*	Urban	Minimum Recommended Allowance
Calories		2,204	1,939	1,669	1,986	2,108	2,700(M) 2,000(F)
Total protein	g	68.7	63.1	58.5	64.4	72.2	60
Fats (total)	g	53.2	45.7	39.6	47.5	59.6	40
Carbohydrates	g	376	331	283	338	331	400
Calcium	mg	740	857	717	763	901	450
Phosphorus	mg	1,211	1,217	1,112	1,184	1,224	450
Iron	mg	17.6	20.4	17.5	18.2	15.4	10
Vitamin A	mg	.749	.338	.259	.508	.941	1.3
Thiamine	mg	.94	.74	.83	.86	.88	1.0
Riboflavin	mg	.92	1.09	.79	.93	1.33	1.2
Niacin	mg	11.7	9.7	9.7	10.7	11.9	13.2
Ascorbic acid	mg	94	41	41	66	82	50

*Computed on basis of total rural sample.

Source: Instituto de Nutricion de Centro America y Panama, Evaluacion Nutricional de la Poblacion de Centro America y Panama: Nicaragua,

As the child matures, his body may accommodate to chronic undernourishment, but the impact of the initial malnutrition has already made its mark. Children who are developmentally retarded are seriously handicapped in school. Low resistance to disease results in a great to an important extent by the nutritional status of the population.

The population is affected both by quantity and by quality of nutrients. The INCAP survey in 1966 found that the average daily caloric consumption per capita was 2,108 in urban areas and 1,986 in rural areas. Using the minimum daily average requirement of 2,070 calories per person,* urban Nicaraguans have diets barely above the minimum, while diets of those in rural areas achieve only 96 percent sufficiency. The situation is most severe in the Atlantic Coastal region where average consumption per capita is only 1,669 calories per day. It is estimated that individuals in 7 percent of the families in this region have daily diets of less than 1,000 calories.

Records of protein consumption also reveal dietary inequities. Intake varies between 72 and 58 grams of protein per capita per day. Although 59 percent of the population consumes more than 100 percent of the recommended daily allowance of 60 grams per day, 16 percent consume less than 70 percent of the recommended allowance. In addition, the intake of animal protein is low, with only 49 percent of the proteins consumed in urban areas and 37 percent in rural areas from animal origin.

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 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 these products are shipped to foreign markets. Second, storage and shipment of fish products inland are restricted by the lack of refrigeration facilities.

Other major nutritional deficiencies are found in the intake of riboflavin, thiamine, niacin and vitamin A. Only 44 percent of the rural population consumed an adequate amount of vitamin A. Dietary habits more than lack of available food sources create these deficiencies. Vegetables are grown in small individual plots but are used as a seasoning rather than a dietary supplement. Fruit is not particularly popular, and with the exception of oranges and mangoes, rarely enters the diet.

In spite of the inadequacy of most Nicaraguan diets, more calories are produced than consumed. While the average daily per capita intake amounts to less than 2,100 calories, the average per capita figure for available calories is 2,370 per day. This discrepancy between available and consumed calories is related to a number of factors. The calories are averaged over the year, without regard to seasonal variances. Obviously, at harvest time more calories are available and the excess must be stored for the non-crop months. Because of poor storage facilities and lack of refrigeration, particularly in rural areas, it is not possible to maintain an adequate supply of foods during the off months. This problem is especially acute during the rainy season when foods are easily susceptible to mold and mildew. Most important, many of the foods produced are exported to foreign markets and are hardly ever available for domestic consumption.

* INCAP recommendation for Nicaragua based on population figures and age requirements.

The problem of distribution compounds the issue. Lack of adequate roads to transport food supplies and for people to reach distribution points means that many people do not have access to certain foods. Food spoilage enroute to markets also contributes to a great deal of wastage. Finally, lack of knowledge about the relationship between food and nutrition means that many mothers do not purchase the most nutritious food for their families.

Institutional Attitudes

Although malnutrition is a major problem in Nicaragua, measures to combat it have not been officially included as part of the National Health Plan, and until the 1973 earthquake there was no national nutrition policy. The characteristically low priority given to nutrition by the government is reflected throughout the health system. Few physicians have received any formal nutrition training (six since 1970), and only one operates in this specialty in public health. The twelve non-physician nutritionists who do work in the country are presumed to lack the adequate technical-administrative skills necessary to manage nutrition programs. As a result, auxiliary personnel must bear the responsibility for nutrition services without the benefit of direction and supervision from more qualified staff.

At the national level, intersectoral cooperation is minimal. Before the earthquake, the country was facing the threat of a serious food shortage because of crop failures. Even without the disaster, it is very likely that the country would have had to rely on outside aid to feed its population. Since the earthquake, nutrition has received somewhat greater attention in government planning circles. The disaster served to focus on the immediate problems of organizing feeding programs for Managua refugees and interim food distribution programs. The necessity for food relief planning led to the inclusion of nutrition programming in the 1973 National Plan for Reconstruction and Development.

Despite this new recognition, however, nutrition planning has not significantly improved. The PRODUSAR pilot projects are the only areas where there are attempts to coordinate the nutrition activities of health, education, and agriculture. (See page 44 for a discription of this program.) Only the Ministry of Public Health has established a division within its organization with the explicit responsibility for program coordination across sectors. Each year, funds are obligated in the Ministries of Agriculture and Education for coordinative purposes, but the actual mechanisms have never been established. Even within the Ministry of Public Health itself, nutrition programs have in past years received only 0.7 percent of the budget, a totally inadequate amount in relation to the size and urgency of the problem.

Programs

In spite of the limitations of resources and status, the Division of Nutrition has attempted to cope with the problem of malnutrition. The Division operates under the Director for Health Promotion and is responsible for setting nutrition standards, technical assistance, and program administration.

The major portion of time, however, is devoted to developing coordination with other agencies in an attempt to define a policy on food and nutrition. Despite the lack of official policy, the Division in 1972 defined its own goals for the next several years:

1. To establish coordination between the Ministry of Public Health and the National Board of Social Welfare in the treatment of those suffering from malnutrition. The Ministry would serve those with Grades I and II malnutrition while the National Board would have responsibility for Grade III.

2. To restructure the Division of Nutrition of the Ministry of Public Health at the national, regional, and local levels.
3. To continue the program of supplemental feeding of children under 5 and pregnant women in the health centers, in coordination with the Ministry of Education.
4. To promote community nutrition centers.
5. To consolidate existing school nutrition programs and to promote additional programs.
6. To train two nutritionists per year at INCAP.
7. To revise the teaching curriculum in nutrition in the school of medicine, auxiliary schools, and all other educational institutions.
8. To develop legislation to create a National Commission on Nutrition which will establish the national policy on nutrition and incorporate this policy into the National Socio-Economic Plan.
9. To promote the training and availability of nutritionists in all the health regions and the regional hospitals.
10. To educate the public in matters related to nutrition and food hygiene.
11. To promote the passage of legislation on iodization of common salt.

The major activity under the Division of Nutrition is the Program of Applied Nutrition (PINAGE), initiated under the auspices of PAHO, FAO, and UNICEF. The program is focused primarily on providing school lunches and nutrition education in elementary school, and currently operates in 232 communities throughout the country. Rehabilitation is offered through 12 urban health centers where malnutrition is diagnosed and treated. In addition, health centers conduct a large number of educational activities for mothers visiting the centers. Attempts are also being made by the Division to educate all health personnel on the importance of transferring adequate nutrition information to their patients.

A second program in which the Division is involved provides food supplement to children and lactating mothers. However, emphasis has been placed on the distributional aspects of the program which are the responsibility of the Catholic Relief Organization in Nicaragua (CARITAS). The autonomy of this agency has made coordination with the Division difficult, and, as a result, the educational aspects of nutrition have been largely ignored. Nevertheless, dietary supplements were offered to 40,000 (or 10%) infants and preschoolers and 14,000 (or 3%) mothers. An additional 130,000 (or 18%) school children received a daily glass of milk. The Social Security Institute has also provided a supplementary feeding program for the dependents of its beneficiaries. Highly nutritious foods are distributed to pregnant women and children under two years of age through its maternal and child health care program, and the Institute offers financial support to lactating mothers at a total cost of U.S. $285,700 per year.

In view of the severity of the problem, these programs have only a limited effect. While certain target groups do receive some benefits, the vast majority of the population must bear the consequences of continual food deprivation. If the problem is to be solved, greater recognition by the Government of the need for careful planning and intersectoral cooperation is necessary.

ENVIRONMENTAL SANITATION

The most important environmental factor influencing disease prevalence in Nicaragua is the lack of potable water. It is estimated that 80 percent of the population suffer from intestinal parasites primarily due to contaminated water supply. A review of statistical mortality data reveals that enteric and other diarrheal diseases are the leading causes of death and account for a large number of hospitalizations and outpatient visits. According to the Committee on Government Operations of the United States Senate, "Irrespective of ethnological or sociological differences, provision of potable water supply in sufficient quantities and conveniently accessible to people will result in 30 to 60 percent reductions of diarrheal diseases." The subsequent increases in productivity brought about by these reductions would be substantial.

Table 10

Status of water supply and sewerage system services in Latin America at the end of 1971.

(Population in thousands)[a]

Country or other political unit	Date of data	Water supply															Sewage disposal			
		Total					Urban					Rural					Urban	Rural	Total	%
		Population	Population served				Population	Population served				Population	Population served							
			House connections	Easy access	Total	%		House connections	%	Easy access	Total	%		House connections	Easy access	Total	%	Connected			
Argentina	Nov. 71	24,210	12,742	1,200	13,942	58	18,400	12,000	65	1,000	13,000	71	5,810	742	200	942	16	6,300	—	6,300	26
Barbados	Oct. 71	241	135	106	241	100	110	105	95	5	110	100	131	30	101	131	100	—	—	—	
Bolivia	Nov. 71	5,062	659	505	1,164	23	1,127	563	50	478	1,041	92	3,935	96	27	123	3	365	—	365	7
Brazil	Dec. 70	96,775	35,621	14,109	49,730	51	56,300	26,047	52	12,109	38,156	76	40,475	9,574	2,000	11,574	25	13,440	—	13,440	14
British Honduras	Nov. 71	121	34	25	59	49	66	30	45	25	55	83	55	4	—	4	7	2	—	2	2
Chile	Nov. 71	9,450	4,630	1,930	6,560	69	6,500	4,500	69	1,800	6,300	97	2,950	130	130	260	9	2,530	185	2,715	29
Colombia	Dec. 71	21,500	8,800	3,200	12,000	56	12,500	6,800	54	2,600	9,400	75	8,900	2,000	600	2,600	29	7,700	2,750	10,450	49
Costa Rica	Oct. 71	1,792	1,188	206	1,394	78	878	817	93	61	878	100	914	371	145	516	56	211	—	211	12
Cuba	June 66	7,950	5,610	650	6,260	79	5,020	3,840	76	650	4,490	89	2,930	1,770	—	1,770	60	1,700	—	1,700	21
Dominican Republic	Nov. 71	4,188	1,172	518	1,690	40	1,818	1,017	56	322	1,339	74	2,370	155	196	351	15	307	—	307	7
Ecuador	Nov. 71	6,350	1,680	470	2,150	34	2,480	1,500	60	350	1,850	75	3,900	180	120	300	8	1,500	40	1,540	24
El Salvador	July 71	3,706	501	738	1,539	40	1,691	700	41	123	823	49	2,015	101	615	716	36	507	—	507	14
Guatemala	Dec. 71	5,309	795	1,290	2,085	39	1,836	739	40	897	1,636	89	3,473	56	393	449	13	769	—	769	14
Guyana	Dec. 71	735	374	40	414	56	225	206	92	15	221	98	510	168	25	193	38	67	—	67	9
Haiti	Jan. 71	5,073	201	337	538	11	948	155	16	257	412	43	4,125	46	80	126	3	75	—	75	2
Honduras	Dec. 71	2,716	621	330	951	35	813	498	61	257	755	93	1,903	123	73	196	10	404	2	406	15
Jamaica	Mar. 71	1,989	780	423	1,203	64	520	500	96	8	508	98	1,369	280	415	695	51	139	14	153	8
Mexico	Dec. 71	54,569	25,720	4,000	29,720	54	31,013	19,940	64	4,000	23,940	77	23,556	5,780	—	5,780	25	12,700	—	12,700	23
Nicaragua	Oct. 71	1,951	781	252	1,033	53	942	663	70	192	855	91	1,009	118	60	178	18	398	—	398	20
Panama	July 71	1,475	700	370	1,070	73	714	645	90	68	713	99	761	55	302	357	47	482	4	486	33
Paraguay	June 71	2,449	170	220	390	16	904	170	19	130	300	33	1,544	—	90	90	6	127	—	127	5
Peru	Sept. 71	13,586	3,300	2,100	5,400	40	6,164	3,200	52	1,300	4,500	73	7,422	100	800	900	12	4,000	12	4,012	30
Surinam	Nov. 71	414	153	124	277	67	215	139	65	76	215	100	199	14	48	62	31	85	—	85	21
Trinidad and Tobago	Dec. 70	1,060	562	460	1,022	96	358	297	83	59	356	99	702	265	401	666	95	181	2	183	17
Uruguay	Nov. 71	2,860	2,057	193	2,250	79	2,120	1,988	94	132	2,120	100	740	69	61	130	18	1,215	—	1,215	42
Venezuela	Dec. 71	10,700	6,893	1,963	8,856	83	7,300	5,570	76	1,370	7,300	100	3,400	1,323	233	1,556	46	2,400	121	3,521	23
Eastern Caribbean countries and territories	Dec. 70	504	131	232	363	72	168	74	44	55	129	77	336	57	177	234	70	14	—	14	3
Total		288,664	116,311	35,991	152,302	53	155,230	92,703	60	28,699	121,402	78	131,434	23,607	7,292	30,899	24	58,618	3,130	61,748	22

[a] Current estimates of population and population served as received from countries by the Department of Engineering and Environmental Sciences, PASB.

Source: Department of Engineering and Environmental Sciences, PASB.

The intimate relationship between potable water and effective sewage disposal, however, must not be ignored. The nearly nationwide lack of adequate sewage disposal systems is alarming. Particularly in rural areas, there is a great deal of ignorance regarding the extent of water contamination by human waste. Sources of water are often streams or shallow wells which have been polluted by sewage-contaminated run-off. Even in the more sophisticated urban areas of the west coast, fecal material is dumped into lakes and rivers. Although potable water is readily available from other sources, these lakes and rivers are used for bathing, swimming, and as a food source. Fish caught in these areas are often contaminated. Children playing in these areas can become infected. To ensure the safety of the population against gastrointestinal diseases proper sewage disposal is a necessity.

Finally, lack of refrigeration facilities and the absence of effective sanitation supervision create a constant threat of food contamination. Except in modern sections of the largest cities, food sanitation and storage are inadequate, making wide distribution of perishables impractical. Consequently, farmers living near cities or highways take their products to market on foot or pack animals, so that food spoilage is common. Both raw and prepared foods are sold in open markets where they are handled by vendor and customer and exposed to filth, flies and rodents. In both rural and urban areas, a considerable quantity of raw milk is distributed unrefrigerated, from cans with dippers, increasing the probability of contamination. Inspection of foods in processing plants is rare, even where it is legally required. Food handling regulations are seldom enforced even in large cities. The consequent risk to the population of food borne disease is high.

The impact of creating a more sanitary environment extends beyond the reduction of gastrointestinal disease. The nutritional status of the population is also affected. As with infectious diseases, enteric and other diarrheal diseases drain the body's resources, creating a need for increased caloric intake. Because the body cannot meet this need on the available diet, malnutrition results. This is exacerbated by parasitic infestations leading to an inability of the digestive system to absorb foods in the proper manner. The result is that nutritional deficiencies are even more severe.

In a country where the availability of nutritious foods is precarious, the increased need for food created by parasitic and other infections is tragic. As outlined earlier, the resulting malnutrition has profound effects on the severity of infectious and respiratory disease problems. It is conceivable that with better environmental sanitation, the extent of malnutrition, and hence the severity of other diseases, can be reduced.

Programs

Nicaragua has done much to improve the availability of water supplies over the past several years. In 1963, only 21.3 percent of all dwellings had access to running water. By 1972, this level was raised so that 53 percent of the population had access to water service.* However, the greatest part of this increase took place in the cities, while rural areas were largely unchanged. The Charter of Punta Del Esta recommended that the goals of supplying potable water service be to reach 70 percent of the urban population and 50 percent of the rural population. In the urban centers, Nicaragua has reached the Charter's goals, providing direct house connections to 70 percent and easy access to an additional 21 percent of the urban population. In rural areas, however, only 18 percent of the population has access to piped water, far below the recommended level of 50 percent. Thus, while rural areas contain 70 percent of the population, major efforts at providing potable water have been directed toward city populations.

* Although these figures are not precisely comparable, they are the only ones available.

Sewage is more of a problem with only 20 percent of the population residing in housing connected to sewage disposal systems and an additional 10 to 15 percent having access to latrines and septic tanks. All of these services are found in the cities, however, and cover approximately 50 percent of the urban population. There are virtually no services in rural areas. This lack of facilities contributes to the spread of disease and, in combination with lack of potable water, presents a serious health problem.

The responsibility for environmental sanitation rests with the National Department of Water Supply and Sewerage Services (DENACAL), under the Ministry of Public Health. Prior to 1967 the agency was part of the Ministry of Interior, but was transferred, in order to provide more effective services in the rural areas and to emphasize more strongly the health aspects of the problem. Since this reorganization, most of the major strides in providing increased access to services have been achieved.

The department operates as a fairly autonomous agency primarily because of loans from international agencies. The Inter-American Development Bank (IDB) is one of the agencies most actively involved and, in conjunction with DENACAL and the Social Welfare Board of Managua, developed a project for sewerage system construction and sanitation improvement of Lake Nicaragua. This project achieved 20 percent of the targeted goal by 1971 and was well on its way to completion. Also by the end of 1971, water was being supplied to 79 localities under the national rural water works program funded through a two million dollar loan from IDB. Finally, the International Development Association granted a three million dollar credit request from the Empresa Aquadora de Mangua, the capital's water utility, to build a self-supporting water supply system. This program has been extremely successful making water supply services available to almost the entire population of the capital city on a payment for service basis.

The autonomy of the water supply department coupled with the extensive financial and technical support from international agencies has made this program one of the most successful in the Ministry of Public Health. Unfortunately, this may mean that once international support ceases, there is danger the program will falter. The country itself has a scarcity of sanitation personnel. Although there have been continual attempts to strengthen sanitary engineering education, with assistance from PAHO and WHO, the number of personnel continues to be below the WHO recommended minimum. Since it is impractical and financially prohibitive to build extensive water supply systems for the isolated communities of Nicaragua, sanitary engineering personnel would be invaluable for instructing rural inhabitants about well construction.

Finally, brief mention should be made of attempts to improve food sanitation. PAHO and WHO have been active in assisting the Ministry of Public Health to establish a national food and drug control program. In 1967, Nicaraguan personnel received training in food and drug analysis and in administrative aspects of food and drug control. In spite of these attempts, however, control continues to be minimal. The lack of food inspection regulations can be corrected through legislation and the development of qualified personnel to implement the regulations. It is likely that additional support will be required to develop adequate transportation networks and refrigeration facilities for improved food distribution and storage.

IMMUNIZATION COVERAGE

The high proportion of deaths from diseases preventable through vaccination (8.7 percent of all known causes of death) reveals the inadequacy of coverage of the immunization program. It is estimated that the number of people immunized against specific diseases is equivalent to no more than 50 percent of the population immediately accessible to health centers. This figure is far below the recommended immunization level of 80 percent of the susceptible population.

Table 11

Immunizations

Three-year period 1968-70

Type of Vaccine	Population in the intermediate year		Total doses in the past three years	Total Num. persons immunized in past 3 years	Percentage levels of immunization	
	Base	Number			Achieved	Recommended
	2	3	4	5	6	7
Smallpox	Under 5 years	364000	17859	17358	4.8	80.0
	Total	2021000	180535	152331	7.5	
DPT	Under 1 year	84000	150497	24943	9.9	80.0
	Under 3 years	256500	...	...	...	...
	Under 5 years	364000	410332	63317	17.4	80.0
Tetanus toxoid	There are no Immunization Programs					
Poliomyelitis	Under 1 year	84000	199856	72212	28.7	80.0
	Under 3 years	256500	...	...	...	...
	Under 5 years	364000	629861	199006	54.7	80.0
	5 years and older	1657000	19946	6832	0.4	-
Measles	Under 1 year	84000				
	Under 3 years	256500				
	Under 5 years	364000				
BCG	Under 1 year	84000	71098	71098	28.2	80.0
	Under 15 years	952000	290483	290483	30.5	100.0

Source: The information in this table was compiled from a variety of National and International sources.

Children under five are the most susceptible to fatalities from these diseases. Seventy-eight percent of the deaths from diseases preventable by vaccination occurred in this age group. There is no information on the extent of morbidity of these diseases in children under five, but it is quite high. As discussed in earlier sections, many of the problems revolve around poor nutrition, overcrowded living conditions, and lack of sanitation facilities. In young children, the impact of these problems is increased because of the vulnerability of the body's own defense system.

In spite of the death toll taken by these preventable diseases, the great majority of people never seek treatment. These infectious diseases represent only 1.9 percent of all hospital discharges and 1.8 percent of all health center consultations. In addition, most of these visits are for long-term illnesses such as tuberculosis. Only 0.4 percent of all hospital discharges and 0.6 percent of all health center consultations were for preventable diseases other than tuberculosis. Yet, there were almost nine times as many deaths from these diseases, (tetanus, whooping cough, and measles) as from tuberculosis.

The primary reason for this discrepancy is that tetanus, whooping cough, and measles develop quickly and have clearly recognizable symptoms. Most families are familiar with these diseases and view them as necessary conditions of childhood. Difficult accessibility to health services leads to delays in seeking medical attention. If and when they do decide to seek medical treatment, the child has either recovered or died.

Although the therapy of these diseases is valuable in preventing their spread and for treating complications, little can be done to alter the course of the diseases themselves. Tetanus toxoid or anti-toxin can be administered for tetanus, but measles and whooping cough must in large measure be allowed to run their course. As a result, preventive measures are invaluable for controlling their incidence. A good immunization program can do much to minimize their effects in Nicaragua, especially deaths due to these diseases.

Programs

Immunization programs are administered under the auspices of the Ministry of Public Health through the health centers and mobile health units. The Ministry has recognized the extreme susceptibility of the young population, particularly children under five, and has geared its programs toward this age group.

However, immunization rates continue to be low. The highest level of immunization coverage achieved in 1970 was 54.7 percent of children under five for polio. This level is largely the result of an intensive innoculation campaign following an outbreak of epidemic proportions in 1967. The next highest level of immunization is for tuberculosis, where 30.5 percent of children under 15 years of age have been immunized with BCG vaccine. Through the use of DPT, immunization against diphtheria, whooping cough and tetanus has covered only 17.4 percent of children under five, and there is no tetanus toxoid immunization program for the fertile female population. This group is particularly important in any plan for tetanus immunizations, since most of the tetanus cases are neonatal as a result of septic conditions at birth. Tetanus ranks fifth among leading causes of death in children under one year of age. Since the child will carry the mother's immunity for the first several months after birth, immunizing mothers prior to delivery would do much to lower this death rate. Tetanus toxoid can be administered safely during pregnancy at minimal cost.

The most obvious deficiency in the program, however, is the fact that there is no program of immunization for measles. During the period from 1968 to 1970, there were 364,000 children under five but no immunizations given. This disease is the second leading cause of death in children between one and four years of age and increases host susceptibility to other diseases. Measles vaccine can be safely administered after the infant reaches a sufficient level of development to tolerate the vaccine, at about nine months of age.

In spite of their value, immunization programs represent only one method of effecting change in mortality and morbidity from infectious diseases. Good nutrition and environmental sanitation are major factors in sustaining a healthy population.

DISEASE SPECIFIC PROGRAMS

Malaria

Although malaria is not one of the leading causes of death in Nicaragua, it nevertheless continues to be one of the major morbidity problems. A review of statistical information shows that in 1970, a total of 27,260 cases were reported yielding a morbidity rate of 1,349 per 100,000 people. Although more recent statistics are unavailable, reports indicate that morbidity rates in 1971 and 1972 reached the highest levels in the program's history. The long-term debilitating effects of this disease coupled with high prevalence rates have a profound impact on population productivity. "All epidemiologists who have analyzed the problem in retrospect agree that malaria has been most effective of all diseases in preventing man's mastery of the land, and that the regions it attacks cannot compete economically with disease-free areas owing to loss of produtive capacity during periods of sickness and the after effects of anemia, weakness, and mental apathy." (Martin)

Because the entire nation is affected by the disease, malaria eradication efforts have taken the form of massive spraying and detection campaigns. The agency responsible for this program is Servico Nacional de Eradicacion de Malaria (SNEM), a division of the Ministry of Public Health, which has an extended network of both professional and voluntary personnel throughout the country. At the periphery, there are about 4,000 volunteer workers responsible for case-finding and reporting. Blood smears are taken on all persons who evidence any sign of fever and presumptive treatment is administered. Approximately 100 full-time evaluators supervise the volunteer workers, visiting detection stations to collect slides and re-stock supplies each month, and making specific house visits if there is no volunteer in the area. Each evaluator reports to one of 30 sector chiefs, who also have responsibility for two or three spray teams in their area. Above the sector chiefs are five non-medical administrators responsible for the operations of field personnel and coordination with the laboratories. The director of the program is a medical officer, who is assisted by a health educator and an epidemiologist.

Through this personnel network, SNEM has been able to develop detailed maps of every geographic area showing each dwelling unit. These maps are used as a basis for planning the activities of the spray teams. In addition, during each spraying cycle, usually two or three times a year, the teams make a complete numerical count of the population which some departments use as a basis for assessing the accuracy of the census.

Malaria eradication has not been achieved, however, due to the increasing resistance of the vector to residual insecticides. The percentage of total land area infested with resistant species is the largest of any country in the entire hemisphere. Concentrated along the Pacific Coast and the northern portion of the Central Highlands, insecticide resistance in mosquito vectors has developed mainly as a result of agricultural spraying practices. In addition, geographic contiguity with Honduras and El Salvador, which also have vector resistance, has aggravated the problem even further. The land area involved contains 66 percent of the population and represents the most economically important agricultural area of the country.

Since vector resistance was discovered in 1961, various experiments with alternative insecticides have been undertaken. DDT continues to be used on the Atlantic Coast and parts of the Central Highlands, while Propoxur (OMS 33) and Malathion have proven to be somewhat effective in the remaining areas. Resistance to Malathion has been growing steadily,

however, and a recent finding in the Rio Viejo Valley, near Chinandega, showed that the local vector was resistant to Propoxur. This is a large rice producing area which has been subject to aerial spraying with Carbaryl for a number of years. At the present time, malaria incidence is low, but some 25,000 people are potentially affected. Since a similar pattern of resistance to Propoxur after agricultural spraying with Carbaryl was discovered in El Salvador, PAHO has undertaken studies to find alternative solutions.

Elsewhere, Propoxur spraying seems to have caused incidence rates to level off. Slide positivity indices have remained in the neighborhood of 13 percent. Statistics for the next several years will show whether or not stabalization of disease incidence has been achieved. In addition to the technical problems of coping with vector resistance, the financial resources available have been insufficient for the sustained, intensive effort necessary to eradicate the disease. According to the Five-Year Plan of Operations for SNEM, only 31 percent of the population was protected as a result of residual house spraying in 1972. This low coverage was largely the result of funding cuts and insufficient international support to conduct the necessary large scale spraying operations.

Prior to the earthquake it was estimated that in order to maintain progress toward eradication, an increase of 36 percent above the 1972 budget would be needed in 1973. Because of the disaster, however, Government funds have been diverted to rebuilding Managua so that continuation of an intensive program is almost totally dependent on international aid. In addition to the annual donation of Propoxur from the Federal Republic of Germany, financial assistance is sought to cover the operating expenses which are projected to total $11 million over the five year period. The Government of Nicaragua contribution to the program is proposed to be about $6.7 million or $1.3 million per year. The remaining funds are being sought through a USAID loan.

Tuberculosis

Like malaria, tuberculosis reveals its major impact not in the number of deaths, but in the long-term costs of loss of productivity and disability. Although the disease frequently develops during childhood, the major effects accrue to the working age group. Of the 119 deaths from tuberculosis reported in 1970, 80 percent occurred among those between 15 and 64 years of age. Data on notifiable diseases report the morbidity rate as being 97.5/100,000 inhabitants, while tuberculosis cases constituted 1.5 percent of hospital discharges and 1.2 percent of health center consultations. Age-specific morbidity rates are unavailable, but it can be assumed that the percentage of these cases falling within the working age group is high. The costs of treating these cases, when hospitalization is a favored policy, added to the costs of lost productivity are great.

Many factors contribute to the prevalence of the disease. Overcrowding, lack of adequate housing, and poor environmental conditions aid the transmission of the tubercule baccillus. In, addition, the high degree of malnutrition leads to low host resistance and provides an added obstacle to recovery. Finally, immunization rates are low. Only 28.2 percent of children under one year of age and 30.5 percent of children under five years of age have been vaccinated with BCG. Since the vaccine is not very effective to begin with, this means that even a smaller percentage of infants and young children are likely to have subsequent immunity.

Early detection and treatment of tuberculosis provides a complementary method of disease control. Consequently, the Government of Nicaragua has embarked on a massive detection campaign. The program functions with three mobile units and two stationary units for diagnosis and treatment. For residents in Managua, these functions are carried out through the National Dispensary. In addition, health centers throughout the country refer any suspected cases of tuberculosis to the program. There are 400 beds available for hospitalization, and potential

admissions must be screened by a Committee on Selection which has been operating since July, 1970. It is hoped that this procedure will reduce unnecessary hospitalization.

The effectiveness of the program is difficult to evaluate. In 1970, it was reported that treatment was initiated in 85 percent of newly detected cases, but there is no information on how many of these continued treatment over time. Unfortunately, treatment of the disease is long-term, usually requiring one to two years of daily medication. Many people are unwilling to continue such a protracted regimen. Symptoms may disappear after a few months, at which point many patients decide that they no longer need treatment and discontinue medication. Likewise, case-finding is made difficult because people immunized with BCG have positive tuberculin skin tests. Since many people are not aware of what vaccinations they have had, it is difficult to determine which of the positive skin tests are primary cases.

In addition to the technical problems, there are problems of resource allocation and distribution. Most professional personnel in the program confine their activities strictly to the clinical areas of the laboratory and the hospital. As a result, most of the detection and treatment activities are conducted by auxiliary workers without adequate supervision. Lack of funds for transportation and supplies creates additional problems. Although the government allocated 4.3 percent of the health budget for tuberculosis in 1972, most of the funds went into the high salaries felt necessary to attract professionals to the program.

IV. ORGANIZATION OF SERVICES

HEALTH AGENCIES

The organization of health services in Nicaragua has been handicapped by fragmentation, duplication, and competition between agencies. There is no national health system under which all programs operate resulting in administrative and program duplication. Preventive and curative services are the responsibility of separate agencies accentuating basic differences in program outlook. Funding shortages and budget cut-backs often undermine attempts at innovative program implementation. Administrative structure, allocation of resources, and program priorities are determined without regard for operations of other agencies. These problems became especially acute after the earthquake when coordination of agency activities became crucial.

There are four major groups responsible for health care delivery, each with its own area of responsibility for either programs or populations.

Ministry of Public Health

The Ministry of Public Health is responsible for the promotion of health, the prevention of disease, and the rehabilitation of people recovering from illness. Ministry objectives are accomplished through a network of health centers, mobile units for rural areas and family planning clinics. The main service activities of this network revolve around programs of immunization, maternal and child health care and other prevention oriented activities.

The organization is divided into three administrative levels: national, regional, and local. Power is concentrated at the national level with strong vertical lines of responsibility. At the highest level is the Minister of Public Health, responsible for setting health policy and long range planning. In addition, his responsibilities include coordination with other health agencies and development of intersectoral policies with other Ministries. The Director General of Public Health is responsible to the Minister and has direct authority for all program areas. Seven technical divisions are accountable to him for their programs: Administrative Services, Health Promotion, Health Protection, Special Health Services, Technical Health Services, Basic Health Services and Personnel Formation.

In addition to administering the technical divisions, the Director General acts as liaison to and overall supervisor of the activities of the National Department of Water Supply and Sewerage (DENECAL). This agency operates as an autonomous unit within the Ministry and is responsible for the development of water supply and sewerage systems throughout the country. The fact that this agency falls under Ministry of Public Health administration is unusual in Latin America and is indicative of the increased awareness in Nicaragua of the relationship between environmental sanitation and health.

At the local level, the various programs and policies of the Ministry are actually implemented through health centers and mobile units. Directives are sent from the national level regarding operational plans with the expectation that they will be implemented. Lack of transportation and communication networks, however, make supervision and accountability difficult. Awareness at the national level of the activities of these units is related to their distance from the capital with the most remote areas of the Atlantic Coast receiving the least attention.

National Board of Assistance and Social Welfare

This agency is primarily responsible for hospital construction and management. A total of 23 hospitals are directly under its administration. The Board itself is composed of various members of Nicaraguan society under the leadership of Mrs. Samoza, wife of the head of the National Party. These members are influential within governmental circles and have done much

to increase awareness of health problems at the national level. The major function of the National Board is to administer the National Lottery, through which funds are raised for hospital maintenance. Lotteries are held every two weeks and offer prize moneh sufficient to sustain an adequate number of ticket purchasers. Revenues raised in this manney are distributed throughout the country to various local community boards, which administer hospital facilities and have the power to collect local taxes to supplement this revenue allotment.

National Institute of Social Security

The program of the Social Security Institute is a type of prepaid health insurance plan covering industrial workers and government employees. Employees contribute 3 percent of earnings and employers 6 percent of payroll according to wage class, and the government contributes 3 percent of earnings plus its employer contribution for public employees. The plan pays welfare benefits to the elderly and dependents of deceased insurees, and also provides health benefits for its insured population. Assistance is given through medical and MCH care payments and work compensation for disability. Clients initially have access to five Social Security hospitals and in addition can seek care at any public hospital or clinic. Those covered, however, represent only eight percent of the total population. Attempts are being made to expand the insurance program into other sectors, but thus far only a small percentage of agricultural workers and miners have been reached.

National Guard Health Program

All members of the military and their dependents are covered through this program (about 5 percent of the total population). Services are provided through the Military Hospital for major medical problems and a network of medical personnel located in the departments for ambulatory care. The National Guard operates its own pharmacy, laboratory, emergency and nursing services. The population covered by this program is small, however, and there is no information on its effectiveness.

Private Sector

Health services provided by non-governmental agencies include those provided by private practitioners, clinics, and both profit and non-profit hospitals. Information on the care provided by these groups is scanty. In total, private sector hospitals number 27, more than half of all hospitals in the country, though they account for only 10 percent of the beds. There is no information on the number of private practitioners, but most of the physicians in the country provide care to some private patients.

A number of missionary organizations operate health activities throughout the country, primarily focused on hospital care. In Managua, there is a Baptist Hospital with a good reputation for quality care. The cost of treatment, however, is prohibitive for those with lower incomes, and few charity patients are treated. In addition, an extension program operates out of the hospital base in an effort to distribute medicines to various parts of the country. Volunteers are recruited from among the foreign population of Managua and after a brief training program, are assigned to handle a specific geographic area. Most of the sites can be reached by car, but several require air transportation.

A number of Moravian hospitals serve populations on the east coast. These also have a good reputation for quality of care, but again costs are too high for the poorest segment of the population. A Catholic Hospital exists in Managua, but the efficiency and quality of care received are not comparable to those of other institutions.

COOPERATION AND PLANNING

One of the major problems with the health care delivery system has been the lack of planning and cooperation between agencies, especially between the Ministry of Public Health and the National Board of Social Welfare. In part, this phenomenon is the result of entirely different

orientations toward health. The Ministry focuses on prevention as the principal way to achieve better health for the population. The National Board, on the other hand, is oriented toward treatment as the most necessary part of the health system.

These different points of view create conflicts over program emphasis and budget allocations and because of the influence of Board members, this agency usually triumphs. For example, a decision was made in 1972 to construct a 300 bed children's hospital in Managua at a cost of 10,000,000 cordobas or the equivalent of $1,428,500. The preventive programs of maternal and child health, nutrition, and vaccination combined were only alloted the equivalent of $250,000. From previous chapters it can be seen that although a children's hospital would benefit a small percentage of the population, greater benefit might accrue to a larger segment if more money were devoted to preventive programs.

This lack of coordination has been recognized by a variety of sources. The most recent Pan American Health Organization report on the health situation after the earthquake states that sectoral planning has been characterized by:

1. Lack of definition of the health sector
2. Lack of coordination of health policies
3. Lack of coordination and complementarity in health activities.

In spite of these limitations, there have been increased attempts during the past several years to rationalize the delivery system. Health agency organization has become focused on regionalization as a method of delivering more effective services. Cooperation between agencies in specific program areas is becoming more often the norm than the exception and hopefully will lead to greater integration of services at all levels. Pilot projects involving other sectors have been undertaken by the health agencies and have met with moderate success.

To achieve an even greater degree of coordination between agencies, the integration of services of the Social Security Institute and the National Board of Assistance and Social Welfare has been discussed by the Government. The merger would eliminate administrative duplication and the facilities under the Social Security Institute would benefit from the widely respected administrative abilities of Mrs. Samoza. In addition, it might be possible for the Social Security insurance plan to be offered to a wider segment of the population since a greater number of hospital facilities would be available to provide care.

However, such a solution needs to be approached with caution. If often happens that when curative services are combined with preventive services the latter receive even less resources than previously. Prevention priorities are preempted by demands for treatment, and funds are allocated on this basis. Should integration occur, in order to prevent a flow of resources away from public health programs, it will be necessary to reserve sufficient time and money to carry out preventive and promotive measures.

In lieu of consolidation, some attempts have been made at cooperation between agencies in planning and policy making. With the help of PAHO, UNICEF and AID, a National Health Planning Committee was established to coordinate the efforts of the Ministry of Public Health with those of other health agencies and to develop an integrated national health plan. The committee is chaired by the Minister of Public Health and has representatives from the National Board of Social Welfare, the Social Security Institute, the University of Nicaragua Medical School and other health agencies.

Because of agency differences, this committee has mainly reflected the goals and program priorities of the Ministry, but recently greater efforts have been made to consider the needs of other agencies and to incorporate them in the planning process. How successful this attempt at cooperation can be, outside of complete integration, will be seen over the next several years.

Intersectoral cooperation has been equally difficult. Although the situation is beginning to improve, health has not been recognized as an important factor in economic development, making

needed cooperation with other sectors difficult. In the past, the Minister of Public Health was not a member of the National Planning Commission for Socio-Economic Development. Recently, he was given representation on the Commission, but he still lacks decision-making impact. Consequently, health considerations in agricultural, industrial and commercial development programs have been minimal.

One example will suffice to illustrate this point. In 1965, as part of the National Socio-Economic Plan, the Commission recommended the extensive development of an irrigation network for the agricultural sector. At the same time, the Malaria Eradication Program was running into financial difficulties, and more intensive activities were required to maintain an adequate level of vector control. Through efforts in previous years, the program had been able to reduce malaria incidence considerably. However, with the implementation of the program to develop irrigation systems coupled with the financial problems of SNEM, malaria incidence rose dramatically. Had economic planners been aware of the relationship between irrigation waters and malaria vectors, exacerbation of the malaria problem would have been avoided. The costs of this oversight are tremendous. Not only must the government allocate a great deal more revenue for the eradication of the disease, but also the agricultural enterprises in these areas suffer from the high rate of resulting absenteeism. This in turn has lowered productivity of the farm, a decrease which the government must eventually make up through importation.

Pilot Projects

Some innovative attempts at inter-agency and inter-sectoral cooperation have been made through selected pilot projects. Although the success of these projects is often dependent on the extent of international involvement, Nicaraguan governmental agencies have generally been enthusiastic about continuing those that prove effective. The rural mobile health unit program is a good example. Initiated under the auspices and financial support of USAID, the program has been expanded throughout the country and is currently financed by government funds.

Among the current projects underway in various geographic areas are the following:

1. On the Atlantic Coast, near Puerto Cabenzas, an attempt is being made to coordinate the activities of the rural mobile units and the Moravian Hospital through a University of Wisconsin project. By sharing personnel vehicles, equipment, and supplies, it has been possible to distribute the limited resources more effectively and efficiently. In addition, efforts have been made to recruit community leaders to serve as health contacts in their localities. These leaders are given training in preliminary diagnostic screening and referral to appropriate health facilities. This will further expand the limited professional resource capacity which by itself cannot possibly cover all communities. Thus far, there are 13 communities served in the geographic area invovled.

2. In the Central region of the country, east of Lake Nicaragua, the rural mobile health units have also undertaken a training program for village leaders. The unit operates along the road between Rama and Juigalpa, but it hopes to extend its coverage to the less accessible surrounding areas. Currently, some of the members of the mobile unit team are receiving instruction in Israel to prepare them for training the village leaders.

3. PRODUSAR has been in operation since 1971 and involves the Ministries of Health, Education and Agriculture. An executive committee oversees the project and consists of persons representing education, nutrition, sanitation, agriculture, home economics and health. The purpose of the project is to develop better health through education. The training program for men in the community concentrates on ways to raise higher quantities and qualities of nutritive crops. For women, the emphasis is on the selection and preparation of more nutritious foods for the family, with particular attention to the nutritional needs of pregnant and lactating women and of infants. The program also encourages the villagers to install latrines and potable water systems and to promote immunizations. Twice each month the community holds a "Health Day." At this time food is distributed to residents and weight-for-age charts for the younger community members are updated. A physician also visits the community on this day to delivery primary care health services. His services are free, but 35 cents is charged for medicine. It is not clear what limitations, if any, this places on those needing care.

The program is now operating in 24 communities located in three departments. Each department has a staff consisting of a physician, nurse, and agronomist. One nutrition expert circulates among all three. In addition, there are four field teams actually working, consisting of a health educator, auxiliary nurse, nutrition educator and sanitary inspector. The program has been most effective in areas where Peace Corps volunteers are active, primarily because they provide continuity for the implementation of the substance of the program.

4. In cooperation with PAHO, a project to develop coordination between the health centers of the Ministry of Public Health and the hospitals operated by the National Board of Social Welfare was initiated. On a trial basis, the health institutions of the city of Somoto and the mining area in Zelaya Department were integrated. In Chinandega and Leon Departments, the medical care services of the National Board facilities were integrated with those of the Ministry for a new comprehensive program in tuberculosis control.

5. An Inter-Ministerial Commission on Health, Agriculture and Labor was established to draw up a program of surveillance in connection with the use of insecticides. This program has important implications for those agricultural areas of the Pacific Coast with high malaria incidence.

V. HEALTH RESOURCES

MANPOWER

Adequate assessment of health manpower capability is limited by the lack of precise information on personnel numbers, distribution, production, and productivity. Different methods of counting specific categories of personnel and of assignment of personnel to those categories lead to considerable variation in personnel estimates from source to source. For example, information obtained by the Pan American Health Organization shows 840 physicians practicing in Nicaragua in 1971 while a Government document reports 1,160 physicians in the country.

Any significant projection of future manpower needs is predicated on reliable knowledge of currently available manpower. Particularly in view of extended training period required for physicians (eight years after high school) and nurses (three years after high school), long-term planning to meet manpower requirements is essential. Students entering premed training programs now will not be able to contribute to the physician manpower pool until 1980. The questionable reliability of available information in Nicaragua must therefore have serious repercussions on the quality of health sector planning.

The following table shows the most recent data available on numbers of physicians, nurses, and auxiliaries and the consequent production requirements necessary to meet the 1980 goals set forth in the Ten-Year Health Plan for the Americas. Both the rates and production requirements are calculated on a 1971 base year population of two million inhabitants and an annual growth rate of 2.9 percent. No claims are made for the accuracy of personnel figures.

TABLE 12

	1980 GOAL*	1970 Regional Average*	1973 Numbers of Personnel	1973 Rate*	Yearly Production Requirement
Physicians	8.0	7.0	1,358	6.41	103
Nurses	4.5	2.3	485	2.28	98
Nurse Auxiliaries	14.5	8.8	1,595	7.52	310

*Rates are per 10,000 population.

Appearances to the contrary, these annual production figures are actually quite demanding when set against the current low level of health personnel production. Over the past several years it has been the policy of the National University Medical School to limit enrollment because of financial constraints. In 1969 the yearly production needed to achieve the 1980 goals. While the numbers of graduates of foreign medical schools who return to practice in Nicaragua has grown, they have still not reached sufficient numbers to counterbalance a general decline in the rate of production of physicians.

Production figures on nurses and nursing auxiliaries are not readily available, but indications are that their production is also declining. Enrollments in the three year Ministry of Public Health nursing program totaled only 102 in 1967. This low enrollment coupled with a high dropout rate during the first and second years means that nurse production could not be more than thirty per year. Although no precise figures are available for the other schools, report indicate that they are also experiencing reduced enrollments.

Aside from the educational requirements which preclude many people from entering the field, the primary reason for the low number of nurses is related to their publicly defined position within the health professions. Roles are defined by physicians who ostensibly expect little more from nurses than housekeeping or janitorial services. Any activity related to medical care is assumed to fall exclusively within the sphere of physician responsibility. In actual fact, nurses do carry out a large number of tasks that require a great deal of medical responsibility. The difficulty is that the publicly defined role discourages young people interested in responsible and interesting positions from entering the field. The lack of proper status and low salaries of nurses serve to reinforce this notion of the nurse as a non-professional.

Problems of lack of status and low salaries also contribute to a steady, albeit less severe, decline in the rate of production of nurse auxiliaries. However, this decline is even more significant than the decline in physician or nurse production because of the dramatic impact it will have on the availability of health services to rural populations. Lower level auxiliary personnel often provide the only access to health care for rural populations. Given the steady rise in population and the growing demand for health services, any decline in production of this type of personnel will effect an even greater decrease in the availability of health care.

While production figures are scarce and often inaccurate, data on the retirement or emmigration of health personnel is non-existant. It is known, for example, that some number of physicians enter the political field after only a few years of practice, so that the actual number of physicians practicing medicine may be considerably lower than would be indicated by the available information. Again, in order to make accurate predictions about future manpower needs, some assessment of the trends in the numbers of health personnel leaving practice is important.

The difficulties in achieving a more desireable manpower supply, however, must not overshadow the problem of uneven personnel distribution. Production of more personnel to improve per population ratios may in fact produce an unwanted surplus of personnel in urban areas while rural areas still remain underserved. According to a report on the health sector after the earthquake, 50 percent of all physicians, 70 percent of all nurses and 65 percent of all nurse auxiliaries in the country are located in the Department of Managua. Yet this department contains only about 25 percent of the total population.

Similarly, more than half of all physicians are in general practice, but only 30 percent practice in the less populated areas where their services are needed most. Efforts to increase the number of physicians practicing in rural areas have been made through an obligatory service requirement prior to certification. Recently this requirement was extended from six months to one year in hopes that this extended experience will encourage

more doctors to remain in rural areas. During 1973, 50 medical school graduates participated in the program, 30 from the National University of Nicaragua and 20 who had returned from schools outside the country.

The tendency of health professionals to concentrate in urban areas will not be easy to reverse. The salaries are generally higher, job opportunities greater, and living conditions more acceptable than those found in rural areas. To compound the problem, the Ministry of Public Health offers only limited travel money and per diem, effectively discouraging professionals in urban areas from visiting rural communities. The result is little or no supervision of personnel located in the field, particularly in the remote areas of the country where personnel with less training carry the major burden of health care delivery.

Next to supply and distribution, the problems of appropriate manpower utilization deserve attention. The poor utilization of already existing manpower, particularly at the higher salary levels, results in unnecessary and unaffordable waste of precious health resources. The incredibly poor ratio of nurses to physicians is a case in point. The fact that there are almost three doctors for every nurse in Nicaragua means that in the facilities where these two groups practice, primarily the hospital, the physician is most likely performing tasks which could be more efficiently performed by a trained nurse. Particularly in view of the higher costs associated with training and employing physicians, cost-effective considerations dictate that as many duties as possible be delegated to lower level personnel in order to keep overall program costs to a minimum.

A related utilization problem arises because of the severe shortage of personnel at the intermediate administrative and management levels. This lack of intermediate level personnel has inhibited the effective operation of direct service programs. Lacking a strong administrative network, appropriate back-up support to outlying health units and accountability to the central office is impossible to achieve. As a result, the amount of administrative and logistical support a health program receives is likely to be inversely proportional to its distance from the capital city. The issue which must be addressed in relation to this problem is whether the clinically oriented health personnel should also be expected to handle the administrative and management problems, in which case training programs would have to be revised, or whether these problems would be handled by a separate classification of personnel trained exclusively in administration and management.

TRAINING

The medical school, founded in 1812, is part of the National University of Nicaragua. The main campus is in Leon, although students spend part of their program at various training hospitals throughout the country. The program requires eight years of course work beyond secondary school, plus the obligatory service requirement.

In previous years, the curriculum has been oriented toward traditional medical practice, with very little attention given to the major public health problems facing Nicaragua. Recently, a new dean was appointed to the school in order to develop a new focus for the curriculum. The major innovation will be a shift from a department orientation in teaching to an orientation of health problem solving. For example, the problem of malnutrition will be discussed by a group of teachers in various specialties, in an effort to integrate the physiological and biochemical aspects of the problem with the behavioral and cultural aspects. Students will be expected to conduct field research to supplement their understanding of the problem. It is hoped that these experiences will produce physicians much more conscious of their role in community medicine than has been the case in the past.

Graduate nurse training is offered through the National School of Nursing of the Ministry of Public Health and several missionary hospitals. The Ministry program operates out of Managua, and requires three years of course work after secondary school before conferring the title of Graduate Nurse. Missionary hospital programs are located in Managua, Bilwascarma, and La Trinidad. These programs also require three years of study, but the quality of education is not uniform. As a result, the academic caliber of these institutions tends to be low, and the quality of graduates uneven.

Among physicians and nurses, training in public health has been minimal. In 1967 there were only 14 physicians and 10 nurses who had received any specific public health training. Attempts to correct this deficiency are being made by both the Ministry of Public Health and the National University Medical School. Newly included in the graduate nursing program is a 26-week course in public health, and the changed focus in the Medical School will encourage a more sophisticated public health approach to problems.

Auxiliary nursing training is given through the National School of Nursing which requires nine months of study after the eighth grade. Course material is prepared by the Ministry of Public Health, but the actual teaching is carried out in local hospitals. Additional auxiliary training is offered through the National School for Professional and Auxiliary Public Health Personnel. This institution was established in 1966 to conduct brief training and refresher courses for a variety of auxiliary workers.

In addition to auxiliary nurses, sanitary inspectors have been trained through this program. Currently, there are 191 sanitary inspectors in Nicaragua, most of whom are graduates of this school. Originally the course required 18 months of study, but because of the need for these workers, it was reduced to one year including six months of field training. Unfortunately, in recent years training funds have been insufficient to offer the full course, and the program has been reduced to a six week refresher course.

The lack of certain types of personnel stems from the past unavailability of training programs. For example, there has been no course offered toward the degree of sanitary engineer. Efforts have been made by the Ministry to rectify this situation by developing a program of short courses, in conjunction with the School of Physical and Mathematical Sciences of the National University, but at the present time there is no degree program. Likewise, no program exists for training in nutrition. The twelve graduate level nutritionists working in the country have been trained at the University in Guatemala. Since the health problems dealt with by these personnel are severe in Nicaragua, measures must be developed to increase their numbers. Although it might be economically inappropriate to develop full scale training programs in these areas, a program of scholarships or fellowships to other universities throughout Latin America would be a feasible alternative.

Over the next several years if the present trends in manpower development continue, the capacity of health resources will be strained beyond its limits. At the annual population growth rate of 3 percent per year, the present rates of production of personnel cannot meet the requirements. Greater efforts must be made to increase the numbers of both professional and auxiliary personnel, not only to keep pace with population increases, but also to reach additional population groups currently without care.

The pressing need for a program of manpower development has been recognized as the major priority in a Pan American Health Organization special report on the health situation following the earthquake. The major recommendation made in this report was that the National University Hospital and the National Health Center (both proposed for construction in Managua) combine to form a National Institute of Health Sciences. This Institute would be directed toward raising the level of medical care presently given and training of personnel dedicated to the solution of complex health problems. Specifically the Institute would provide the following services:

1. a specialized referral center for problems requiring highly specialized hospital or ambulatory care for patients throughout the country

2. a learning center for post graduate training and applied research
3. a health information center
4. a highly sophisticated central laboratory
5. a center for training in the medical specialties, nurses and other types of personnel

The total cost of developing this Institute would be between 8 and 11 million dollars, the great portion of funds coming from PAHO adn WHO. In order to develop this center as soon as possible, the report recommends that a national commission be established to oversee the development of program design and construction.

Given the planned construction of a National University Hospital and a National Health Center, the proposal to merge these two institutions into a National Institute for Health Sciences will be a positive step. The major benefit to be derived from such a merger will be that the Institute will serve as a vehicle for an integrated approach to health care training and research. The curative aspects of health care will be emphasized in the Hospital setting while the preventive and community aspects of health care will be taught through the National Health Center.

The major problem with the proposal revolves around whether the level of sophistication of training and research at the Institute will be commensurate with the level of sophistication needed to deal with health problems in Nicaragua. If the Institute sets desired training outcomes at a level higher than is necessary for the care of the major Nicaraguan health problems, this Institute may serve to draw professionals even further away from community based medicine than presently exists. Nicaragua already faces serious distribution problems as a result of highly sophisticated and well educated personnel and cannot afford to have these problems exacerbated.

MEDICAL CARE FACILITIES

Although the shortage of manpower is perhaps the major constraint to adequate health care facilities is a second indicator of low levels of care. In spite of increased attempts to provide services, medical care coverage of the general population continues to be inadequate. From a review of the preceeding chapters it can be noted that 70 percent of the population consists of females of childbearing age and children under 15 years, the two groups which make the heaviest demands on the health care system. Yet, less than 50 percent of children under one year are seen in health centers; less than 17 percent of preschoolers are seen; less than 50 percent of children under five are vaccinated against infectious diseases; and less than 15 percent of expectant mothers get any kind of prenatal care. Additional national estimates state that close to 50 percent of the population have never seen a physician.

Just looking at mortality data alone, one can estimate that since the CELADE survey shows almost double the official mortality rate, one-half of the population receives no care at the time of death. Also, since the number of medically certified deaths represent only 48 percent of all recorded deaths, it is likely that 52 percent of these deaths, if attended at all, were attended by auxiliary health personnel. This means that only one-quarter of all those dying received professional medical care at the time of death.

The problem of poor medical care coverage, however, appears to be related more to socio-cultural factors than to lack of availability of facilities. Before the earthquake there were 56 hospitals in Nicaragua containing a total of 4,938 beds. The bed per population ratio at that time was 2.4 per thousand population, more than double the WHO minimum standard. The following table shows the breakdown of hospitals and hospital beds by sponsoring agency.

Table 13

Institution	Number of Hospitals, 1972	Number of Beds, 1972
National Board of Social Welfare	23	3,809
Social Security Institute	5	509
National Guard Hospital	1	145
Private Sector	27	475
TOTAL	56	4,938

Most of these hospitals tend to be concentrated in the department capitals, with 16 in Managua and 20 in the larger cities. Since concentrated populations are necessary to support hospital facilities, the concentration of hospitals in urban areas is not surprising. Only five hospitals are located in areas of less than 2,000 inhabitants, and these contain an average of no more than 10 beds each. Almost 45 percent of all hospitals beds are located in Managua. The disaster in December 1972 resulted in the destruction of four major hospitals in Managua with the consequent loss of 1,350 hospital beds. This represented the destruction of more than half of all hospital beds in the capital city.

Alternatively, primary care in the more rural areas of the country is given through the 119 health centers and 13 mobile units of the PUMAR program. Of these health centers, 35 are located in communities of less than 2,000 inhabitants. The mobile units operate out of health centers in an effort to reach the more remote areas of the country. They are staffed by a health team which originally consisted of a physician, nurse and sanitarian. Recently, sanitarians have been dropped from the units because of the shortage of this type of personnel. The teams commute by truck carrying supplies and equipment to various surrounding communities and deliver primary care out of a local facility. A nominal fee is charged, which in turn is placed in a community fund to be used from some type of health activity.

Given the need to achieve continued high utilization of health facilities in order to justify their expense, the concentration of health facilities in larger population areas is not unreasonable. Moreover, while these facilities are concentrated in urban areas, most of the rural population lives within a reasonable distance from some type of medical care facility. In spite of this, most of the population remain untouched by the medical care system.

The problem, then, revolves around accessibility and acceptability. In the more urbanized areas of the pacific coast and the departmental capitals, access to medical care services is much easier than in the remote rural areas of the country. Lack of roads or other means of transportation prohibits a large segment of the population from reaching services. Financial constraints also create problems since travel to a health center often means losing part of a day's work. In addition, lack of sophistication of the population in rural areas inhibits the acceptance of modern medical technology. The traditional "curandero" is considered to be more trustworthy than many of the professional health workers. Besides knowing the families they treat, they are familiar with the cultural lore regarding the origin of many diseases.

Within the medical care network itself, however, differences in facility utilization can be directly related to sponsoring agencies. Using statistics on out-patient visits and hospital occupancy rates as indicators of utilization patterns, the beneficiaries of the Social Security Institute are receiving the most comprehensive care. In 1970, the Social Security Institute covered less than eight percent of the population, while the Ministry of Public Health and the National Board of Social Welfare were responsible for

covering more than 90 percent of the population. Yet, the Social Security Institute reported in absolute numbers twice as many out-patient consultations with a physician than either of the other two groups.

Similarly, hospital occupancy rates are generally better, range of services broader, and the number of discharges per bed higher in Social Security Hospitals than in other hospitals. While the average length of stay in short-term hospitals is about 7.8 days in both the National Board hospitals and those of the Social Security Institute, the occupancy rate ranges from 69 percent in the former to 94 percent in the later. Average occupancy rates are particularly low for the small National Board Hospitals where 40 percent occupancy rates are common. Although no figures exist for the hospitals of the private sector, it can be assumed that these are probably small hospitals (475 beds in 27 hospitals) and therefore have low occupancy rates as well.

Part of the explanation for these differences in coverage lies in the nature of the Social Security programs. First, because the cost of most services is covered by insurance, beneficiaries have more incentive to use the services than those who must pay the full amount for care. Second, the population served by the Social Security program, the industrial labor force, tends to be more sophisticated and therefore more apt to accept and utilize modern medical technology. Finally, the Social Security Institute has been able to attract a higher caliber personnel because of better salaries and working conditions. Of the total number of physicians in the country, 263 or almost 20 percent work part or full time for the Institute. Because of this relatively high number of personnel, the number of consultations per physician hour is only 3.9 as compared to an average of six in the National Board hospitals and Ministry of Public Health clinics.

Beyond information on utilization rates, there is virtually no information on the quality of care received in these facilities. Reportedly the quality of medical school graduates from the National University of Nicaragua is below the average produced in Central America as a whole, but it is not known on what basis this assessment was made. Some element of peer review quality control is ostensibly provided by the various medical societies in the country. However, view of personnel shortages, particularly in hospitals outside larger cities, very little overt quality control measures exist. Many hospitals and health centers are staffed by only a small number of physicians and the enforcement of strict quality standards would be likely to reduce their effective numbers further. Moreover, the weak position of these societies in relation to the National Board of Social Welfare and other Government agencies makes actual quality control by these organizations nonexistant.

Hospital facilities themselves are inadequate, which in turn has an impact on the quality of care. Most of the hospitals are general hospitals offering medical, surgical, and pharmacy services. Only a few hospitals offer a broad range of services, but these are situated only in Managua, the capital, and Leon, the site of the medical school. Except for these comprehensive facilities, most hospitals are in fair to unsatisfactory condition. Only four hospitals have auxiliary or emergency generators, and only about one-thrid have their own water supply. Sewage disposal is universally inadequate.

In short, though a small portion of the population receives adequate coverage and care, the great majority of people either have no access to care or are not assured of receiving high quality care. While health care facilities need improvement and could be more equitably distributed, the greatest need is for more effective means of reaching isolated population.

HEALTH BUDGET

The percentage of the national budget allocated to health has steadily increased over the past decade. In 1965, health and social assistance expenditures represented only 5 percent of the Government budget, but by 1972, allocations for this sector rose to 13 percent

Table 14

MINISTRY OF HEALTH BUDGET - 1972

CENTRAL ADMINISTRATION	2.064.000.		2.064.000.	4.6%
Superior Direction	464.000.		464.000.	1.0%
General Administration	1.600.000.		1.600.000.	3.6%
HEALTH PROMOTION	1.080.000.		1.080.000.	2.4%
Maternal & Child Health	770.000.		770.000.	1.7%
Applied Nutrition	310.000.		310.000.	0.7%
HEALTH PROTECTION	12.535.000.		12.535.000.	28.4%
Prevention & Treatment of Communicable Diseases	652.000.		652.000.	1.4%
Prevention of Tuberculosis	1.921.000.		1.921.000.	4.3%
Environmental Sanitation	962.000.		962.000.	2.1%
Malaria Erradication				
SPECIAL HEALTH SERVICES	450.000.		450.000.	1.0%
Dental Health	247.000.		247.000.	0.5%
Control of Drugs & Food	203.000.		203.000.	0.5%
GENERAL TECHNICAL HEALTH SERVICES	1.649.000.		1.649.000.	3.7%
Direction & Biostatistics	183.000.		183.000.	0.4%
Laboratory Services	550.000.		550.000.	1.2%
Public Health Education	226.000.		226.000.	0.5%
Planning & Supervision of Nursing	85.000.		85.000.	0.1%
Academic Formation of Nursing	446.000.		446.000.	1.0%
Formation & Training of Paramedical	159.000.		159.000.	0.3%
BASIC HEALTH SERVICES	9.481.500.	250.500.	9.732.000.	22.0%
CONSTRUCTION OF HEALTH CENTERS		1.470.000.	1.470.000.	3.3%
ADMINISTRATION & CONSTRUCTION OF WATER & SEWERAGE		15.146.000.	15.146.000.	34.3%

Source: Presupuesto General de Ingresos y Egresos de la Republic, 1972

of all expenditures. Likewise, while the percentage of national disbursements for health more than doubled, the amount of funds actually allocated increased 50 percent. Government money spent on health and social assistance over this seven year period rose from $3,000,000* to $15,000,000.

The reasons for this dramatic rise are not difficult to ascertian. Part of the explanation can be attributed to a shift in government policy toward a larger investment in the welfare of human resources. (See National Socio-Economic Plan.) The construction of hospitals, health centers, and water supply and sewerage disposal systems has been a major focus for investment, revealing the national committment to improve health care. Similiary, there has been a rise in international contributions. Over the last ten years, grants and loans from international organizations have been made for a variety of health projects. Although it is difficult to determine the exact amount of the budget contributed from abroad, the large number of capital projects undertaken implies that it is substantial.

However, the National budget alone does not give a total picture of the amount of money spent on health care. Along with Government allocations of $6,300,000 to the Ministry of Public Health and $8,400,000 to the National Board of Social Welfare, additional funds were allocated by various autonomous organizations. In 1972, $9,000,000 or approximately one half of the Social Security Institute total income was allocated for medical care facilities and services. Because the income from this agency is derived from premium payments, these funds are not included as part of the national budget. Likewise, the Empressa Aguadora de Managua, the capital's water supply agency, obtains most of its revenue from utility charges. This money is also not included as part of Government health expenditures although of its $2,808,000 budget, $1,663,000 was spent on operation and expansion of the water supply system. Finally, military expenditures on health care are included within the defense budget. In 1972, this expenditure was allocated at $561,000.

Because of the varity of funding sources and the lack of adequate budget breakdown for the autonomous agencies, it is difficult to obtain an accurate figure for per-capita expenditures on health. Total Government expenditures, including funds allocated to the Ministry of Public Health, the National Board of Social Welfare, and the Military, amount to $7.63 per capita. Adding to this the $4.50 per capita spent by Social Security and the $0.83 per capita by the Empressa, total health related allocations amount ot $12.96 per capita. This figure is a maximum figure, however, including administrative costs, investments, and capital expenditures. When private expenditures for professional services and medicines are added, this sum could easily double. This represents a relatively high expenditure for health services and one which probably leaves very little room for futher expansion. The realization of expanded health sector goals in any program area can probably only be realized by increasing efficiency of operation or cutting back in some other program areas.

Within the budget of the Ministry of Public Health, emphasis is on providing basic preventive services. The five major areas of budget allocation proposed for 1972 were:

1.	Administration and construction of water and sewerage facilities	34.0%
2.	Basic Health Services (salaries of health center employees)	22.0%
3.	Malaria Eradication	20.3%
4.	Prevention of Tuberculosis	4.3%
5.	General Administration	3.6%

*All figures in this section are given in U.S. dollars. Converson factor is 7 cordobas = $1.00 U.S.

However, operational allocations for program areas other than malaria eradication and tuberculosis control were minimal. The major problem areas of maternal and child health, prevention of communicable diseases (other than tuberculosis), and applied nutrition received 1.7 percent, 1.4 percent, and 0.7 percent of the public health budget respectively. Moreover, in spite of the shortage of nurses and applied health personnel, the Ministry allocated only 1.4 percent of its budget for training and supervision of these groups.

The dollar amount programmed for preventive services of the Ministry of Public Health, amounted to $3.15 per capita. However, excluding the capital expenditures for sanitation services and health center construction, general administrative costs, and funds allocated to malaria eradication, the amount spent on actual program operations was only $1.15 per capita.

VI. NATIONAL PLANNING

CONCEPTUAL APPROACH

The aftermath of the 1972 earthquake brought with it an acute realization of the need for better health planning and the more efficient utilization of available health resources. As indicated throughout this document, the disaster did not appreciably change the already existing health problems of the population but rather served to bring them into sharper focus. While efforts were being made to meet the immediate needs of food, shelter and medical care for the many refugees, planners were considering ways to improve the continued operation of the health system as a whole.

On the national level, the major focus of attention was placed on the question of health services integration. One alternative proposed was the establishment of a National Health Service, responsible for all aspects of health care. Efforts would be made not only to consolidate the two agencies responsible for hospital services, the National Board and the Social Security Institute, but also to integrate the curative hospital services with the preventive services of the Ministry of Public Health.

A second alternative outlined would maintain the separation between basic preventive services as administered by the Ministry and curative hospital services, including Social Security hospital services, which would be managed by the National Board of Assistance and Social Welfare. Rather than integration, which might jeopardize the importance of preventive services, emphasis would be on developing mechanisms for close coordination between the two systems. Efforts are currently underway to develop this type of system in the city of Managua in order to assess its potential for improving health delivery system effectiveness.

In a broader context, however, planners in Nicaragua are beginning to concentrate on the need to redirect the entire health care system. Verbally at least, there is a growing awareness of the need to shift emphasis away from hospital care toward primary care, with the community as the central focus of the delivery system. Hospital services would be community based, and though offering a complete range of services, must be geared to the requirements of the individual communities in which they operate. The health center would replace the hospital as the major focus of health care activity. Using these health centers as a base, a network of primary care personnel would extend into the community to provide basic health services and followup.

While the emphasis in the future will be on the development of this type of community based network, additional attention will be given to the development of sufficient manpower capable of working within this network. If the focus of the health care system is to be on primary care in the community, then training of personnel must be geared to this level. Moreover, adequate administrative and managerial capabilities must be developed to insure operational efficiency and effectiveness. Finally, in order to plan for future health sector needs, adequate systems of data collection must be developed which will reflect the changes in health status and health resources which must be addressed.

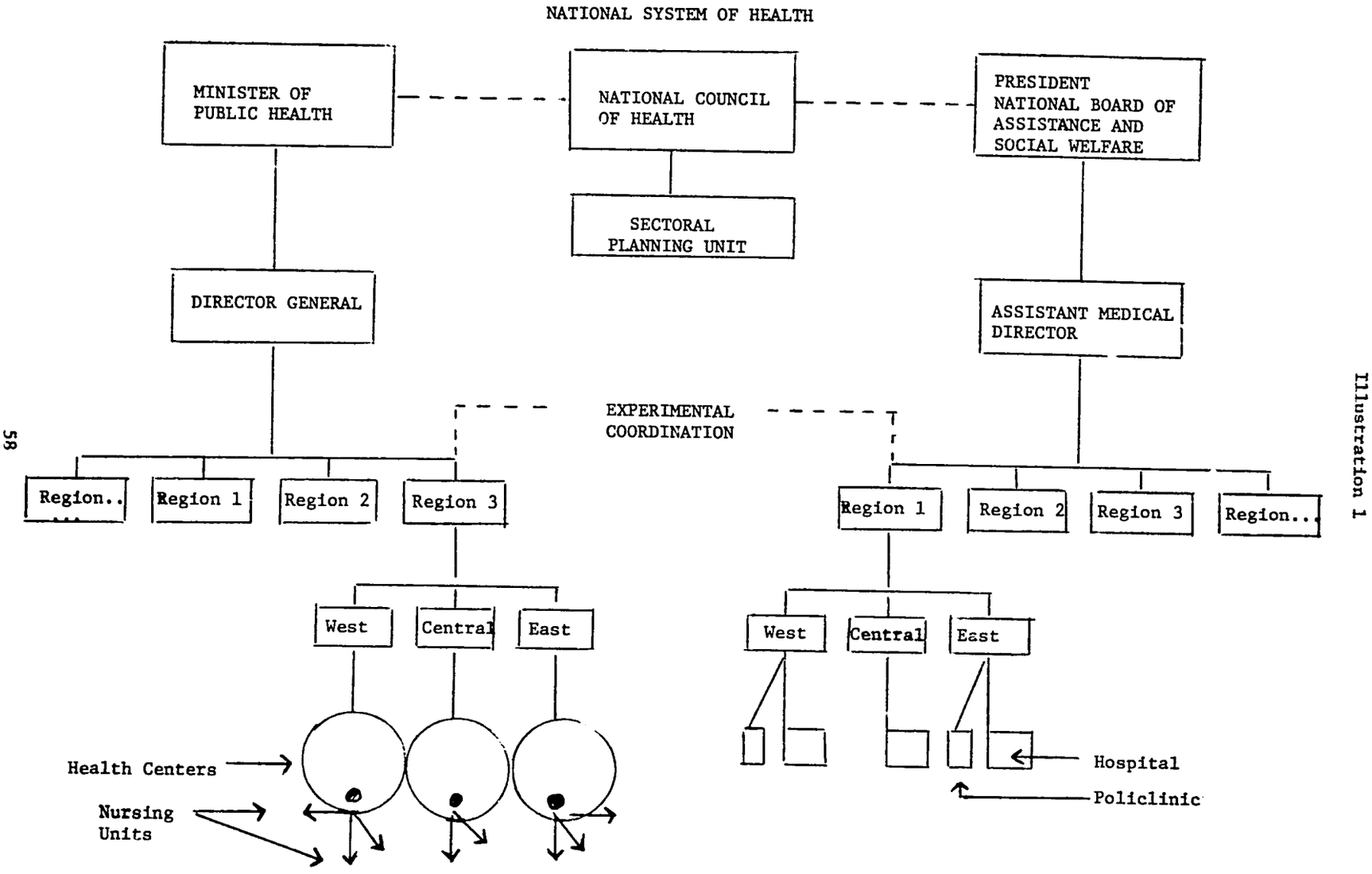

Illustration 1

LEVELS OF ASSISTANCE

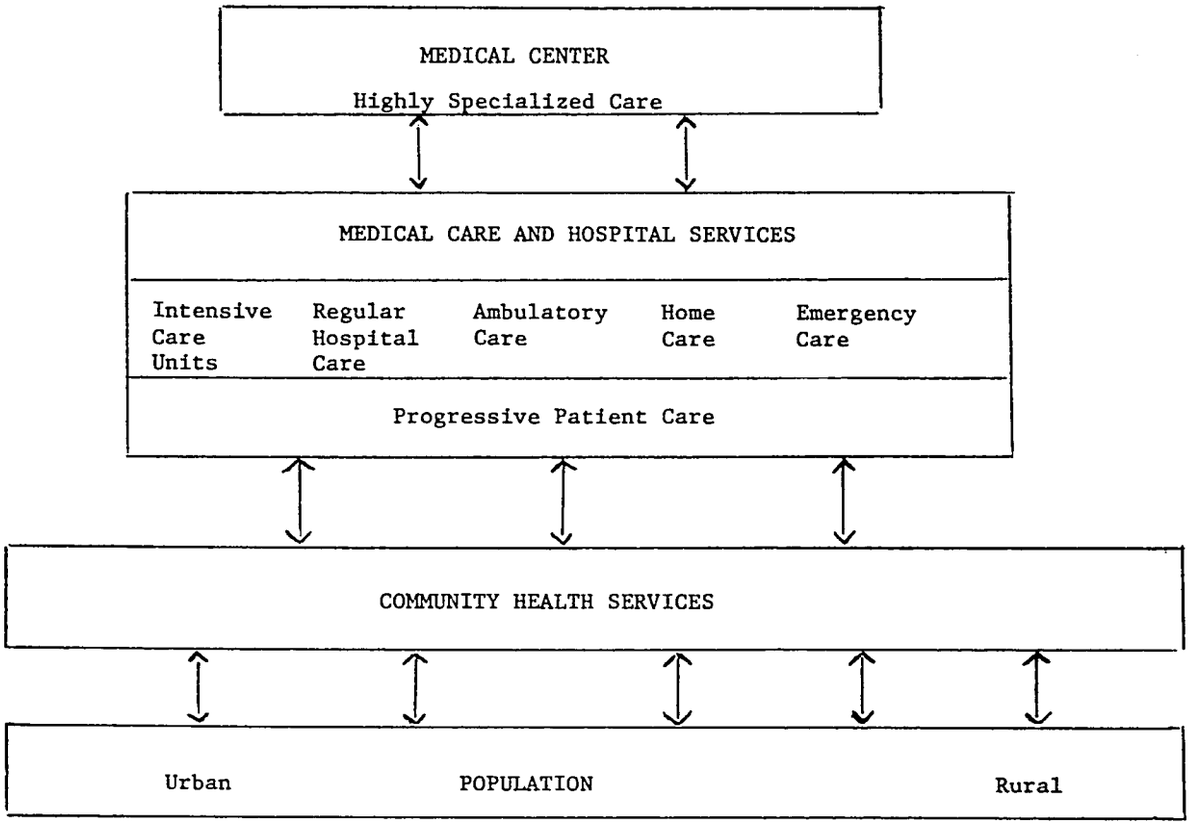

Illustration 2

RECOMMENDATIONS OF THE WHO/PAHO SPECIAL MISSION TO NICARAGUA, APRIL 1973

I. General Recommendations

1. The Mission approves of the steps taken by the national government in its efforts to avoid epidemics and provide health services to the population of Managua.

2. The Mission believes that the program of construction already underway and scheduled for completion by July 1, 1974 is satisfactory and will allow the reestablishment of hospital services to the level which existed before the earthquake. The program, with assistance from AID, consists of the construction of two general hospitals and the transformation of Valez Paiz hospital into a children's hospital. The Mission considers that with these steps, the emergency phase of the program of reconstruction and rehabilitation will be satisfactorily conlcuded. From now on the country must prepare itself to maintain the latest medical and social standards and to organize a modern system of health services.

3. The Mission supports completely the six points of the "Basic Doctrines for Medical Assistance in Nicaragua" which are found in the plan approved by the Planning Commission created in February, 1973.

4. The Mission considers that the new organizational structure approved in principal for the health sector appears to be a sound point of departure for the process of coordination between the Ministry of Health and the National Board of Assistance and Social Welfare. Furthermore, the Mission understands that the Armed Forces already give large amounts of health care to their personnel and their families.

II. Conceptual Recommendatonns

1. It is recommended that the basic level of health delivery be the health center where the health team offers to the community preventive and curative services simultaneously on an ambulatory basis; that as many sub-centers of health in the communities of suburban and rural areas be established as are needed;

2. That the general hospital for the community support the health activities of the centers and sub-centers, and that wherever there are hospital beds, ambulatory treatments should be offered, in the same building if possible;

3. That specialized hospitals, because of their high cost and high consumption of resources be reserved exclusively for the zones of dense populations at the national and state level and that they dedicate themselves to training and research;

4. That whenever the conditions of the household allow, home care services be established;

5. That on the job training and development of personnel be ongoing at all levels of service.

III. Specific Recommendations

1. The Mission considers that the National University Hospital and National Health Center, which construction is recommended by the WHO Executive Board, offer an exceptional opportunity and could serve many purposes if they were fused into one functional unit to constitute a National Institute of Health Sciences.

2. This Institute would be an organization which would generate innovative and creative ideas resulting in a rennovation of the structure of the existing health services and would be oriented toward raising the level of medical care and developing new methods of delivery of medical care.

3. It is planned that the Institute would carry out the following functions:

   a. a specialized referral center for problems requiring highly specialized hospital or ambulatory care for patients throughout the country;
   b. a learning center for post graduate training and applied research;
   c. a health information center;
   d. a highly sophisticated central laboratory;
   e. a center for training in the medical specialties, in nursing and in other health professions.

4. The Mission recommends that a National Commission be established whose primary function would be to develop a program for the establishment of this Institute.

5. For the rapid execution of this task, the Commission should have the authority to supervise the programming activities of design and construction.

6. In compliance with its mandate, the Commission could count on the assistance of WHO and PAHO.

7. If the Commission starts its work no later than July 1, 1973, it is hoped that the Institute could be inaugurated within the next four years.

8. According to the program which could finally be approved, the cost of construction could vary between eight and eleven million dollars.

9. The Mission recommends that land around hospitals which are presently planned for construction be bought in case of future expansion.

10. The Mission recommends that from the very beginning, great attention be given to preparation of personnel for the administrative services, teaching, and direct medical care services to the patients.

NATIONAL HEALTH PLAN 1972

The following information has been excerpted from the Ten Year Plan for Nicaragua as it was presented at the Third Special Reunion of the Ministers of Health of the Americas, Santiago, Chile, October, 1972. The general description of the health problems of Nicaragua presented in the plan is similar to the analysis presented in the preceeding chapters. The recommendations are as follows:

General Recommendations

1. To formulate a policy for the health sector.
2. To formulate a strategy for the health sector.
3. To create a national health service.
4. To promote and stimulate the planning process.
5. To formulate plans for health over the short and long term.
6. To promote the formulation of human resources.
7. To improve the system of statistical information.
8. To improve administrative methods.
9. To promote research.
10. To improve budgeting and financing systems.

National Policy of Health

1. To improve the actual health status of the population.
2. To increase coverage of health services to reach 100% of the urban and rural population.
3. To prevent those diseases which result in high mortality.
4. To improve medical care through medical consultations, the provision of medicines, and hospitalizations.
5. To improve the state of nutrition of the population, especially of mothers and children.
6. To improve the general conditions of environmental contamination.
7. To prevent infectious diseases through an intensive program of vaccination against polio, diptheria, whooping cough, tetanus, tuberculosis, etc.
8. To prevent those infectious diseases derived from water, food or soil through environmental sanitation.
9. To develop programs of control against malaria, tuberculosis and venereal diseases.
10. To develop nutrition education in inter-sectoral programs and coordination with other health sector institutions.
11. To equip 16 new health centers proposed in the 1972 budget with human and material resources.
12. To put the health center west of Managua into operation and to coordinate its activities with the National Board of Social Welfare.
13. To develop a program of family welfare.
14. To develop a program of training of personnel to increase the technical resources necessary to carry out the programs of the new health centers.
15. To provide the rural population with the basic services of health education, prevention, and rehabilitation by providing water supply and sewerage systems, wells, latrines, and medical care through health stations and mobile units.
16. To add all programs which the necessities of health require to the Health Plan.

Goals for Specific Programs

System of Statistics

1. To create a single office for the Health Sector which is responsible for gathering all pertinent statistics.
2. To program the activities of this office.

3. To elaborate the program of tabulation and publication.
4. To publish research in pertinent periodicals and journals on health needs and resource availability.
5. To acquire modern equipment.
6. To develop personnel capacity according to the following levels: specialists at the university level including 8 demographers, 36 technicians, and 250 auxiliary personnel.

Human Resources

1. To make the geographic distribution of personnel more equitable.
2. To raise the number of physicians to 7/10,000 inhabitants.
3. To increase nursing personnel to 350 nurses and 1,600 auxiliaries for hospitals and 300 nurses and 1,250 auxiliaries for ambulatory services.

Communicable Diseases

1. To reduce the morbidity and mortality caused by diseases preventable by vaccination, by immunizing 80 percent of children under five years of age and establishing programs to maintain this level.
2. To promote social activities favorable to vaccination programs and to take inventory of the resources necessary for equitable coverage of vaccination programs.
3. To assign funds in the national budget specifically for the acquisition of vaccines and other drugs.
4. To execute epidemiological research on immunity.

Eradication of Aedes aegypti

(Nicaragua has not had a problem with Aedes aegypti or any diseases transmitted by the vector since 1940. However, the problem of reinfestation is a constant threat especially with increased international travel and trade, surveillance programs have been continued.)

1. To intensify vigilence activities against the reinfestation of Aedes aegypti by applying a total plan of active vigilance operations and introduction appropriate counter measures when necessary.
2. To intensify the level of cooperation between health centers and other organizations in the surveillance project.
3. In case of reinfestation, the Government will seek out adequate resources to eliminate the mosquitoes in the shortest time possible.

Eradication of Malaria

1. To maintain the final intent of eradication of malaria in the country.
2. To execute a program of total coverage in accordance with the epidemiological situation and by means of the utilization of the methods of attack which have been demonstrated to be most effective.
3. To reduce the foci and incidence of malaria to the lowest level possible. The attainment of this goal is a direct function of two conditions: (a) solving the technical problems related to the vector and the parasite and (b) assigning sufficient funds to apply the most efficient methods of attack.

Maternal and Child Health and Family Welfare

1. To reduce maternal mortality by 25 percent, infant mortality by 30 percent, and mortality of children between one and four by 50 percent.
2. To reduce the proportion of deaths of children under five to all deaths from 42 percent to 30 percent.

3. To increase institutional coverage of births to 60 percent of all births, and to do post-partum follow-up for 60 percent of the mothers of new-borns.
4. To train 1,860 empirical midwives to cover 40 percent of the communities with less than 500 residents.
5. To increase substantially coverage of children under 15 years of age.
6. To extend the Family Planning services to 100 percent of the population.
7. To extend outpatient services for maternal and child health and family planning to five regional hospitals and 10 hospitals in departmental capitals.
8. To perform vaginal cytology examinations for all women requesting them.
9. To extend health education services to 75 percent of the population.
10. To increase the number of social workers by 50 percent and follow-up case workers by 200 percent.
11. To provide courses in maternal and child health and family planning to physicians, nurses a other personnel.
12. To establish an evaluation unit for the program.
13. To create three regional centers for training volunteer health workers.
14. To increase the number of maternity beds by 290.
15. To construct a children's hospital with a capacity of 300 beds and 1,000 daily consultation
16. To extend the coverage of health centers to service 100 percent of the population.
17. To carry out research in various aspects of maternal and child health and family planning.

Environmental Sanitation

1. To provide water supply through house connections to 80 percent of the population and to ensure continued service of satisfactory quantity and quality.
2. To provide potable water to 100 percent of the rural population living in communities of between 300 and 2,000 inhabitants, and to make water available to 30 percent of the dispers population through wells or public taps.
3. To provide sewerage systems to 50 percent of the urban population and to cover the remainin 50 percent through latrines and septic tanks.
4. To offer sewerage disposal services to 10 percent of the rural population living in communities of more than 300 inhabitants and to cover the remainder through sanitary latrines.
5. To offer efficient services of solid waste collection and disposal to 70 percent of the residents of cities larger than 10,000 people and 100 percent of the residents of Managua.

Nutrition

Specific nutrition goals are not officially included as part of the National Health Plan. For an outline of Ministry of Health goals as defined by the Division of Nutrition see page 30.

NATIONAL SOCIO-ECONOMIC PLAN 1965-1969

The socio-economic development plans for Nicaragua have been directed toward building a stable economic base with major emphasis on increasing the capital production of the industrial and agricultural sectors. The methods for achieving this goal, however, have shifted over the last several years from an initial concern with developing economic infrastructure, to a more recent interest in developing the human resource capacity for productivity. This shift can most easily be seen by comparing the allocations for public investment, by sector, proposed in the plan.

Of the total public investment funds to be spent over the five year period, 64.5 percent were to be allocated to the economic sector while 31.5 percent were reserved for the social sector. The remaining funds were to be spent in a variety of miscellaneous categories. The high percentage of funds allocated to the economic sector is indicative of the priority given to the development of this area. Looking at the yearly allocations, however, economic sector investments decreased dramatically between 1965 and 1966, reflecting a major policy shift. In 1965, the economic sector was to receive 73.6 percent of the investment funds while the social sector received only 22.1 percent. The following year, economic sector investment dropped to 61.1 percent as social sector investment rose to 34.4 percent. Increases were mainly concentrated in the areas of health and housing, with a slight increase in education. The significance of this shift is that it reflects a growing awareness on the part of the government that major economic strides cannot be made without parallel efforts to raise the quality of life of the members of its labor force.

The overall objective of the plan was to develop the means of raising capital productivity. To accomplish this objective, it is necessary to maintain a minimal level of health in the labor force. Industrial and agricultural potential is worthless without the productive manpower. Although the Government of Nicaragua has begun to recognize that investment in human resources is as valuable as investment in material resources, it is not clear that all of the health ramifications of the goals for different sub-sector plans have been considered.

Transportation

This sector received the major portion of investment funds for the purpose of road building and highway improvements. Efforts were made to expand and improve accessibility to the rapidly developing agricultural areas of the country, so that transportation of goods to the consumer population in the urban areas would be more practical and feasible. Likewise, increased access to growing industrial areas, particularly in Matagalpa, Boaco, and Chontales, was planned to improve the productive capability of this sector. Emphasis was also given to developing a road system between the urban Pacific region and the Atlantic Coast in order to more fully integrate this latter area with the more economically productive and developed west. Finally, road improvement was proposed to reduce the costs of vehicular maintenance.

In light of the major problems in Nicaragua, the development of an improved transportation system has great potential for making a positive contribution, particularly to accessibility to care and distribution of nutritious foods. More roads will make it easier for patients to visit health centers and for the providers of care to reach the more isolated areas of the country where service facilities do not now exist. Expansion of highway systems between agricultural and urban areas results in better access to food processing plants and storage facilities, which in turn cuts down on food wastage. In addition, the problem of inequitable distribution of foods to various parts of the country is lessened through increased access to food distribution points for both the consumer and vendor. All of these consequences have the added advantage of reducing costs of production and purchase.

The negative effects of increased mobility, however, must not be ignored. More highways allow more people to travel and increases the potential for transmission of communicable diseases. Migration to urban areas produces overcrowded slums. These factors must be taken into consideration if the positive effects of the program are to be protected and preserved.

Energy

To paraphrase the text of the plan, the generation of electrical energy constitutes an especially important activity for the economic development of the country. It is the principal source of mechanical energy both for industrial development and for increasing the productivity of all national economic sectors. Investments were to be made for developing new power plants and for providing electrical energy to a larger segment of the population. Again, the major emphasis was focused on urban industrial areas and large scale agricultural enterprises capable of raising the level of income of the country.

The availability of electrical energy to hospitals and health centers will prove beneficial, especially since most rely on unstable sources of power. Beyond the immediate effects of increased energy supply, the resultant development of industry and agriculture will create a larger demand for health services. As more people are drawn into the labor force, more health services will be required for this larger population. Whether these services are ultimately provided by the government or the industries will require advance planning.

Agriculture

Of the total amount of public investment funds allocated to agricultural development, 44 percent was for the development of irrigation networks and 30 percent for product diversification. Both of these programs were to be concentrated in the southwestern part of the country near Rivas. The remaining funds were to be spent on education and extension services and on the construction of storage silos. The overall goals of the investment programs were to raise the percentage contribution of agricultural production to the gross domestic product; to increase and diversify exports while reducing imports; and to increase the supply of agricultural raw materials for the industrial sector and of other products which were becoming of economic importance.

Agriculture, more than any other sector of the economy, has the most profound impact on health. The quality and quantity of foods produced by the sector affects the nutritional status of the population. If appropriate foods are not produced and/or quantitites are insufficient, the population will be undernourished and more susceptible to disease. Moreover, the impact of disease in terms of fatality and disability will be more severe. A review of previous chapters on Nutrition and Agriculture shows that a large portion of the population of Nicaragua suffers from malnutrition. In addition to poor distribution of available foods, there are deficiencies in the kinds of foods produced. The proposal, by the plan, to diversify agricultural products can have a positive affect on correcting this deficit.

However, as desirable as the attempt to raise production is, if most of this increased production is exported, little benefit will accrue to the malnourished population. Even now, large quantities of coffee and cotton are produced, crops which have a high cash value but exert little effect on improving the state of nutrition. Extensive analysis must be made to determine the best combination of high value cash crops for export and nutritious crops for domestic consumption, both to raise the country's income and to increase the ability of the labor force to be more productive.

The effects of agricultural development programs on health go beyond the area of nutrition. The large allocation of funds for irrigation projects has increased malaria incidence. Not only do these irrigation networks provide breeding places for malaria vectors, but extensive spraying with pesticides increases vector tolerance to DDT, Malathion, and cost of treating these workers, and the increased imports necessary to make up for productivity losses must be borne by society.

Health

The plan for public investment in health covers four major areas. First it was designed to extend the potable water supplies to an additional 266,400 inhabitants at a cost of U.S. $7,000,000. Of this investment, approximately half was allocated to the improvement of water supply systems in the city of Managua and vicinity. Secondly, it was proposed that the network of sanitary sewerage systems be extended in the urban zones at a cost of about U.S. $6,000,000. Again, more than two-thirds of this investment was allocated to construction of the first phase of a sewerage system for Managua. Thirdly, the plan proposed to increase medical care to a larger percentage of the population through the construction of health centers in varous parts of the country to be determined by the Minister of Public Health. It was recommended that 116 units be constructed at a cost of U.S. $1,200,000. Finally, an effort was to be made to increase hopsital capacity by 2,000 beds over the five year period at a cost of about U.S. $8,500,000.

Although the Government has accomplished the majority of these goals, most of the investment has gone into improving health conditions only around Managua. From a strictly economic point of view, it is desirable to increase health coverage of the productive segment of the population, yet a large proportion do not live near Managua. Most of the agricultural activity and a good deal of industry is located in other areas of the country. The only health sector allocations which would affect these workers are the small allocation for health centers and possibly some of the hospital beds. Better medical care coverage of this population can provide an effective means of increasing and maintaining productivity. In addition, investment in the manpower of the future can be made through the extension of potable water supplies and sewerage systems to the rural areas of the country. This investment is a necessity for industrial and agricultural expansion.

Education

The major focus of public investment in education is the construction of primary education units. Of the total allocation 70% was reserved for this purpose. The remainder was to be used for the construction of secondary and vocational schools and the improvement and expansion of the physical plant of the University of Nicaragua.

Investment in education raises the level of knowledge and literacy rates, which in turn increase awareness of health. However, if the population has a high morbidity rate, the resultant absenteeism and drop-out rate will diminish the effects of this investment. In addition, retarded development in early childhood as a consequence of malnutrition and disease reduces learning capacity. Unless the population to be served by educational facilities is healthy to begin with, investment in these facilities will not have optimal effect.

Housing

For the five-year period, the plan proposed to construct 21,092 dwellings, of which 14,250 were in urban areas. The investment of public funds necessary to construct these units was estimated to be approximately U.S. $27,000,000, of which U.S. $4,410,000 was allocated to the rural areas. In addition, the plan recommended that greater emphasis be given to the needs of rural populations in the future, since previous investment in these areas has been minimal. Finally, a recommendation was made to encourage increased participation of private sector development in housing.

Better housing can substantially reduce the overcrowding which facilitates the spread of communicable disease. However, along with the provision of housing, accessibility to water and sewerage systems is a necessity if disease loads are to be kept to a minimum. Moreover, the type of housing provided must be carefully considered in view of its potential for harboring disease vectors. Finally, dwellings made of light construction materials are more desirable in Nicaragua because of the constant danger of earthquakes. It has been shown that earthquake victims are less likely to suffer death or permanent disability if light wood construction is used.

VII. CONCLUSIONS AND RECOMMENDATIONS

As this document illustrates, the major health problems in Nicaragua are similar to those of other developing countries in the Western Hemisphere. Extensive malnutrition, high prevalence rates of infectious and parasitic diseases, and rapid population growth combine to produce a low level of health in the population, thus straining existing social services to their limits. Food production for domestic consumption is inadequate, environmental sanitation is practically nonexistant except in the major cities, and immunization coverage of susceptible population groups is low. These problems are compounded by the lack of adequate resources and the less than optimum utilization of those that do exist.

Officials in the Nicaraguan government are acutely aware of both the major health problems and the limited resources at their disposal to cope with them. In developing the National Health Plan, officials have focused, for the most part, on those areas which create the most serious health problems and the organizational and resource requirements necessary to alleviate them. The proportion of government funds allocated to health has steadily increased over the past decade, and unlike many other Latin American countries, Nicaragua has included the health sector in its National Socio-Economic Plan for public investment.

Despite these efforts, most of the major health programs lack cohesion and direction. The earthquake, of course, has had a profound effect on the future development of the health sector. While its impact has not had a significant effect on national health status, efforts to cope with the physical destruction caused by the disaster will divert important resources, both financial and manpower, away from other critical health problems. Recently proposed plans indicate that initial emphasis will be placed on reconstructing those health facilities which were destroyed. For this reason, it is even more important to make a detailed plan of action for the coming years. The actual need for treatment services must be thoroughly reassessed. It is possible that a greater impact on the health of the Nicaraguan population might be realized by investments in preventive services or non-traditional treatment programs.

Health Planning and Statistical Information

Rational health planning is predicated on accurate statistical information, yet as this document illustrates, statistical information in Nicaragua is generally inadequate. Consequently the health planning that does occur is necessarily unsophisticated and based on inadequate or inaccurate data. While professionals in Nicaragua have begun to recognize the limitations of available data and have proposed plans to improve the qualtiy of this information, there has been no realistic assessment of data needs. As a minimum, information should be available on causes of morbidity and mortality by age, sex and geographic location. Only age specific mortality information is currently available. These data are particularly important for pinpointing the loci of various health problems for preliminary sector assessment.

As problem areas begin to surface, analysis will generate a need for more detailed information. The fact that data requirements are largely defined by planning requirements means that the relationship between planners and statisticians must be a dynamic one. In Nicaragua, various kinds of data are gathered by an assortment of independent groups reluctant to exchange information. As a result, planners in the Ministry of Public Health, for example, do not have access to necessary information on the treatment programs or costs of National Board hospitals. In fact, detailed cost breakdowns are the most difficult data to obtain for any agency, yet the most useful information for planning.

However, even when information is available in the form of surveys and studies, it is not always used. A survey on the 1971 polio epidemic supplied information indicating that the outbreak occurred in the urban centers of the Pacific Coast and gradually infiltrated the more rural areas of the west and north central regions of the country. On the basis of this information, planners might have proposed that vaccination programs be concentrated in the specific urban areas of the original outbreak. Follow-up statistics on future epidemics would show

whether or not this is an appropriate strategy. However, mass vaccination campaigns continue to be favored, in spite of the fact that program coverage is too thinly spread over too large an area to have a significant impact.

The handicap under which planners operate because of the lack or misuse of data might be corrected with the creation of an independent statistical agency, as proposed in the National Health Plan. This agency would presumably be responsible for collecting all information relevant to the health sector agencies. Nevertheless, whether data collection and analysis is conducted as an independent program or whether it operates as a sub-unit of a larger agency, three important considerations must be emphasized: (1) the system must be responsive to the data needs of planners and planning agencies; (2) statistical information must be accessible to agencies needing the information; and (3) the information must be used by planners to make appropriate health sector decisions.

One of the most important planning decisions involves the setting of priorities. In a country with serious financial and resource limitations, some definition of priorities is necessary for obtaining the most efficient and effective use of these resources. Although the National Health Plan does attempt to define the major health problems and proposes methods of solving them it makes no attempt to rank the problems in order of importance. Particularly significant is the omission of the nutrition problem from the Plan. Given the extent and severity of malnutrition, corrective programs should rank high. Methods must be found for weighing the various health problems and for determining effectiveness of program alternatives. The consequence of avoiding the establishment of such priorities and allocating resources accordingly is that people become ill, disabled and die in greater numbers than would be the case with a more rational and systematic expenditure of the same resources. Some of the questions raised in the process of priority definition are:

1. What portion of the population is actually or potentially affected by the problem?
2. What portion of the population suffers death, disease, or disability as a result of the problem?
3. What are the direct costs that must be borne by society as a result of the problem? These include total man-years of productive labor lost, additional costs of supporting dependent populations, loss of investment in education and other social services for individuals who will die or become disabled prematurely, etc.
4. What losses can be avoided by treating the problem as compared to the costs of such treatment?
5. What losses can be avoided by preventing the problem as compared to the costs of prevention?
6. What is the optimal combination of treatment and/or preventive services which will minimize societal costs with the least financial investment?
7. Where can these services most effectively be used?

After priorities are established, a realistic assessment of feasible program alternatives must be made to determine which plan of action will offer the greatest benefit at the least cost. The plan should include incremental goals -- a step-by-step process for achieving the final objective. This must be developed within the constraints of budget, available resources, potentials for developing new resources, etc. In addition, it is necessary to explore alternative ways of financing health sector programs. The water utility of Managua is a good example of self-supporting service that has lowered the rates of disease by providing potable water. Since it became operational, governmental funds that were previously allocated for the water supply in Managua can now be used for other programs.

Nutrition

Most of the major disease problems in Nicaragua are either caused by or associated with the widespread prevalence of malnutrition. While nutritionists have struggled to increase awareness of the significance of the problem, officials have not accorded it a major place in policy considerations. There is no official policy on nutrition and, even more important, it is not included

in the National Health Plan as a primary area of emphasis. While frequent mention is made of the need to provide more adequate diets in the National Socio-Economic Plan for the agricultural sector, this is done only in terms of increasing production of the food staple, corn. No mention is made of the greater need to create supplies of more nutritious foods or to improve food distribution, and only 0.7 percent of the Ministry of Public Health budget is allocated to nutrition programs.

Ironically, while nutrition has not achieved a high policy ranking, it is one of the few areas in which intersectoral cooperation has been attempted. Both the Applied Nutrition Program and the PRODUSAR pilot project incorporate the expertise of specialists in agriculture and education as part of their programs. The need to increase the strengthen concerted action on an intersectoral level cannot be overemphasized. Solutions cannot be developed by any one sector. Effective and efficient approaches to the problem will require coordinated action in the food processing industry, transportation, health, education, agriculture, public finance, and foreign trade.

Existing health sector programs have been focused on supplementary foods and nutrition education. Division of Nutrition goals for continuing and expanding these programs are commendable and every effort should be made to insure their success. This implies incorporation of nutrition goals into the National Health Plan and reassessment of budget allocations for nutrition programs. Additional improvements in environmental sanitation will reduce the rates of parasitic and infectious diseases which aggravate malnutrition. For this reason, these programs should be included as part of a comprehensive nutrition plan.

Intersectoral programs should be focused on increasing the production, distribution and availability of nutritious foods. Expansion and improvement of transportation systems as proposed in the National Socio-Economic Plan will provide the mechanism for better food distribution but only if consideration is given to consumer needs. Consideration should also be given to the possibility of developing financial incentives to enhance food distribution capacity,i.e., government subsidies for trucks might increase the number of distribution vehicles. In addition, the development and expansion of the fishing industry could be valuable both for better nutrition as well as for economic reasons. Cash-earning lobster, shrimp, and fish could be harvested more extensively for export, while fish less in demand overseas are distributed for domestic consumption. If this expansion proves feasible it will be necessary to develop ways of processing fish to eliminate excess loss due to perishability. However, export of food should not be allowed to eclipse the domestic needs. Otherwise, the economic benefits derived from exports will be counterbalanced by the costs to society of the productivity losses and chronic disability associated with the malnutrition and subsequent illness.

Environmental Sanitation

The provision of adequate water supply and sewage disposal systems can effectively reduce the problem of diarrheal and other gastrointestinal diseases. In a country where enteritis and other diarrheas are the leading cause of death and 80 percent of the population suffers from intestinal parasites, providing adequate treatment programs is a costly enterprise. According to C.E.A. Winslow, a curative program will cost ten times the amount needed to finance a purely preventive one. Environmental sanitation, then, can be both an effective and financially reasonable method of reducing the prevalence of these diseases.

The Government of Nicaragua has recognized the importance of providing these sanitation systems. A large portion of the Ministry of Public Health budget (34.3 percent) is reserved for the construction of water supply and sewerage systems, and the National Socio-Economic Plan focused on the construction of these facilities in its program for public investment. In addition, programmatic goals are outlined for environmental sanitation services in the National Health Plan.

However, emphasis has primarily been directed toward supplying urban areas with these services. The majority of international contributions and loans have been acquired for the construction of an independent, autonomous water utility in Managua. Additional financing has been obtained for the development of a sewerage utility for Managua which will collect and treat wastes. This project will undoubtedly decrease the spread of disease, but only if discharge of wastes into Lake Nicaragua as proposed in the plan, does not create a secondary problem of water pollution.

While efforts to supply urban areas are important, it is also necessary to increase services to rural areas. The self-help water supply projects currently operating in Colombia and Panama might be adapted for use in Nicaragua. In these projects, the Government supplies maternal and engineering support while the community groups install and maintain the facility. Utility fees collected by the community can then be used for facility maintenance and other community projects. Health education is needed to change sanitation habits. Emphasis must be given to the importance of washing hands, cleaning food, and boiling unsafe water. Financial incentives to employers and owners of tenant farmland to provide adequate facilities on their premises might be useful, i.e. tax breaks for those providing these services.

Finally, regulations should be implemented to control food processing and handling. This might take the form of minimum compliance standards with penalties for those who do not meet these standards. Not only would this promote more active quality control of food products, but it might also provide a source of additional income.

Communicable Disease Control

While prevention and control of communicable diseases is to a large extent related to the adequacy of nutrition and environmental sanitation, immunization and vector control programs are necessary correlates in any attempt to reduce disease prevalence. The Government of Nicaragua recognizes the importance of these programs and has included them in the National Health Plan. Because of the high number of deaths of children under five, one major focus has been on immunizing 80 percent of this most susceptible age group. A second focus has been eradication of the malaria vector through intensive residual house spraying campaigns.

Despite the intent of the Plan, neither program has been successful. Government vaccination programs are hampered by insufficient funds, lack of trained personnel and poor distribution and storage of vaccines. In addition, inadequate coordination results in many children receiving unnecessary, duplicate vaccinations while others receive none. In contrast, the malaria eradication program receives a large allocation of financial and manpower resources. More than 20 percent of the Ministry of Public Health budget is allocated to malaria eradication, and the personnel network is more extensive than for any other program. However, as eradication efforts have increased, so has vector resistance to residual insecticides. The overwhelming technical problems have resulted in incidence rates higher than at any other time in the past decade.

Because of these problems, it is essential that priorities be established for the allocation of resources. The cost effectiveness of malaria eradication must be weighed against the resource needs of other programs. Consideration should be given to malaria control as an alternative to eradication. Since control programs require less frequent applications of insecticides over a smaller geographic area than eradication programs, they provide a financially practical as well as a reasonably effective alternative. Funds previously used for malaria eradication could then be applied to other health programs.

Even with additional funds, however, it is neither necessary nor desirable to obtain complete immunization coverage of the total population. As mentioned previously, polio vaccination programs could be concentrated in selected high risk urban areas, rather than spread over the entire country. Tetanus immunization programs should be developed to cover the particularly susceptible neonatal population. Since expectant mothers will transfer their own immunological defenses to the fetus, vaccination of pregnant women would decrease the risk of tetanus neonatorum. Conversely, most women are already immune to measles, and readily transfer this immunity to the fetus

during pregnancy. Once this transferred immunity diminishes, however, the child becomes highly susceptible to measles virus. Consequently, programs must be developed to immunize children at the earliest possible age, usually about nine months. The absence of such a program is a cause for concern. Finally, in spite of the partial effectiveness of BCG vaccination, administration of BCG has become standard medical procedure in most developing countries. On the other hand, if the operation of BCG vaccination programs prohibits the purchase of other more effective vaccines, continuation of these programs should be questioned.

Beyond the development of immunization programs, effective communicable disease control requires additional,more complex methods in other areas, In order to forestall the steady increase in venereal disease, more sophisticated educational techniques must be developed to assure awareness of the importance of personal hygiene and contraception. Family planning programs can be used as an effective vehicle for disseminating this information. Experience elsewhere invites consideration of the effect of legal control of prostitution in reducing the spread of venereal diseases. Legalization can provide a practical means of monitoring potential carriers through regular inspections.

Health Resources

While disease problems can be reduced through program development, the success of these programs is dependent on the adequacy and appropriateness of available health resources. At the present time, less than optimum organization and utilization of resources combine to restrict effective health care delivery. Government officials are aware of their resource limitations, but the only solutions proposed involve increasing the amount of total resources, rather than studying the cost effectiveness of present utilization patterns.

Although there is certainly a need for more personnel resources, increasing the number of facilities should be approached with caution. Part of the problem of inadequate resource capacity can be traced to unnecessary utilization of existing facilities. For example, assuming that hospital obstetrical costs are high, the proposal in the National Health Plan to increase hospital coverage of births of 60 percent of the pregnant population may be an unnecessary expenditure of precious health resources. In a country with such a high prevalence of diseases that could be reduced by appropriate preventive measures, hospitalization of pregnant women for normal delivery at such a high cost diverts both money and personnel away from preventive programs. The alternative of adequately training midwives to attend home deliveries would provide an adequate level of care, while at the same time releasing resources that could then be used for other programs. Likewise, hospitalization of tuberculous patients is often only necessary for the first few months. After this, treatment can continue through outpatient administration of the appropriate medication, at greatly reduced cost.

The funds reclaimed from these unnecessary expenditures can more appropriately be used for increasing and upgrading health personnel. As program emphasis shifts away from hospital-based care, more personnel will be needed to conduct preventive programs, outpatient treatment, and outreach. The importance of using auxiliary personnel for these activities cannot be underestimated. Auxiliaries can effectively be used for reaching the most isolated populations without access to immediate health care. Effective recruitment programs are necessary to insure both sufficient numbers and quality of auxiliaries. If the malaria eradication program is reduced in scale, volunteer workers previously utilized in this activity could be incorporated into auxiliary outreach programs, with a minimum amount of training. These workers would be particularly useful because of their knowledge of their communities and the people in them.

Physician recruitment and placement is also necessary to increase the supply of doctors in rural areas. One approach would be to offer medical school fellowships in exchange for two or three years of obligatory service. This would not only provide a greater supply of physicians for rural areas, but also create an impetus for young people to enter medical school.

Finally, the legal system can be utilized as an effective health resource. As mentioned previously, legal control of prostitution and the institution of legal recourse for violations of

sanitary regulations can effectively reduce the spread of disease. Additional consideration must be given to the need for occupational safety codes in view of the large number of accidents at work. These codes should not only include regulations for accident prevention, but also require the provision of adequate emergency services.

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ADDITIONAL TABLES

AND ILLUSTRATIONS

Illustration 3

NICARAGUA: DEPARTMENTS AND RESPECTIVE CAPITALS

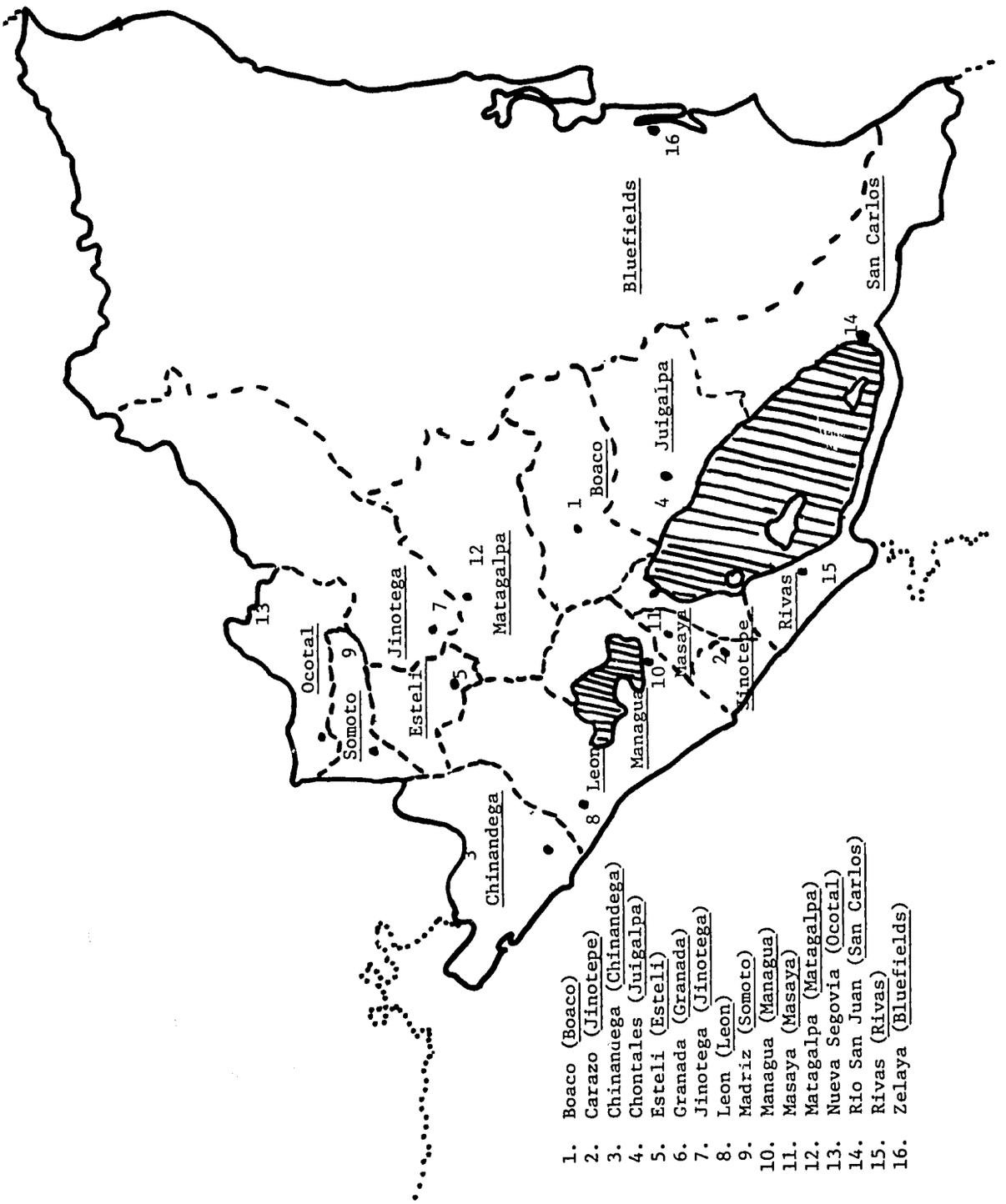

Illustration 4

NICARAGUA: ROADS AND AIRPORTS

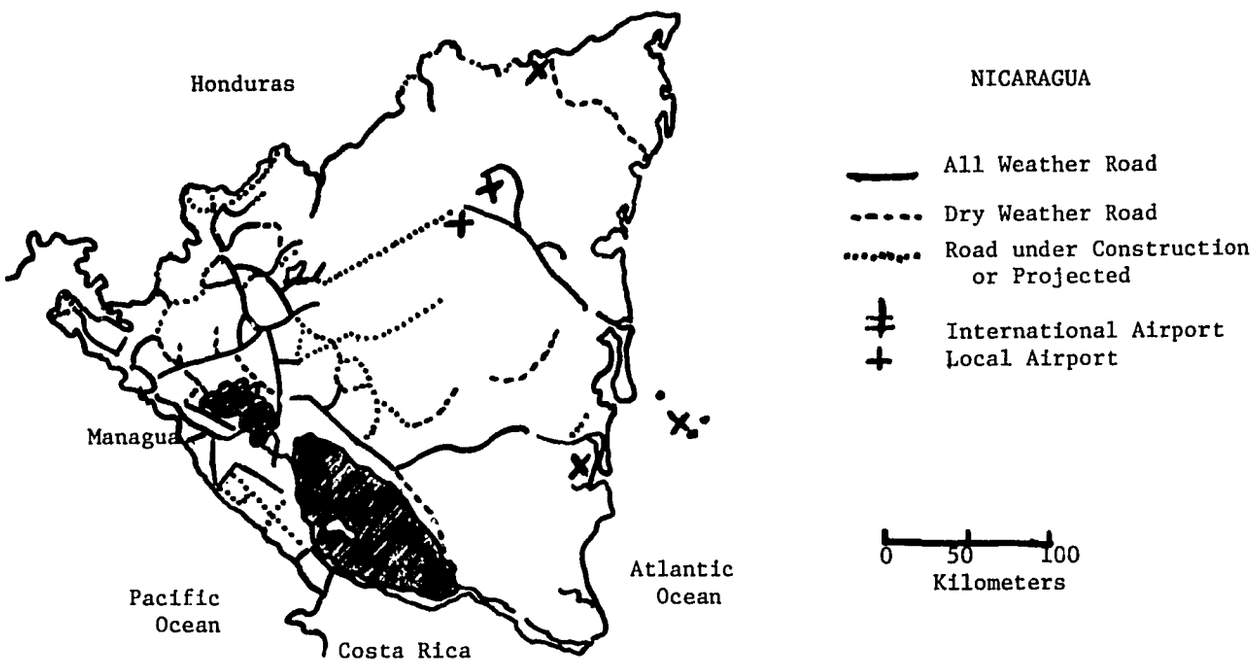

Table 15

Population, by Department - Nicaragua 1950-1967

Departments	Population 1950	1967
Chinandega	81,836	153,125
Leon	123,614	175,482
Managua	161,513	380,966
Masaya	72,466	92,161
Granada	48,732	77,523
Carazo	52,138	78,063
Rivas	43,314	76,197
Chontales	50,529	85,119
Boaco	50,039	77,128
Matagalpa	135,401	188,118
Jinotega	48,554	88,948
Esteli	43,742	78,267
Madriz	33,178	55,965
Nueva Segovia	27,078	53,461
Rio San Juan	9,089	18,124
Zelaya	73,820	98,324
	1,055,023	1,776,971

Source: American University, Area Handbook for Nicaragua

Table 16

Number and Population of Localities by Number of Inhabitants

Size of Localities	Number of Localities	Population No. (in thousands)	Population %
TOTAL	5.286	1.909.2	100.0
100,000 and over	1	358.6	18.8
20,000 - 99,999	5	164.2	8.6
2,000 - 19,999	49	286.7	15.0
500 - 1,999	580	424.6	22.2
Under 500	4.651	675.1	35.4
Scattered Population	--	--	--

Source: The information in this table was compiled from a variety of National and International sources.

Table 17

Structure of Gross Domestic Product by Sectors of Production and Services

Year* 1969

Sector	Gross Domestic Product		
	National currency (in thousands of units)	US Dollars (in thousands)	%
TOTAL	5.285.000	755.000	100.0
PRIMARY	1.547.000	221.000	29.3
Crop raising and stock farming	1.415.000	202.142	26.8
Mining and quarrying	67.000	9.572	1.3
Other sub-sectors	65.000	9.286.	1.2
SECONDARY	1.097.000	156.714	20.8
Manufacturing	927.000	132.429	17.6
Other sub-sectors	170.000	24.285	3.2
TERTIARY	2.641.000	377.285	49.9
UNKNOWN	-----	---	--

* Most recent year for which data is available.

Source: The information in this table was compiled from a variety of National and International sources.

Table 18

Economically Active Population by Sectors of Production

Year* 1969

SECTOR	Population	
	Number (in thousands)	%
TOTAL	596.990	100.0
PRIMARY	337.069	56.5
Crop raising and stock farming	332.279	55.7
Mining and quarrying	4.790	0.8
Other sub-sectors	----	---
SECONDARY	94.593	15.8
Manufacturing	70.647	11.8
Other sub-sectors	23.946	4.0
TERTIARY	165.328	27.7
UNKNOWN	----	---

*Most recent year for which data is available.

Source: The information in this table was compiled from a variety of National and International sources.

Table 19

Number of Deaths by Cause and Age Group

Groups of causes	All ages		Age groups in years						
	Number	Per cent*	Under one	1-4	5-14	15-44	45-64	65 and over	Not specified
Group F	15.938	100.0	4.420	2.281	725	2.846	2.232	2.603	831
Symptoms and ill-defined conditions (780-796)	4.213	26.4	630	648	218	490	530	1.028	669
Total excluding Group F	11.725	100.0	3.790	1.633	507	2.356	1.702	1.575	162
Group A	5.564	47.5	3.234	1.327	190	365	228	185	35
A. 1	1.021	8.7	518	284	56	89	47	26	
Tuberculosis (010-019)	119	1.0	-	-	5	62	33	19	-
Diphtheria (032)	4	0.0	-	3	1	-	-	-	-
Whooping cough (033)	203	1.7	126	65	12	-	-	-	-
Tetanus (037)	375	3.2	286	25	16	27	14	7	-
Poliomyelitis (040-043)	6	0.1	2	3	-	-	-	-	-
Smallpox (050)	-	-	-	-	-	-	-	-	-
Measles (055)	314	2.7	104	188	22	-	-	-	-
A. 2	3.320	28.3	2.238	683	85	126	75	89	24
Typhoid fever (001)	75	0.6	18	10	5	24	12	6	-
Paratyphoid fever and other salmonella infections (002,003)	180	1.5	50	52	12	31	15	15	5
Bacillary dysentery and amebiasis (004,006)	31	0.3	1	6	5	4	7	7	1
Enteritis and other diarrheal diseases (008, 009)	2.764	23.6	2.032	568	40	39	28	44	13
Plague (020)	-	-	-	-	-	-	-	-	-
Yellow fever (060)	-	-	-	-	-	-	-	-	-
Rabies (071)	-	-	-	-	-	-	-	-	-
Typhus and other rickettsial diseases (080-083)	-	-	-	-	-	-	-	-	-
Malaria (084)	270	2.3	137	47	23	28	13	17	5

*Percentage of total deaths, excluding Group F, ill defined and unknown causes.

Number of Deaths (cont.)

Group of causes	All ages		Age groups in years						
	Number	Per cent*	Under one	1-4	5-14	15-44	45-64	65 and over	Not specified
A. 3	945	8.1	404	200	22	140	101	69	9
Influenza (470-474)	234	2.0	52	57	11	53	26	29	6
Pneumonia (480-486)	493	4.2	246	67	11	60	66	40	3
Bronchitis emphysema and asthma (490-493)	218	1.9	106	76	-	27	9	-	-
A. 4	278	2.4	74	160	27	10	5	1	1
Syphilis and its sequelae (090-097)	-	-	-	-	-	-	-	-	-
Scarlet fever and streptococcal sore throat (034)	-	-	-	-	-	-	-	-	-
Meningococcal infection (036)	-	-	-	-	-	-	-	-	-
Leprosy (030)	2	0.0	-	-	-	1	1	-	-
Infectious hepatitis (070)									
Yaws (102)									
Schistosomiasis (120)									
Remaining infective and parasitic diseases (00, 005,007,021-027, 031,035, 038,039 044-046,051-054, 056 057 061-069,072-079, 085-089,098-101,103-119, 121-136)	276	2.4	74	160	27	9	4	1	1
Group B	288	2.5	288	-	-	-	-	-	-
Causes of perinatal morbidity (760-779)	288	2.5	288	-	-	-	-	-	-

*Percentage of total deaths, excluding Group F, ill defined and unknown causes.

Number of Deaths (cont.)

Group of causes	All ages		Age groups in years						
	Number	Per cent*	Under one	1-4	5-14	15-44	45-64	65 and over	Not specified
Group C	454	3.9	-	-	12	140	154	139	9
Malignant neoplasms (140-209)	358	3.1	-	-	4	99	130	119	6
Benign neoplasms and neoplasms of unspecified nature (210-239)	96	0.8	-	-	8	41	24	20	3
Group D	1.704	14.5	2	3	11	329	583	740	36
Active rheumatic fever (390-392)	7	0.1	-	-	-	-	6	1	-
Chronic rheumatic heart disease (393-398)	4	0.0	-	-	-	-	-	4	-
Hypertensive disease (400-404)	21	0.2	-	-	-	-	7	14	-
Ischemic heart disease (410-414)	190	1.6	-	-	-	20	98	72	-
Other forms of heart disease (420-429)	806	6.9	2	3	2	191	233	353	22
Cerebrovascular disease (430-438)	535	4.6	-	-	7	75	180	261	12
Other diseases of circulatory system (440-458)	141	1.2	-	-	2	43	59	35	2
Group E	3.715	31.7	266	303	294	1.522	737	511	82
E. 1	367	3.1	9	118	61	57	63	59	-
Non-toxic goiter and thyrotoxicosis (240-242)	-	-	-	-	-	-	-	-	-
Diabetes (250)	89	0.8	-	-	-	9	34	46	-
Avitaminosis and other nutritional deficiency (260-269)	109	0.9	9	68	13	8	11	-	-
Anemias (280-285)	169	1.4	-	50	48	40	18	13	-

*Percentage of total deaths, excluding Group F, ill defined and unknown causes

Number of Deaths (cont.)

Groups of causes	All ages		Age groups in years						
	Number	Per cent*	Under one	1-4	5-14	15-44	45-64	65 and over	Not specified
E. 2	130	1.1	-	-	-	35	59	26	10
Cirrhosis of liver (571)	130	1.1	-	-	-	35	59	26	10
E. 3	133	1.1	-	-	2	121	10	-	-
Delivery without mention of complications (650) Abortion (640-645) Complications of pregnancy, childbirth and puerperium (630-639, 651-678)	133	1.1	-	-	2	121	10	-	-
E. 4	16	0.1	16	-	-	-	-	-	-
Congenital anomalies (740-759)	16	0.1	16	-	-	-	-	-	-
E. 5	913	7.8	5	75	113	472	135	88	25
Motor vehicle accidents (E810-E823)	173	1.5	-	20	28	85	21	15	4
Other accidents (E800-E807, E825-E949)	740	6.3	5	55	85	387	114	73	21
E. 6	648	5.5	4	16	55	470	66	10	27
Suicide (E950-E959)	25	0.2	-	-	-	25	-	-	-
Homicide and injuries resulting from operations of war (E960-E999)	623	5.3	4	16	55	445	66	10	27
E. 7	1.508	12.9	232	94	63	367	404	328	20
Meningitis (320)	81	0.7	54	12	9	6	-	-	-

*Percentage of total deaths, excluding Group F, ill defined and unknown causes

Number of Deaths (cont.)

Groups of causes	All ages		Age groups in years						
	Number	Per cent*	Under one	1-4	5-14	15-44	45-64	65 and over	Not specified
Other diseases of respiratory system (460-466, 500-519)	259	2.2	138	38	17	42	14	9	1
Peptic ulcer (531-533)	24	0.2	-	-	-	9	8	7	-
Appendicitis (540-543)	7	0.1	-	-	1	6	-	-	-
Intestinal obstruction and hernia (550-553, 560)	37	0.3	1	2	2	20	9	2	1
Diseases of oral cavity, salivary glands and jaws (520-529)									
Other diseases of digestive system (520-530, 534-537,561-570,572-577)	645	5.5	29	28	27	159	223	170	9
Nephritis and nephrosis (580-584)	15	0.1	-	-	-	4	7	3	1
Other diseases of genito-urinary system (590-629)	168	1.4	4	11	4	24	64	60	1
Psychoses (290-299)									
Neuroses, etc. (300-309)									
Mental retardation (310-315)									
All other defined diseases	272	2.3	6	3	3	97	79	77	7
Special conditions and examinations (Y00-Y59)									

*Percentage of total deaths, excluding Group F, ill defined and unknown causes

Source: The information in this table was compiled from a variety of National and International sources.

Table 20

Number of Hospital Discharges by Groups of Causes

Groups of causes	All ages	
	Number	Percent*
Group F		
Symptoms and ill-defined conditions (780-796)	5.047	
Total excluding Group F	86.677	100.0
Group A	17.008	19.6
A.1	1.650	1.9
Tuberculosis (010-019)	1.384	1.6
Diphtheria (032)	16	0.02
Whooping cough (033)	39	0.04
Tetanus (037)	-	-
Poliomyelitis (040-043)	-	-
Smallpox (050)	-	-
Measles (055)	195	0.2
A.2	8.145	9.4
Typhoid fever (001)		
Paratyphoid fever and other salmonella infections (002,003)	564	0.7
Bacillary dysentery and amebiasis (004,006)	332	0.4
Enteritis and other diarrheal diseases (008, 009)	6.128	7.1
Plague (020)	-	-
Yellow fever (060)	-	-
Rabies (071)	-	-
Typhus and other rickettsial diseases (080-083)	42	0.05
Malaria (084)	1.079	1.2
A.3	4.542	5.2
Influenza (470-474)	455	0.5
Pneumonia (480-486)	2.269	2.6
Bronchitis emphysema and asthma (490-493)	1.858	2.1

*Percentage of total deaths, excluding Group F, ill defined and unknown causes.
Source: The information in this table was compiled from a variety of National and International sources.

Hospital Discharges (Cont.)

Groups of causes	All ages	
	Number	Percent*
A.4		
Syphilis and its sequelae (090-097)	65	0.07
Scarlet fever and streptococcal sore throat (034)	34	0.04
Meningococcal infection (036)	-	-
Leprosy (030)	-	-
Infectious hepatitis (070)	-	-
Yaws (102)	-	-
Schistosomiasis (120)	-	-
Remaining infective and parasitic diseases (000, 005,007,021-027, 031,035, 038,039, 044-046, 051-054 056, 057, 061-069, 072-079, 085-089, 098-101, 103-119, 121-136)	2.572	3.0
Group B	1.095	1.3
Causes of perinatal morbidity (760-779)	1.095	1.3
Group C	1.646	1.9
Malignant neoplasms (140-209)	834	1.0
Benign neoplasms and neoplasms of unspecified nature (210-239)	812	0.9
Group D	2.300	2.7
Active rheumatic fever (390-392)	27	0.03
Chronic rheumatic heart disease (393-398)	31	0.04
Hypertensive disease (400-404)	393	0.5
Ischemic heart disease (410-414)	152	0.2
Other forms of heart disease (420-429)	1.360	1.6
Cerebrovascular disease (430-438)	330	0.4
Other diseases of circulatory system (440-458)	7	0.008

Source: The information in this table was compiled from a variety of National and International sources.

Hospital Discharges (Cont.)

Groups of causes	All ages	
	Number	Percent*
Group E	64.627	74.5
E.1	2.597	3.0
Non-toxic goiter and thyrotoxicosis (240-242)	353	0.4
Diabetes (250)	266	0.3
Avitaminosis and other nutritional deficiency (260-269)	808	0.9
Anemias (280-285)	1.170	1.3
E.2		
Cirrhosis of liver (571)	-	-
E.3	33.609	38.8
Delivery without mention of complications (650)	-	-
Abortion (640-645)	-	-
Complications of pregnancy, childbirth and puerperium (630-639, 651-678)	33.609	38.8
E.4	432	0.5
Congenital anomalies (740-759)	432	0.5
E.5	92	0.1
Motor vehicle accidents (E810-E823)	92	0.1
E.6	31	0.04
Suicide (E950-E959)	-	-
Homicide and injuries resulting from operations of war (E960-E999)	31	0.04
E.7	27.886	32.1
Meningitis (320)	198	0.2
Other diseases of respiratory system (460-466, 500-519)	1.088	1.3
Peptic ulcer (531-533)	258	0.3
Appendicitis (540-543)	1.576	1.8

Source: The information in this table was compiled from a variety of of National and International sources.

Hospital Discharges (Cont.)

Groups of causes	All ages	
	Number	Percent*
Intestinal obstruction and hernia (550-553, 560)	1.813	2.1
Diseases of oral cavity, salivary glands and jaws (520-529)	-	-
Other diseases of digestive system (520-530, 534-537, 561-570, 572-577)	3.024	3.5
Nephritis and nephrosis (580-584)	206	0.2
Other diseases of genito-urinary system (590-629)	4.568	5.3
Psychoses (290-299)	-	-
Neuroses, etc. (300-309)	1.548	1.8
Mental retardation (310-315)		
All other defined diseases	13.552	15.6
Special conditions and examinations (Y00-Y59)	-	-

Source: The information in this table was compiled from a variety of National and International sources.

Table 21

Prevalence of Goiter by Department - Nicaragua, 1966

Department	No. of People Examined	Rate of Prevalence (%)
Managua	122	38
Zelaya	333	13
Masaya	210	31
Chontales	254	14
Boaco	102	34
Carazo	108	42
Granada	232	38
Rivas	193	45
Leon	378	32
Chinandega	353	48
Metagalpa	220	30
Jinotega	120	22
Esteli	89	34
Madriz	306	34
Nueva Segovia	295	34
TOTAL	3,315	AVERAGE 32

Source: Institudo de Nutricion de Centro America y Panama, Evaluacion Nutricional de la Poblacion de Centro America y Panama: Nicaragua

Table 22

Categories of personnel and their geographical distribution
Ratio per 10,000 inhabitants based on estimated population

Year 1971

Categories	Entire area		Locals. of less than 20,000 inhabitants		Locals. of 20,000 to 99,999 inhabitants		Locals of 100,000 and more inhabitants	
	No.	Ratio	No.	Ratio	No.	Ratio	No.	Ratio
Physicians TOTAL	870	4.56	190	1.37	184	11.22	496	13.83
Engaged principally in:								
General clinical practice	553	2.90	176	1.27	113	6.89	264	7.36
Special fields	297	1.56	13	0.09	68	4.15	216	6.02
Administration	20	0.10	1	0.01	3	0.18	16	0.45
With courses in Pub. Health	14	0.73	1	0.01	3	0,18	10	0.28
Special paramedical fields								
Medical Assistants TOTAL								
This category does not exist								
Dentists TOTAL								
Dentists who work in public health	83	0.43	25	0,18	19	1.16	39	1.09
With course in Pub. Health	3	0.02			2	0.12	1	0.03
Dental technicians								
This category does not exist								
Engineers who work in public health TOTAL	24	0.13					24	0.67
Sanitary engineers	7	0.04					7	0.20
Sanitary inspectors TOTAL	191	1.00	110	0.79	45	2.74	36	1.00
Trained (8 / 6)o	180	0.94	104	0.75	42	2.56	34	0.95

o (Years of general education required/months of specific training)

Source: The information in this table was compiled from a variety of National and International sources.

Categories		Entire area		Locals. of less than 20,000 inhabitants		Locals. of 20,000 to 99,999 inhabitants		Locals. of 100,000 and more inhabitants	
		No.	Ratio	No.	Ratio	No.	Ratio	No.	Ratio
Graduate nurses	TOTAL	481	2.52	129	0.93	44	2.68	308	8.59
School of Nursing (12 3)*		481	2.52	129	0.93	44	2.68	308	8.59
with postgraduate qualifications in public health		10	0.05			2	0.12	8	0.22
Nurse-midwives	TOTAL	-							
with postgraduate qualifications in public health		-							
Nursing auxiliaries	TOTAL	2,094	10.97	405	2.92	456	27.80	1,233	34.38
-trained (9 9)o		1,369	7.17	270	1.95	144	8.78	955	26.63
Graduate midwives (6 3)*	TOTAL	10	0.05	3	0.02			7	0.20
Empirical midwives (0 1)		116	0.61	116	0.83				
-trained	TOTAL	116	0.61	116	0.83				
Veterinarians	TOTAL	15	0.08	7	0.05	2	0.12	6	0.17
with postgraduate qualifications in public health		-							
Professional lab. staff	TOTAL	6	0.03					6	0.17
Laboratory technicians	TOTAL	153	0.80	82	0.59	29	1.77	42	1.17
-trained		-							
Professional nutritionists	TOTAL	6	0.03					6	0.17
Dieticians	TOTAL	-							
Prof. pharmac. chemists	TOTAL	253	1.32					125	3.49
-pharmac. auxiliaries		-							
X-ray technicians	TOTAL	43	0.23	16	0.12	12	0.73	15	0.42
-trained		-							

o (Years of general education required/months of specific training)
* (Years of general education required/years of vocational education)

Source: The information in this table was compiled from a variety of National and International sources.

Categories		Entire area		Locals. of less than 20,000 inhabitants		Locals. of 20,000 to 99,999 inhabitants		Locals. of 100,000 and more inhabitants	
		No.	Ratio	No.	Ratio	No.	Ratio	No.	Ratio
Health educators	TOTAL	30	0.16	12	0.08	4	0.24	14	0.39
Professional		14	0.07					14	0.39
Health education auxiliaries	TOTAL	16	0.08	12	0.08	4	0.24		
-trained		16	0.08	12	0.08	4	0.24		
Social workers	TOTAL	35	0.18					35	0.98
Professional		-							
Auxiliary social workers	TOTAL	-							
-trained		-							
Statisticians	TOTAL	15	0.08			2	0.12	13	0.36
Professional		2	0.01					2	0.06
Intermediate level		4	0.02			1	0.06	3	0.08
Public administrators employed in the pub. health field		3	0.02					3	0.08
Demographers		1	0.005					1	0.03

o (Years of general education required/months of specific training)
* (Years of general education required/years of vocational education)

Source: The information in this table was compiled from a variety of National and International sources.

Table 23

Manpower training in university centers in the last three years

Years: 1967 - 1969

Careers and Courses	Number of Schools	Number enrolled 1967	1968	1969	Number graduated 1967	1968	1969
Medicine	1	272	259	266	49	39	34
Dentistry	1	59	57	58	14	23	9
Veterinary science	1	189	125	136	-	-	8
Sanitary engineering	-						
Nursing	-						
Obstetrics	-						
Pharmacy	1	46	43	48	17	31	16
Nutrition	-						
Statistics	-						
Public administration	1	371	517	414	12	18	15
Social work	1	37	43	50	7	4	8
Medical Technologist	1	41	37	49	7	12	18
Post-basic courses							
Pediatric medicine	-						
Pediatric nursing	-						
Psychiatric medicine	-						
Psychiatric nursing	-						

Source: The information in this table was compiled from a variety of National and International sources.

Table 24

Geographic Distribution of Health Establishments by Groups of Localities

Año 1970

Groups of Localities	Health Establishments			
	Hospitals		Ministry of P.H.	Others
	Est. No.	No. of Beds	Number	Number
TOTAL	54	4,686	96	15
With 100,000 or more inhbt.	16	2,088	9	5
With 20,000 to 99,999 inhbt.	20	1,615	1	1
With 2,000 to 19,000 inhbt.	13	872	51	9
With fewer than 2,000 inbht.	5	111	35	-

Source: The information in this table was compiled from a variety of National and International sources.

Table 25

Hospitals by agency and number of beds. A. Short-term hospitals

Year 1969

Agency and size of hospitals Public subsector	No. of Hospitals (1)	No. of beds (2)	No. of dis-charges (3)	Patient days (4)	Average length of stay (5)	Per centage occu-pancy (6)	Turn-over rates (7)	Dis-charges per 100 Population (8)	Patient days per 100 Population (9)
National Board of Social Welfare									
Total	19	2.648	86.484	666.983	7.7	69	33	4.4	34.0
Under 10 beds	-	-	-	-	-	-	-	-	
10 - 49 beds	4	133	3.985	40.046	10.0	82	30	-	
50 - 99 beds	5	418	5.732	60.393	10.5	40	14	-	
100-499 beds	9	1.285	49,284	328.940	6.7	70	38	-	
500 beds and over	1	812	27.483	237.604	8.6	80	34	-	
Social Security Institutions									
Total	6	493	20.325	161.093	7.9	90	41	15.1	119.7
Under 10 beds	1	6	-	-	-	-	-	-	
10 - 49 beds	4	90	3.678	19.144	5.2	58	41	-	
50 - 99 beds	-	-	-	-	-	-	-	-	
100-499 beds	1	397	16.647	141.949	8.5	98	42		
500 beds and over		-					-	-	
Other (specify) Military Hospital									
Total	1	145	1.403	43.070	30.7	81	10	8.8	
Under 10 beds	-	-	-	-	-	-	-	-	
10 - 49 beds	-	-	-	-	-	-	-	-	
50 - 99 beds	-	-	-	-	-	-	-	-	
100-499 beds	1	145	1.403	43.070	30.7	81	10	8.8	
500 beds and over									

Source: The information in this table was compiled from a variety of National and International sources.

Table 26

Hospitals by agency and number of beds. B. Long-term hospitals

Year 1969

Agency and size of hospitals Public subsector	No. of Hospitals (1)	No. of beds (2)	No. of dis-charges (3)	Patient days (4)	Average length of stay (5)	Per-centage occu-pancy (6)	Turn-over rates (7)	Dis-charges per 100 Population (8)	Patient days per 100 Population (9)
Ministry of Health									
Total	4	946	1.129	195.904		57	1.2	0.06	10.0
Under 10 beds	-	-	-	-		-	-	-	-
10 - 49 beds	1	42(a)	s/d	s/d		s/d	s/d		
50 - 99 beds	1	86	6	30.606		98	0.1		
100-499 beds	2	818	1.123	165.298		55	0.4		
500 beds and over									

Source: The information in this table was compiled from a vareity of National and International sources.

Table 27

NICARAGUA: PROGRAM OF PUBLIC INVESTMENTS BY SECTORS

1965 - 1969

(Millones de Cordobas)

Sectors	1965	1966	1967	1968	1969	Total
Economy	135.2	138.4	161.5	202.0	227.4	864.5
Transportation	81.9	64.5	78.6	98.9	123.9	447.8
Energy	28.9	30.0	31.1	53.6	45.0	188.6
Communication	2.4	4.4	12.8	8.5	8.5	36.6
Agriculture	22.0	39.5	39.0	41.0	50.0	191.5
Social	40.5	77.6	91.5	103.2	112.1	424.9
Health	18.5	31.9	33.8	36.5	38.8	159.5
Education	4.7	12.6	17.1	19.3	21.8	76.5
Housing	16.3	33.1	40.6	47.4	51.5	188.9
Others	8.0	10.0	11.0	13.0	16.0	58.0
Total	183.7	226.0	264.0	318.2	355.5	1,347.4
Plan	167.4	209.3	253.9	264.6	297.4	1,192.6
Difference	16.3	16.7	10.1	53.6	58.1	154.8

PERCENTAGES

Sectors	1965	1966	1967	1968	1969	Total
Economy	73.6	61.2	61.1	63.4	63.9	64.2
Transportation	44.6	28.5	29.8	31.0	34.8	33.3
Energy	15.7	13.3	11.7	16.8	12.6	14.0
Communications	1.3	1.9	4.8	2.7	2.4	2.7
Agriculture	12.0	17.5	14.8	12.9	14.1	14.2
Social	22.1	34.4	34.7	32.6	31.6	31.5
Health	10.1	14.1	12.8	11.5	10.9	11.8
Education	3.1	5.6	6.5	6.1	6.2	5.7
Housing	8.9	14.6	15.4	14.9	14.5	14.0
Others	4.3	4.5	4.2	4.1	4.5	4.3
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Plan	91.1	92.6	96.2	83.2	83.7	88.5

Source: Plan Nacional de Desarrollo Economica y Social de Nicaragua, Program de Inversiones Publicas, Part II, 1965

Table 28

Nicaragua Report

Mauric J. Williams, Deputy Administrator of the Agency for International Development and President Nixon's Special Coordinator for Emergency Relief to Nicaragua, reported to the President in both January and February on the progress of relief and reconstruction efforts in Nicaragua following the December 23 earthquake. Most of the capital city of Managua (War on Hunger, February 1973) was destroyed. The Wisconsin Partners of the Americas program was one of the "outstanding examples of private initiative" cited by Mr. Williams in his second report to President Nixon in mid-February.

Total U.S. assistance to Nicaragua as of February 15, 1972, was as follows:

U.S. GOVERNMENT COMMITMENTS

Military Supplies & Equipment	$2,512,216
Military Airlift	1,080,000
AID Emergency Housing	3,000,000
AID Procured Supplies	1,006,600
Commercial Transport	350,000
U.S. Contributions to OAS	25,000
Ongoing Cost Not Yet Reported	200,000
Food for Peace	4,300,000
Multi-purpose Loan	15,000,000
TOTAL	$27,473,816

U.S. VOLUNTARY AGENCIES

American Red Cross	$251,400
CARE	544,513
Catholic Relief Services	783,078
Church World Service	19,500
Community Development Foundation	30,000
Mennonite Central Committee	2,000
Salvation Army	25,000
Seventh Day Adventists	29,750
Wisconsin Partners of the Americas	234,750
World Relief Commission	12,000
World Vision Relief Organization	25,000
TOTAL	$1,956,991

ANNEX

PAHO Projects - FY 1971-FY 1974

Nicaragua-0200, Malaria Eradication

The entire country of Nicaragua, with a population of 1,912,000, is considered to be malarious. In 1970 the triennial plan terminated without having attained interruption of transmission, due in large part to the resistance of the vector A. albimanus to DDT in the Pacific coastal border and in part of the central region. In these areas there is a population of 1,289,000, or 67.4% of the population of the malarious area. In 1971 the use of propoxur as an alternative method was planned for the protection of 55,000 houses with the application of four trimestral cycles. Because of budgetary limitations, this insecticide was only applied to 20,000 houses in two cycles. In areas where the vector is susceptible to DDT, 17,000 houses were protected with this insecticide in two semestral cycles.

Because of its limited character, the operations carried out in 1971 had little effect on the incidence of malaria in the country as a whole, but there was a favorable local response, particularly in the areas treated with propoxur, where the incidence of P. falciparum diminished noticeably. In a survey carried out in the second half of 1971, 450 blood samples were taken from children under one year of age; five were positive, and only one case was classified autochthonous. In 1971, 223,098 blood samples were examined with 25,303 positive (11.3%); and in 1970, of 281,386 samples taken, 27,260 were positive (9.7%).

UNICEF cooperates in this project.

Nicaragua-2200, Water Supplies

At the end of 1971, 70% of the urban population and 10% of the rural population in Nicaragua had water services by house connections; 44.6% of the urban population had sewerage service; and in rural areas, this service was provided only by individual systems. The objective of this project is to improve and strengthen the administrative practices and procedures of the National Department of Waterworks and Sewerage Systems, with a view to improving and enlarging the services provided, especially to the rural areas. Training of personnel, professional and auxiliary, is also included in this project.

Nicaragua-2201, National Water Supply Program

The objectives of this project in Nicaragua include the improvement and reform of the administrative procedures of the Departamento Nacional de Acueductos y Alcantarillados (DENACAL). This is to be accomplished through the development of manuals, standards, and regulations, as well as improving data systems in order to permit better operating ability and control. This technical-administrative nationalization of DENACAL will be carried out in accordance with the multidisciplinary team approach of PAHO. The training schemes for personnel in technical-administrative activities will be developed and coordinated with the team activities. A series of follow-ups will develop the necessary evaluation regarding the applications of recommendations and those adjustments that may be considered necessary.

Nicaragua-2202, Water Supplies in Managua

The purpose of this project was to provide advisory services to the Empress Aguadora de Nicaragua in the development of a technical-administrative program on potable water systems.

Nicaragua-3100, Health Services

The objectives of this project in Nicaragua are to improve the overall administration,

including the legislation and the structure of the Ministry of Health at national, regional, and local levels; to provide better planning, implementation, and execution of the health programs, with emphasis on an effective population coverage through the basic integrated health programs and services; to train professional and auxiliary personnel; and to coordinate the health activities with the national institutions responsible for the medical care services.

UNICEF cooperates in this project.

Nicaragua-3300, Laboratory Services

Lack of regulations on the functioning of laboratories as well as lack of information on the demand for and use of services is a constant preoccupation of those revising the laboratory services in Nicaragua. In 1971 there were 87 laboratories, with plans to increase the number to 96 in 1972. The objectives of this project are (1) the reorganization of the technical-administrative structure of the entire laboratory system of the Ministry of Public Health; (2) the improvement and expansion of the Central Laboratory; (3) the creation of new regional laboratories and improvement of the existing ones; (4) the improvement and expansion of local laboratories; and (5) the training of personnel.

Nicaragua-4200, Nutrition

The purpose of this project is to provide advisory services to the Division of Nutrition and to the National Committee of the Nutrition Program in Nicaragua; to participate in the programming and conduct of training at a national level; to assist in the training of professional personnel at institutions outside the country by means of fellowships; and to provide scientific literature for use of personnel.

UNICEF cooperates in this project.

Nicaragua-4800, Medical Care Services

The three agencies of the Government of Nicaragua which provide diagnostic services and hospitalization have 4,232 beds distributed in 30 hospitals. The national average of beds is acceptable, 2.4 per 1,000 population, but the distribution is very poor. The services provided by the three agencies also show marked differences. The purpose of this project is to improve the administrative structure of the hospital system to obtain better quality of care and to train personnel by means of short courses, seminars, clinics, and fellowships.

Nicaragua-4900, Maternal and Child Health and Family Planning

Due to high infant and maternal mortality, a high percentage of induced abortions, and the need for providing prenatal and postnatal care through maternity hospital services, the Government of Nicaragua has requested the Organization's assistance in the establishment of a maternity-centered family planning program.

The objectives of the program are to support the national MCH and family planning program through improvement of activities based in maternity hospitals, with referrals to surrounding clinics; to provide information, education, and motivation in family planning to women in the postpartum, postabortion, and gynecological and obstetrical wards; and to aid in the development of continuous prenatal, partum, and postnatal maternal services, with a referral system for neonatal and pediatrics care. The program will be located at the Hospital General El Retiro in Managua, where clinical services will be provided. Medical and paramedical personnel will receive specific training. Fulltime medical officers will serve as supervisors and directors. Limited material assistance will be provided for expanding postpartum services.

AID cooperates in this project.

Nicaragua-6200, Medical Education

The objectives of this project are to collaborate with the School of Medicine of the National Autonomous University of Nicaragua in providing better instruction in the program of the health sector in the training of physicians; to improve the training of professors in the School of Medicine; to promote scientific investigations; and to assist in planning and operation of new facilities.

Nicaragua-6400, Sanitary Engineering Education

The purpose of this project is to strengthen the teaching of sanitary engineering at the Faculty of Physics and Mathematics of the National University of Nicaragua. One of the principal objectives is to cooperate in the training of personnel of the agencies responsible for programs in sanitary engineering and environmental sanitation. The project covers a fellowship program for teaching personnel and staff members of the official agencies; organization of short intensive courses in areas of environmental engineering; improvement of laboratory and library facilities; and promotion of applied research.

Nicarauga-6600, Dental Education

The principal objectives of this project are to assist in improving the Department of Social and Preventive Dentistry of the School of Dentistry of the National Autonomous University of Nicaragua and also preclinical and clinical instruction; to improve the technical preparation of students in social and public health, including the preventive and scientific aspects of dentistry; to investigate and resolve the serious dental public health problem due to the lack of a sufficient number of dentists; to develop an education campaign to raise the dental health level in the different communities; to promote scientific investigation; to train dentists and auxiliary personnel in public health dentistry; and to coordinate the teaching activities with the national dental health services.