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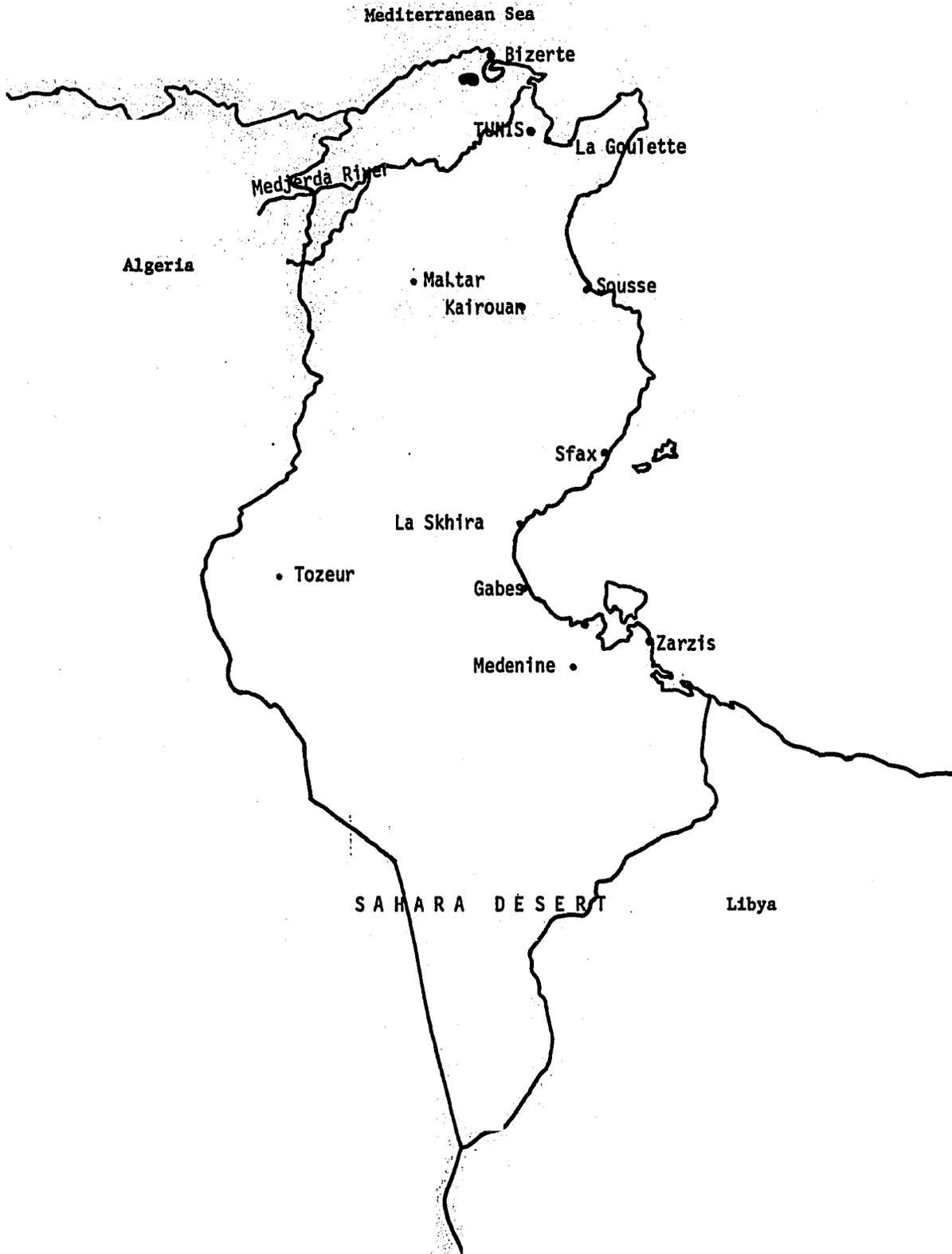
**SYNCRISIS:**  
**THE DYNAMICS OF HEALTH**

*An Analytic Series on the Interactions  
of Health and Socioeconomic Development*

**XV: TUNISIA**

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

**OFFICE OF INTERNATIONAL HEALTH  
DIVISION OF PROGRAM ANALYSIS**



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SYNCRISIS

THE DYNAMICS OF HEALTH

An Analytic Series on the Interactio  
of Health and Socioeconomic Development

TUNISIA

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#### PREFACE

This report was prepared by the Division of Program Analysis of the Office of International Health, Department of Health, Education, and Welfare in response to a request from the Agency for International Development. The health section of the report was originally prepared to assist AID in reviewing its development assistance programs in Tunisia.

This is the fifteenth volume in an ongoing series funded by AID to explore the interrelationship of health and socioeconomic development. The information contained in the report was based upon a number of official and unofficial sources available in the United States and Tunisia.

The authors are grateful for the assistance and helpful comments of a number of people, especially the staff of the USAID Mission/Tunis.

**FRAMEWORK FOR ANALYSIS**



## PHYSICAL SETTING

Tunisia is strategically located on the Mediterranean Sea between North Africa, Europe and the Middle East. Easily accessible by sea, and from the east, by land, Tunisian history has been heavily influenced by the diverse cultures of its neighbors. Invading forces at various times have come from Phoenicia, Rome, Arabia, Turkey, and most recently from France. Today the population is almost completely Arabized with few of the indigenous Berber inhabitants remaining in isolated groups throughout the country. Dwarfed by its Mahgreb neighbors, Libya to the east and Algeria to the west, Tunisia covers 163,610 square kilometers, approximately the size of the state of Georgia. The Mediterranean coastline extends about 1,200 kilometers along the northern and eastern borders.

Climate critically affects the nation's economy, food supplies and general health of its people. Major factors influencing it are the Mediterranean Sea in the northern and coastal areas, the Sahara desert in the south and the Atlas Mountains in central and western Tunisia. There is a cool, rainy season lasting from December to March while the remainder of the year is warm and dry. Seasonal variations in temperature are not great because of the sea's moderating effect, except in parts of the south and the interior. Mean annual precipitation ranges from 60 inches on the northwestern coastal slopes to less than four inches in the southern desert region. Due to lack of water and soils which are rocky, sandy or saline, less than one-half of the country's land is naturally suitable for agriculture. Even in the wetter northern area, Tunisia's climate is irregular, causing great variations in agricultural production. Floods due to heavy rains may also prove hazardous at times. Nonetheless, irrigation could add many productive kilometers of land to the approximately 50,000 presently cultivated, especially in the north and central plateau areas.

Tunisia can be divided into three topographical and climatic regions. These include the fertile Northern Region, lying between the northern Mediterranean coast and the southern dorsal of the Atlas Mountains; the semiarid central plateau of the Central Region, extending into the eastern coastal plain; and the arid Southern Region which eventually joins the Sahara desert.

The Northern Region, comprising about 25 percent of the country's land, is the source of most of Tunisia's agricultural produce. The Medjerda River, Tunisia's principal and only perennial river, flows through this area of fertile clay soils. The average annual rainfall is 10 to 24 inches but reaches 60 inches in the mountains near the Algerian border. Running from midway along the Algerian border to the eastern coastline into the Cape Bon peninsula, these mountains serve as an important climatic barrier, catching and holding Mediterranean showers and dividing the north from the central plateau. Within the forested mountainous area, population is sparse and cross-country movement restricted to a few all season roads limiting access to modern health services.

The rainfall and its distribution from September to May make much of the region ideally suited for production of winter cereals which are harvested in the dry summer months. About 80 percent of the country's wheat is grown in the Northern region, as are many vegetables, forage crops and deciduous fruits. This region contains most of the country's water resources, has most of the developed irrigation and offers the best potential for expanding irrigation.

South of the dorsal the Central Region begins with an extensive platform sloping gently towards the eastern coast where barren hills and high plateaus ease into the flat coastal plain of the Sahel. Occasional watercourses cross the area but flow only after heavy rain, and even then usually fan out and evaporate in salt flats before reaching the sea.

Annual rainfall in the area is 8 to 16 inches, insufficient for regular cultivation of most crops without irrigation. There is no continuous cover of vegetation. Large areas of the teppes support only clumps of wiry esparto grass which is collected and exported for paper manufacture. While irrigation is a possibility in some sections much of the area is likely to remain devoted to the grazing of livestock.

A relatively small subregion called the Sahel includes Cape Bon and the coastal plains south of Sfax and beyond. This area has little rainfall and, except for olives and almonds, most crops require irrigation. The warmth and moisture provided by the sea make this area a major producer of olives. Most of Tunisia's citrus fruits come from Cape Bon and are watered by pump irrigation from wells. Other fruits and vegetables also grow well with irrigation, though the possibilities are not so promising as in the north.

The Southern Region is a pre-desert to desert zone receiving an average annual rainfall of inches which fall only at rare intervals. Except where supplies of ground water make cultivation possible, the land supports only a sparse nomadic population. Around oases irrigated dates, wheat and vegetables are grown. During years of rainfall, some dry land barley and wheat are grown but production is marginal. The area is important for the production of phosphate rock as well as oil and other minerals.

The rolling sand dunes and marshes of the South are breeding places for flies and mosquitoes during and following the rainy season. The enervating hot, dry climate coupled with inescapable dust and sand makes living uncomfortable and maintenance of any kind of equipment difficult. The extreme temperatures and dry, dusty conditions inhibit travel and the spread of services. Hot, sand-laden winds (siroccos) blow periodically out of the southwest and throughout the country causing eye and respiratory infections and general debilitation.

## SOCIAL ENVIRONMENT

### The People

The majority of Tunisia's nearly six million inhabitants are concentrated in towns and rural areas of the north and northeastern coastal area. Here fertile land, relatively dependable rainfall, perennial waterways and major harbors favor agricultural production, industry, and commerce. In contrast, the central and southern parts of the country support only scattered settlements and nomadic pastoralists with a generally low standard of living and high rate of births. Though population density for the entire country is about 80 people per square mile this rate varies considerably from section to section: as high as 972 per square mile in Tunis to less than 10 in areas of the south. An estimated 80 percent of the population live in rural areas but migration to the cities is increasing.

Ninety-seven percent of all Tunisians are a mixture of Arab and Berber stock. Adherence to the Moslem faith binds most of the population into a close cultural unity. The only readily distinguishable minorities are the Europeans and Jews who live mostly in Tunis, plus a few isolated groups of pure Berbers throughout the country, and some even more isolated pure Arabs who make up the wandering Bedouin population of the southern desert area. Though the Europeans and the Jews have been the objects of hostility at times, and their numbers have been reduced as a natural consequence of Tunisianization since independence, those remaining have managed to maintain political and economic power, as well as their cultural identities. Significant divisions occurring in the society cannot thus be accounted for entirely by ethnic differences but are more closely associated with variations between traditional and modernizing, rural and urban, sedentary and nomadic lifestyles.

Language reflects this diversity. Three languages are used in Tunisia, each a reflection of the culture with which it is linked: colloquial Arabic, classical Arabic, and French. The indigenous language, Berber, is spoken only among the small Berber colonies of Tunisia, while colloquial Arabic is commonly used by the traditional population. Arabic, especially that spoken and written by the more educated citizens, represents the great historical Arabian heritage shared by Tunisia. French, the language of colonialism, is also the sign of education and a necessity for careers in government and business. Thus, the use of any one of these languages implies association with a certain socioeconomic class and produces dilemmas of personal and national identity on a political, religious and/or moral level. The question of language emerges on a national level as Tunisia relates to its African, European and Middle Eastern neighbors.

### Family and Culture

Tunisian family structure originally followed the Arabian pattern of three-generation extended family units. However, western influence and urbanization is changing the configuration to a simple nuclear family, especially in the larger cities. The household remains a common unit for agriculture and small business enterprises.

With the abolition of polygamy, the restriction of divorce to within the courts and the establishment of a minimum legal age for marriage (17 for women, 20 for men), women are slowly acquiring the rights and responsibilities to allow their full participation in Tunisian society. Restrictions on marriage and divorce, religious and official support for family planning, and a greater role for women in the social and economic life of the country, should eventually have an effect on the population growth rate.

Some social customs have a bearing on the state of health. Among traditional Tunisians many physical ailments and deaths are attributed to supernatural forces or evil spirits, such as the Evil Eye or various wicked jinn. Funeral traditions, still followed by some, include the distribution of clothing and bedding of a deceased person to his funeral attendants, kissing

and hugging of the corpse, and indiscriminate disposal of water used to cleanse the body before burial. The belief still prevails that fever can be drawn from a sick person by placing him between two healthy individuals. Maternal and infant health is endangered by pregnant women who eat dirt to alleviate labor pains and by the custom of rubbing dung on the cut umbilical cord. The refusal of women to expose themselves to any male limits the potential for medical treatment. Though folk remedies, some of which are rational and fairly effective, are still common in rural areas, modern curative medicine is gradually becoming accepted and sought after.

Islam has a strong influence in the daily lives of many Tunisians. While some of the ritualistic practices are closely related to personal hygiene they can be harmful in certain circumstances. The washing of face, hands, and feet in public basins before prayers can spread disease. Cleansing after defecation which is prescribed by the faith, encourages fecal-oral spread of intestinal infections through public water sources. The observance of Ramadan, a month long, daytime fasting period, can be harmful to the undernourished. Traditional Islamic views also include a fatalistic acceptance of disease and physical distress which inhibits seeking help.

Consumption of alcoholic beverages and narcotics is prohibited by the Islamic faith, yet hashish, locally known as kif, is widely used. Effective control over the importation and distribution of narcotic drugs and amphetamines restricts their use to medical purposes, while drugs and pharmaceuticals must be registered with the Secretariat of Public Health. Alcoholism is not widespread but is apparently a growing problem.

#### Living Conditions

The standard of living ranges from well-to-do among a small minority to bare survival for many, determined by economic status more than urban/rural location. The upper and middle classes live at levels comparable to those enjoyed by Western Europeans. Lower class groups, on the other hand, inhabit overcrowded, unventilated huts, often along with their animals. Typical low thatched roofs and cracking mud walls form ideal conditions for insect vectors.

Due to ignorance of personal hygiene and inadequate sanitation, common practices contribute to the spread of disease. These include using common sources of water for humans and animals and inadequate disposal of wastes. Urbanization, a growing phenomenon in Tunisia as in much of the developing world, compounds these problems. Unskilled emigrants from the countryside often establish residence in the shanty towns, or bidonvilles, at the periphery of larger cities where crowding and unsanitary conditions favor the spread of disease. Recognizing the seriousness of the situation, the Tunisian government has begun to construct medical facilities for these areas.

Outside of the home the most serious environmental problems are inadequate public sanitation and scarce water supply in much of the country. Except in sections of Tunis and a few of the other larger cities, public sanitary facilities are inadequate or altogether lacking. Tunis has a central waterborne sewage system along with sufficient sewage treatment facilities; the greatest problem here and in other coastal cities is the backup of sea water into the systems. The older quarters of cities tend to be inadequately serviced. Primitive methods are used in the villages where collected waste is carried in carts and dumped just outside of the village area or used as fertilizer. The dumps become breeding places for flies and contribute to the spread of disease.

Modern garbage disposal methods can also be found in the larger cities where trash is effectively collected and burned. In smaller towns and villages garbage is indiscriminately disposed of, again causing problems of insect infestation.

Water is generally in adequate supply in the north but shortages occur in central and southern Tunisia particularly during the summer months. Except for artesian wells in these

areas water supplies are frequently of poor quality and may be unsuitable even for agricultural purposes. Water sources may also be polluted by human or animal waste. Central supplies in larger cities are generally safe but maintenance is sometimes inadequate resulting in interruption of service and the possibility of contamination.

### Education

Since independence in 1956 the Tunisian government has seen education as the key to achieving social and economic development. Consequently, between one-fourth and one-third of the national budget has been allocated each year to developing the educational program from primary level through higher education. The results have been impressive: between 1958 and 1971 enrollment has increased from 320,000 to 934,000 in primary schools, 33,000 to 184,000 in secondary schools and from 2,000 to 11,000 in higher education. By 1971, of the 6-14 age group, 73 percent were attending school (including 90 percent of boys of that age and 55-65 percent of the girls); figures for attendance among the 15-19 and 20-24 age groups were 42 and 3 percent, respectively. However, for the population between the ages of 15 and 45 years there are an estimated 1,600,000 people who cannot read or write.

Despite the great progress made, the original goal of universal primary education by 1972 has not been met. The government's policy is to provide a basic education to all children but there are significant differences in urban/rural, male/female enrollments.

Primary school training is designed to last six years for the 6 to 12 year olds. The curriculum is complicated by languages. Classical Arabic, which differs from the dialect spoken in the home, is used for part of the instruction. French is introduced at an early grade and becomes increasingly important as the student progresses until the university level where it is used almost exclusively.

Primary education is directed more toward preparation for entrance exams into the secondary level than to skills appropriate for participation in daily economic and social affairs. Further, many students repeat one or more years, requiring more than the standard six years to complete primary school. Even with the large percentage of repeaters, 30 percent of Tunisian students leave school without finishing their primary education. Of those who stay 23 percent fail to qualify for entrance to secondary education.

Secondary education is of two types: professional training which lasts for four years and classical secondary training which lasts seven years and prepares the student for university study. At both the secondary and higher levels science, technology and vocational education lack sufficient support. The government recognizes this problem and is moving to correct it. There is also concern for the rising costs and growing demand for secondary education despite the increase in unemployment of school leavers, especially those without technical training. Contributing to the high costs is the government support granted to all students and money allocated to maintaining the foreign teachers who make up almost one-third of the teaching staff. Of all students who enter the secondary level only 25 percent stay to complete it.

To improve the quality of education the government recently lowered the size of classes resulting in a drop in the number of children attending school: in 1971 the number students in primary school was 934,000 while in 1973 it had dropped to 850,000; in non-technical education the number fell from 128,000 to 122,000. The reduction of admissions to secondary schools from 40 to 25 percent of primary school graduates affected those from poorer homes and rural areas most severely since entrance examinations required a higher level of French than previously.

Tunisian institutions of higher education enroll about 11,000 students, while an additional 3,000 go abroad for university training. As at the secondary level, the bulk of enrollment in the liberal arts is not in accord with the employment market demand for scientific and technical skills. Recognizing this imbalance the Ministry of Education is placing increased emphasis on enrollment in these fields.

Agricultural training falls under the auspices of the Ministry of Agriculture. It provides programs which range from training specialized workers to preparing students for university degrees. In 1972, 460 persons graduated from junior and senior secondary agricultural schools designed to prepare extension agents, while 5,700 persons completed two-year practical farm training at 31 agricultural vocational training centers.

Non-formal education in Tunisia is designed to complement the regular school program, and to provide specialized training of short duration building upon the general knowledge acquired through formal education. Organized shortly after independence, vocational training centers were initiated to train Tunisians to fill the jobs of departing foreigners. Currently 7,200 persons are trained annually for periods ranging from six months to two years in 27 centers for adult training. Other vocational training includes a pilot program in primary schools, on the job apprentice training, handicraft and social education classes, and other evening and correspondence courses. Outside of the Ministry of Education, then, the estimated number of students receiving some type of education is 27,400 per year.

There are important relationships between the education sector and the health status of the population. Knowledge of personal hygiene can be provided to school children so they have an understanding of the source of disease and are exposed to good habits in the school that will carry over into the home. Unfortunately, there is little attention to this relatively inexpensive and potentially effective means of spreading knowledge of disease and developing good habits. Week-long conferences have been held in 1974 and 1975 involving the Ministries of Health and Education, the Office of Family Planning, and a number of school administrators to promote a feasible program, train manpower, and develop appropriate training materials. UNESCO has sent a consultant to provide training for school teachers and prepare educational materials.

Another important relationship between the education and health sectors involves the large amount of the national budget devoted to the social sector which is required to support a school system with an increasing school age population. Effective family planning programs could reduce the birth rate, the consequent load on the school system, and the need for increasing resources required for education in the face of other pressing social needs.

## ECONOMY

### General

The Tunisian economy has been characterized by somewhat erratic but strong growth over the past few years. Agriculture is the largest sector (currently accounting for about 18 percent of GDP) and poor harvests or low commodity prices can have a disproportionate effect on the overall economy. Food processing, an important component of the manufacturing sector, is also affected by variations in agricultural production. The most dramatic improvement in the economy, however, has been due to the increased production and strong world prices for phosphates and petroleum.

In 1974 the per capita national income was \$450, about 35 percent over the 1972 level. Although the money supply has been expanding rapidly, and wholesale prices rose sharply in 1974, consumer prices are a relatively modest 17 percent higher than 1970 due in large part to government subsidies for certain basic commodities.

Mainly as a result of excellent foreign exchange earnings from petroleum and phosphates the balance of payments is in surplus and foreign exchange is at a record level. Imports, mainly of foodstuffs, are in excess of exports but services and capital inflows have enabled payments to remain in the black.

The level of unemployment and underemployment is high and is estimated at 15 percent. Tunisia has been able to export part of this problem by encouraging workers to emigrate to other countries, primarily France. This outflow of Tunisian manpower has had the twofold effect of relieving, at least temporarily, a serious social problem and providing substantial levels of foreign exchange remitted by overseas workers. The government is trying to cope with the remaining unemployment by increasing domestic investment (currently about 24 percent of GDP) and through efforts to attract foreign capital. Favorable exchange earnings and domestic savings have resulted in somewhat less reliance on foreign investment.

Particularly since 1968 tourism has represented a large and consistent source of foreign exchange earnings. In 1972 over 650,000 visitors provided receipts of approximately \$100 million. The growth of tourism levelled off in 1973 and 1974. This slowdown was attributed to currency realignments, which made Tunisia relatively less competitive, and increases in transportation costs. Although Tunisia has much to offer the tourist in terms of accommodations, climate, and places of interest, the growth of the tourist industry will depend heavily on general economic conditions in Europe.

### Agriculture

The total land area of Tunisia is approximately 16.2 million hectares and is broken down as follows (in millions of hectares):

	<u>North</u>	<u>So. Central</u>	<u>Total</u>	<u>Percent</u>
Arable land	1.90	2.30	4.20	26.0
Pasture land	.45	1.80	2.25	13.9
Woods and Forests	.40	.90	1.30	8.0
Non-agricultural	.10	8.35	8.45	52.1
TOTAL	2.85	13.35	16.20	100.0

Of the land under cultivation the following table shows the acreage dedicated to various crops and the per capita acreage (in hectares):

<u>Type of Crop</u>	<u>Total Land Area</u>	<u>Land Area per Capita</u>
Fruit tree	1,307,000	.273
Cereals	1,570,000	.328
Legumes	76,000	.016
Vegetables	51,000	.011
Other	<u>344,000</u>	<u>.072</u>
TOTAL	3,348,000	.700

Tables on the following pages give agricultural production for the period 1966-72 and data on livestock and poultry availability.

Since 1960 Tunisia has been a net importer of grain. In spite of the fact that wheat is grown in large amounts, and indeed is the principal agricultural product, it has consistently been the most important food import. Olive oil is the main agricultural export earner. There are, however, wide fluctuations from year to year in harvest and export earnings of olive oil.

Although nutrition will be considered in greater detail later in this report, there is obviously a close relation between the types of food produced and the diet of the population. Generally speaking the diet of the great bulk of the population consists almost entirely of cereals, vegetables, and oils.

#### Manufacturing and Extractive Industries

Although still a modest contributor to the GDP (currently about 10 percent) manufacturing is growing at a rapid rate. Development of the sector had been retarded by dependence on France and its market. The Tunisians are now making great efforts to attract foreign investment, particularly for export-oriented industry, and provide a favorable investment climate. The government attaches a high priority to industrialization to provide greater employment opportunities, increase foreign exchange earnings, and raise per capita income.

Food processing still represents an important segment of manufacturing but growth in the sector has been in other areas: chemicals, cement, light mechanical and electrical equipment, textiles, processing plants for phosphates, and oil refineries.

The extractive industries, particularly petroleum and phosphates, have shown the most dramatic growth in production and earnings. Phosphate production for 1974 was 4 million tons versus 3.3 million tons in 1973. The sharp increase in prices, however, raised earnings from 15.7 million dinars in 1973 to 66.9 million dinars in 1974. There is no certainty that world prices will remain at their current level but Tunisia is planning to expand production to 5.75 million tons by 1978. The development of phosphoric acid and new fertilizer plants hold promise for significant long term benefits in terms of greater value added, higher export earnings, and more jobs.

Petroleum has become the major source of foreign exchange earnings and budget revenue. The estimated production in 1974 was 4 million tons with about two-thirds of that amount exported. Production and exports have remained relatively stable but revenue has tripled due to high prices. When proven offshore reserves are brought into production earnings will increase

<u>Production Estimates</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972<sup>a</sup></u>
				(in thousand tons)			
<u>Crops</u>							
Wheat	349	330	383	300	442	600	
Barley	80	70	100	80	150	140	1,100
Sugar beet	38	37	28	34	30	27	25
Tobacco	2.2	2.3	2.8	2.7	2.6	2.0	2.5
<u>Fruit</u>							
Olives <sup>b</sup>	100	275	235	264	125	474	835
Olive oil <sup>b</sup>	19.5 <sup>c</sup>	51 <sup>c</sup>	57.5	62.7	28.3	93.3	167
Grapes	165	148	142	131	102	151	152
Wine <sup>c</sup> (100 hl)	1,265	978	985	847	568	1,050	1,050
Deciduous	26	35	32	37	32	43	---
Figs	20 <sup>b</sup>	24 <sup>b</sup>	33	14	13.8	14.5	---
Dates	54 <sup>b</sup>	42 <sup>b</sup>	39 <sup>b</sup>	60 <sup>b</sup>	46	39	60
Citrus fruit	82 <sup>b</sup>	110 <sup>b</sup>	66 <sup>b</sup>	98 <sup>b</sup>	101	77	127
<u>Market Gardening</u>							
Potatoes	68	79	58	52	68	90	107
Tomatoes	149	149	86	137	165	165	165
Peppers	---	---	47	47	58	83	76
Alfa grass	66	108	109	74	84	79	---

a/ Estimates or unofficial reports

b/ Season ending in year

c/ Season beginning in year

Estimated grain production for 1972 is a record 1,008,000 tons including 788,000 tons of wheat. The results for 1973 should be on the order of 900,000-1,000,000 tons of grain, 180,000 tons of tomatoes, and 350,000 tons of olives.

Source: Economic Commission for Africa, Summaries of Economic Data, Compiled October 1973.

FAO PUBLISHED FIGURES

<u>Livestock: Herds</u>	<u>1964/65</u>	<u>1965/66</u>	<u>1966/67</u> (thousand head)	<u>1967/68</u>	<u>1968/69</u>	<u>1969/70</u>
Cattle	592	592	575	592	600	610
Sheep	3,365	3,767	3,500	3,400	3,300	3,200
Goats	475	527	490	480	470	460
Pigs	4	5	6	7	7	7
Equines	292	303	315	317	328	335
Camels	169	150	214	220	225	230
Poultry	5,500	5,500	6,500	7,000	7,500	8,500

Source: Economic Commission for Africa, Summaries of Economic Data, Compiled October 1973.

accordingly given a continuation of present price levels. A number of U.S. and other oil companies are involved in development of oil resources with the Tunisians.

The production of iron ore amounted to about 480,000 tons in 1974. About 60 percent of this was exported and the balance refined in Tunisian mills. The ore in the Djerissa mine has high metal content and the ease of working it favored exploitation. Other known deposits, however, have been exploited only intermittently and without adequate equipment. Small amounts of lead and zinc are mined but there are still substantial underdeveloped deposits of these minerals.

#### Employment

Since census data are not available after 1966, it is impossible to describe the current employment situation with great accuracy. However, in 1972 the government estimated the number of people employed at approximately 1.4 million. Of that figure about 50 percent were employed in agriculture, while a total of 65 percent of the population is dependent upon that sector.

Because of the large proportion of agricultural workers, seasonal employment is common. Among the estimated 1,047,000 employed men, 713,000 have permanent jobs leaving one-third (334,000) with only seasonal work. The figures for females showed 250,000 of 342,000 employed women working in agriculture, most of whom entered the work force because of a shortage of family labor at times of peak demand and thus may also be counted as seasonal workers. Permanent employment, therefore, is held by only half of the total working population.

Unemployment in 1972 was estimated to affect 130,000 workers. Over the years 1973 and 1974, 31,500 and 40,000 new jobs were created, respectively. Yet the total number of persons entering the labor force exceeded the number of new jobs created by 33,500; 28,000 emigrated, 19,000 in 1973 and 9,000 in 1974, leaving 5,500 newly unemployed. The current estimated unemployment rate is 15 percent of the labor force.

The rate of unemployment would be at an intolerable level except for an estimated 200,000 Tunisians working abroad. If the European economies should deteriorate to such an extent that there would be a "freeze" on the employment of foreigners, or worse that foreigners would be repatriated to make room for nationals of the host countries, the Tunisian unemployment problem would become much worse.

#### Transportation

Tunisia's transportation system, in large part an inheritance of its colonial period, is relatively modern and well developed. The total road network of 10,394 miles connects the cities on the coast with major inland settlements. About one-half of the road network is hard surfaced, all weather highways. There are plans to improve roads in the more isolated southern part of the country where many towns and villages can only be reached by tracks. The relatively small size of the country, and the concentration of the bulk of the population in the northern and eastern parts of the country, makes a system of regional health facilities practical from the point of view of transportation.

The rail system is small (about 1,255 miles) but links the most important mining and agricultural centers with the sea. There are plans for a standard gauge rail line between Sfax and Tripoli, Libya, to be jointly undertaken by the two countries and financed by Arab and international development funds.

Tunisia's four major deep water ports are located at Tunis-La Goulette, Bizerte, Sousse and Sfax and another is being constructed at Gabes. A special port at La Skhirra handles the shipping of much of the country's petroleum, while the Sfax harbor is principally used for the export of phosphates. International air traffic can be accommodated at the Tunis-Carthage airport. Several secondary airports are located throughout the country.

## SURVEY OF THE HEALTH SITUATION

### Mortality and Morbidity

The health status of the Tunisian population has improved markedly over recent years but lags well behind the levels of the developed countries. The data vary considerably but by comparison with the period at the end of World War II the mortality rate per thousand has fallen from 27 to the 11-16 range while infant mortality has declined from 220 to an estimated 100. In keeping with this drop in mortality the expectation of life at birth has risen from 30 years to over 51 years. Even with a considerable level of underreporting of infant and childhood mortality in the rural areas, nearly one-half of all deaths reported are children under 5 years of age. (See Table 1). Although data are not available there is thought to be wide variation in mortality rates between those of the middle and upper socio-economic classes, whose standard of living is comparable to a similarly placed European population, and the lower classes.

Some of the major communicable diseases of former years such as smallpox, typhus, typhoid, malaria, poliomyelitis and diphtheria have been largely brought under control through vaccination programs. The immunization procedures carried out in 1970 are shown in Table 2. These preventive measures are, however, carried out sporadically rather than on a regularly scheduled basis. It is interesting to note that the diseases in which the most progress has been made are those which are most susceptible to preventive measures.

The pattern of childhood morbidity and mortality has shifted so that the incidence of polio, diphtheria, whooping cough, and tuberculosis has been considerably reduced, while gastro-intestinal infections, upper respiratory infections, and skin disorders have become relatively more important. The incidence and severity of these conditions are not quantified and rest on the views of experienced observers. They are closely related to the prevalence of malnutrition, undernutrition, and the generally low level of environmental sanitation.

For the population as a whole the major disease problems are tuberculosis, respiratory infections, gastro-intestinal and parasitic infections, eye diseases, skin diseases, schistosomiasis, and venereal diseases. Morbidity data are incomplete. Even those diseases for which reporting is required are understated because they are derived from health facilities reports and would neglect cases which do not come to a health facility or are not diagnosed by a physician. Nevertheless, Table 3 gives an indication of the levels of reported disease incidence for the years 1969-71.

Tuberculosis is a major health problem with an estimated 250,000 cases. The crowded and unsanitary living conditions are predisposing factors in its spread. Considerable stress has been laid upon immunization, diagnosis and treatment. A compulsory program of BCG vaccination for all persons under age 20 began in 1959, and recent estimates show that a little under 80 percent of the people in that age group have been reached. There are three specialized hospitals for tuberculosis and lung diseases with a capacity of 948 beds.

Skin diseases are very common; there were an estimated 900,000 treatments for scabies and dermatitis in 1970. Many of these conditions are aggravated by unsanitary living conditions, poor nutrition, and the state of personal hygiene.

Schistosomiasis represents a significant health problem in the southern and southwestern parts of Tunisia where there are an estimated 20,000 cases. Epidemiological and malacological surveys have been carried out in cooperation with WHO. At present there are over 400 sources

under surveillance, while fewer than 20 were positive after one year of treatment of water with molluscicides (Bayluscide), there has been a problem of foci becoming reinfested with the intermediate host. One result of surveillance activities has been the discovery of a new focus of infection at Hadjeb El Aoun, some 140 kilometers north of any previously known infected area and only 200 km from Tunis. In 1973 there were 9,557 cases detected out of 135,600 urine examinations. Authorities state that the population shows a positive attitude both to urine sampling and drug treatment. Results of one group of 827 cases treated with Ambilhar in Gafsa Governorate claim a 90.9 percent cure rate.

Although the exact number of persons infected may be open to question, it is clear from the available data that there is a significant level of infection of the population at risk. The danger of spreading the disease should be an important consideration in any water resource development project.

Trachoma is endemic and is particularly common in areas with low standards of living. It is primarily a disease of very young children and according to the findings of a PL 480 Special Foreign Currency Project, in some villages infects almost the entire population by the age of two years. The disease tends to subside by age 15 but by that time has had a permanent effect on vision. In the more seriously affected areas, up to 15 percent of the adult population have economically significant visual loss. With such a large percentage of children in the total population, the incidence of this disease will have serious consequences for the adult population of the future. Controlled trials are being carried out by Tunisia with PL 480 Special Foreign Currency Program support by University of California at San Francisco and Tunisian scientists to test the effect of various chemotherapeutic measures.

Tunisia has had a malaria control program since the 1930s. Although the threat of the disease has been significantly reduced (there were 19 cases reported in 1972, 4 in the consolidation area and 15 in the attack area), it continues to require operations and surveillance to maintain the gains achieved. The financial costs of anti-malaria activities have been sizable; expenditures in 1971 by the national government, AID, UNDP, and WHO came to \$379,000. Based on the epidemiological situation the country is divided into two operational areas: the three southern governorates (Gafsa, Gabes, and Medenine with a population of nearly one million) are in the attack phase; the remaining governorates (population 4.6 million) are in the consolidation phase. The malaria service Plan of Action calls for geographical reconnaissance, spraying with DDT and anti-larval operations. There is sometimes a serious decline in the quantity and quality of surveillance activities because of the periodic need to transfer malaria program personnel to other activities.

There are periodic outbreaks of cholera. One of the most recent, during the period July 24 to December 14, 1973, had a 26 percent fatality rate among the approximately 200 cases reported. In addition to the morbidity and mortality from the disease, there was considerable disruption to the malaria and schistosomiasis programs as a result of personnel being transferred for duties in the cholera emergency.

Vaccination against smallpox is compulsory and there have been no reported cases of the disease for several years.

There is significant prevalence of leprosy in the Governorates of Sousse, Sfax, Gabes, and Medenine, with an estimated 500 cases. WHO has recommended an integrated leprosy control program in the areas at risk including training courses for the necessary personnel.

Typhoid is an endemic disease with 978 cases reported in 1971 and 904 in 1972. Personnel have been assigned from other programs, particularly malaria and schistosomiasis, for use in typhoid outbreaks.

### Environmental Sanitation

The incidence of the various diseases related to inadequate or unsafe water supplies and sewage disposal are not available but several sources cite these factors as the bases of a major health problem. The data show that there is heavy infant and childhood mortality and by inference the conclusion can be drawn that enteric infections (e.g., amoebiasis, cholera, typhoid, paratyphoid, hepatitis, salmonellosis, shigellosis, poliomyelitis and enterovirus infections) along with some parasitic and helminthic infections, contribute to morbidity and mortality of the young as well as their elders.

Ready availability of sanitary facilities is not enough in itself to control the incidence of disease if the population does not at the same time adopt habits of personal hygiene. The location of piped water and latrines are also important variables in any attempt to improve environmental sanitation. For example, estimates of the number of liters of water used per capita per day are 5-10 from public standposts and 100-150 from house connections. This differential usage due to the greater ease of access of house connections has a direct effect on the willingness to use water for drinking, cooking and washing. However, it has been shown that sanitary facilities properly used have a very important effect on the health of the population and particularly on the health of the younger members of the population.

Tunisia has a problem of adequacy as well as purity of water supplies. The northern part of the country has generally adequate amounts of water but in the south there are shortages during the summer months. The major cities, such as Tunis and Sousse have central distribution systems which use purification chemicals but many smaller cities and rural areas have water that is not potable (due to salinization of ground and surface water) and/or unsafe.

Tables 4 and 5 give data on the population served by community water supply systems and sewage disposal facilities and Tunisian targets for the population to be served by 1980. The level of expenditure in 1970 for environmental sanitation facilities, including national and external sources, was broken down as follows (in thousands of dollars):

	<u>Urban</u>	<u>Rural</u>	<u>Total</u>
Community water supplies	6,090	500	6,590
Sewage disposal	700	-	700
<b>Total</b>	<b>6,790</b>	<b>500</b>	<b>7,290</b>

The proposed expenditures over the decade 1970-80 are shown below (in thousands of dollars):

	<u>Urban</u>	<u>Rural</u>	<u>Total</u>
Community water supplies	36,300	5,200	41,500
Sewage disposal	63,600	-	63,600
<b>Total</b>	<b>99,900</b>	<b>5,200</b>	<b>105,100</b>

On the basis of these projections there seems to be a wide disparity between the priorities for urban and rural environmental sanitation with twenty times as much funding scheduled for the former as for the latter while the population distribution is perhaps 60 percent rural.

Tunisian officials have ranked the constraints they foresee in implementing the proposed projects to reach their environmental sanitation goals. For community water supplies these constraints are:

1. Insufficient internal financing;
2. Insufficient external assistance;
3. Insufficient local production of materials;
4. Lack of trained personnel.

For sewage disposal the stated constraints are:

1. Insufficient internal financing;
2. Insufficient external assistance;
3. Lack of a national organization responsible for the program;
4. Other, miscellaneous.

Since these constraints were originally drawn up it would seem that the Tunisian financial situation has improved materially with sharply higher exports earnings for 1974. Also, the lack of locally produced materials should be less a problem in view of the increased ability to support imports with a favorable trade balance. Perhaps the greatest constraint on better environmental sanitation, particularly in rural areas, has been a lack of interest and leadership in developing programs. It should be noted that in late November, 1974, the Tunisian government announced the establishment of a National Office of Environmental Sanitation. It will apparently have broad authority in the field, but detailed information on its program and budget is not yet available.

#### Nutrition

From an agricultural point of view Tunisia can be divided into northern and southern regions. The northern coastal areas have a typical Mediterranean climate and produce grains, citrus fruit, garden vegetables and grapes. In the north central area grains and livestock are raised, while the northwest is primarily suited for growing cork oak. To the south there is less water, and vegetation and the principal agricultural products are olives and grapes. Further south the vegetation becomes progressively more sparse and agricultural production is limited to camel and sheep raising, small areas of pasturage, and dates.

Of the total land area of 16.2 million hectares about 26 percent is arable, 14 percent is pasture, 8 percent is forests, and the balance is desert or otherwise unsuitable for agricultural purposes. Of the land under cultivation about 90 percent is devoted to cereal production, olive groves, fruit trees, and vineyards, with the balance in vegetables and other commodities.

Data on food crop production is included in the section on agriculture. Although the quantities have varied, since 1960 Tunisia has imported more grain than it has exported. For the period 1960-64 imports exceeded exports by about 150,000 tons; for 1965-69 the difference in imports rose to 300,000 tons.

The diet of most of the population consists mainly of carbohydrates with only occasional animal proteins. The staple dish in the countryside, and to a lesser extent in the cities, is couscous prepared from semolina. This is eaten with small amounts of meat, if available, or

vegetables that are in season. A similar dish (burgol) is made from barley. Although both the urban and rural population rely heavily on wheat products, there is a difference in consumption patterns; the semolina for couscous is made from durum wheat while in the cities, bread from bread wheat is used three times as much as the durum products. In the south, dates are a dietary staple but are little used in other parts of the country. Some areas of the south also make use of camel and goat milk to make yogurt and cheese. Tea is the national beverage, but coffee has some popularity in the cities. Generally speaking, the diet of the bulk of the population consists almost entirely of cereals, vegetables, and oils.

Although the population is not faced with stringent dietary taboos, other than the use of pork in a Moslem country, habits, tastes, and traditions, to say nothing of income levels and food availability, stand in the way of good nutrition. Tea or coffee, with or without bread, is a common breakfast for all classes. Afternoon and evening meals are chiefly couscous, some form of macaroni or bread, with higher income levels having meat stews or fish as well. Wealthier people may also include some type of fruit. An extensive study made of relatively wealthy, middle level, and poor people in the suburbs of Tunis showed that if more resources were available to them, the middle level and poor people would prefer to consume still more couscous followed by more meat. None of the groups would elect to eat more legumes which would give them a more balanced diet at little extra cost. In Tunisian society, as in others, the social environment is a principal determinant in dietary beliefs and practices.

Studies of the diets of pregnant women have shown that they, like the population in general, have a diet that is almost exclusively carbohydrates with practically no protein or animal fat. As a result, children are born with a protein deficit because the mother has little protein to give. Infant diets are deficient in part due to prolonged nursing with no supplemental foods, and low protein/calorie levels on weaning. Infants may be fed the nut of the pine cone, sesame seeds, and crushed chestnuts mixed with oil and sugar. A porridge made of wheat flour, chick peas, olive oil, and spices is also commonly given to babies. Children of one to two years of age are also poorly fed. The diet may consist of bread, noodles and spices, and is low in proteins, vitamins and minerals.

A number of studies have been made over the years of the nutritional status of the Tunisian population. They vary in their estimates of undernutrition and malnutrition, but uniformly conclude that there is a substantial nutrition problem. As a generalization it can be said that a relatively high proportion of the population has a diet which does not provide enough calories. Even though there is a very high carbohydrate content, it is deficient in protein, particularly animal protein, and does not have adequate vitamins and minerals.

Although perhaps somewhat outdated, an interesting and comprehensive study was made in 1960 in a suburb of Tunis. A carefully drawn sample divided the population into three groups according to high, medium and low incomes. The per capita daily calories available to these groups were 2,280, 1,580, and 1,125, respectively, with an average of 1,568. Tables 6 and 7 provide detailed breakdowns of the amount of nutrients available to the three groups on a per capita/daily basis and the percentage excess or deficits those nutrients represent of the nutritional norms set for the study. The deficits shown are substantial and apply to all classes of nutrients for the medium and low income groups and in several instances, for the high income group as well.

More recently a general survey of the entire country made by the Secretariat of State for Planning and National Economy in 1966 covered 7,147 households and 42,859 people. This study provided much of the background data on Tunisia which was presented at the jointly sponsored (Government of Tunisia and USAID) Third African Conference on Nutrition and Child Feeding which was held in 1970. The results of this large scale survey showed a somewhat brighter but still serious outlook in that 25 percent of the total population received less than 2,000 calories per day (and less than 50 grams of protein), while another 29 percent has 2,000-2,500 calories per day and between 55-70 grams of protein. As shown in other surveys, the urban areas generally have a better and more balanced level of nutrition. Table 8 provides a detailed breakdown of the findings of this study.

AID is currently cooperating with the National Institute of Nutrition and Food Technology in a national survey to assess the nutritional status of the population. A scientific sample of 15,000 persons is being tested for a wide range of nutritional variables. This survey, in addition to the data it will develop, has an important effect on training of personnel and development of the Nutrition Institute. As the result of the level of endemic goiter in one of the regions under study, the use of iodized salt has been introduced throughout the country. The scheduled field work should be completed by June 1975.

While the exact status of undernutrition and malnutrition in the Tunisian population may be open to question, all of the research and expert observations available describe nutrition as a major problem. The effects of a poor diet are shown in the inability to do a full day's work or concentrate on studies at school. The problem is especially acute for small children and pregnant women and lactating mothers. There is a close relationship between the high level of infant and childhood mortality and the state of nutrition. In underdeveloped countries, deaths due to poor nutrition and diarrhea may be 100 times as great for children under one year as in developed countries, while the mortality rate for children ages one to four years may be 500 times as great. Mortality due to communicable diseases is high and the production of antibodies following immunizations is greatly diminished.

Average levels of nutrition of course do not tell the whole story. The state of individual nutrition involves a complex of factors: the availability and demand for various foodstuffs; the income level and subsequent ability of the individual to satisfy that demand; the age, sex, weight, level of activity and state of health of the individual. These factors and the environment in which he lives, all have a bearing on the nutritional state.

The study presented at the Conference on Nutrition and Child Feeding showed that on the average the per capita cash income was 72 dinars per year. Of this amount, one-half is spent on food (an earlier study of rural family budgets showed 59.9 percent spent on food). This sum would, at the time the study was prepared, provide the equivalent of 2,360 calories per day, which would be sufficient by the standards of a joint FAO/WHO ad hoc Expert Committee for an adolescent female age 10-12 years. Table 9 gives the findings of the Conference on the sources from which calories are derived, and the average daily protein intake, by area of habitation.

The diet that appears to be available, on the average, shows that about two-thirds of the caloric intake is carbohydrate. Protein levels, at least as estimated in this study, appear to be adequate but the amount of animal protein as a proportion of the total is below an acceptable level.

It is difficult to overstate the importance of good nutrition to the health of the population. A number of experts have concluded that the main factor responsible for the nineteenth and twentieth century decline in mortality in the developed countries was better nutrition rather than improved medical care. A Central American study has shown that an adequate diet, particularly for children, can have a more beneficial effect than a combination of quality medical care and adequate environmental sanitation.

The effects on the Tunisian population of various dietary deficiencies have been cited in studies, reports and through the impressions of expert observers. Some of these deficiencies, the diseases or conditions they produce, and the prevalence, are as follows:

Vitamin A deficiency is often associated with protein-calorie deficiencies and mainly affects infants and children up to five years of age. An early symptom is night blindness; a more serious manifestation is xerophthalmia which may lead to total or partial blindness. The incidence of this deficiency is considered to be very common; one estimate places it at one-third of the population;

Lack of Vitamin B1 (Thiamine) occurs in people of all ages and can be particularly common in pregnant and lactating women. Insufficient quantities in the diet can cause neuritis and polyneuritis. Breast-fed infants two to five months of age are especially susceptible;

Vitamin C deficiencies have been noted in both infants and adults, with an estimated 10-20 percent prevalence;

Vitamin D deficiency and a negative balance of calcium and phosphorus lead to rickets in infants and children (estimated at 2-30 percent of the population under age 20) and osteomalacia in adults (females up to age 45 are affected at a 12-25 percent rate). Local customs of keeping children indoors out of the sunlight contribute to lack of vitamin D. Dental defects, in part due to calcium deficiency, are estimated to affect 5-25 percent of children and 30 percent of adults on the average.

Estimates of protein-calories malnutrition (PCM) show considerable variance but there is a consensus that it is a serious problem. Underweight conditions (20 percent) and growth retardation (13 percent) are related to PCM and it particularly affects children under three years of age. A population thus weakened is particularly susceptible to various water-borne infections and gastroenteritis. Incidence of kwashiorkor is estimated at .25 to .50 percent with a high ratio of mortality to incidence.

Lack of iodine leads to an estimated prevalence of endemic goiter in 5 percent of the population, primarily in inland mountainous areas, although it is expected that this condition will diminish following the use of iodized salt in those areas.

Poor nutrition is evident, particularly in children, other than in the diseases caused by nutritional deficiencies. Children are commonly stunted, pale, and thin, lips and tongues often show cheilosis and fissures. The skin may be thickened, cracked, and show various types of dermatitis. One study made in 1956 showed the following incidence of such conditions: lesions of the tongue 20 percent; thickening of the skin 16 percent; gum bleeding 17 percent cheilosis 11 percent.

#### POPULATION AND FAMILY PLANNING

The current population of Tunisia is about 5.5 million. The data vary with the source chosen and the periods to which they refer, but the estimated natural increase of population is variously shown as between 2.3 and 3 percent. The lower rate is generally considered more nearly correct. At these rates of increase, the population would double in 23 to 30 years.

Although recent data are more encouraging, with an estimated birth rate of about 38 per thousand, a useful perspective of Tunisian demography can be gained by the following comparison with U.S. experience during the period 1965-70. The rates shown are per thousand:

	<u>Tunisia</u>	<u>U.S.</u>
Marriages	7.2	10.9
Crude births	46.3	15.6
Fertility <u>a/</u>	131.2	59.3
Crude deaths	16.0	9.4
Infant deaths <u>b/</u>	125.0	18.5
Natural increase <u>c/</u>	30.3	6.2
Expectancy at birth (male & female)	51.7 years	71.1 years

a/ Fertility rate = the number of live births per 1,000 females age 10-49

b/ Infant death rate = number of deaths of children under one year per 1,000 live births

c/ Natural increase rate = crude birth rate minus the crude death rate

Source: United Nations Demographic Yearbook, 1972.

In line with this relatively high rate of natural population increase, about 45 percent of the total population is under age 15. A young population of this order has clear implications for demands upon education, nutrition, health services, employment, and other resources of the society.

The Tunisian Government has recognized the problem associated with rapid population growth and has broad political and religious support for its national family planning program. Restrictions on the sale of contraceptives were abolished in 1961. Abortion laws were amended in 1965 and again in 1973. At the present time, abortions may be performed by a qualified physician for social or medical reasons during the first three months of pregnancy. After that time they may be done for medical reasons. Other legislation has also been directed at restraining population growth: raising the minimum ages for marriage, abolishing polygamy, and a limitation on family allowances to include only the first four children. In recognition of the importance of a national family planning effort, the National Office of Family Planning and Population (ONPFP) was established in 1973 as a semi-autonomous agency under the Ministry of Health.

Official sanction for family planning was translated into programs in 1964 when the Ministry of Health, working with the Ford Foundation and the Population Council, began a pilot project of providing information on birth control techniques. A previous survey of women of child bearing age had shown that a significant proportion of them wanted no more children. The Government then used a variety of communication channels to support the effort and set up family planning centers and mobile units to provide information, insert IUDs and dispense pills. Initial results were encouraging with 28,000 women visiting centers and 18,000 accepting IUDs. However, later results showed that many of the women who were original acceptors were not prepared for the side effects of the pills or the IUD and did not continue with their use for more than a few months. It was found difficult to sustain the interest and acceptance of a largely unsophisticated population in procedures which are inconvenient, uncomfortable, and require personal discipline for a purpose at odds with long standing social and economic factors.

The family planning program has nevertheless grown through the years so that of the 500 or so health facilities of the Ministry of Health, which include the MCH/Family Planning Centers and hospitals and dispensaries of all levels, over 300 now provide counseling and/or contraceptive services. Table 10 provides the numbers and locations of these family planning activities.

Despite considerable expansion of facilities, government and external support, publicity and public education, the program made only modest progress until recently. An estimate of the total number of acceptors is now about 7 percent of some 800,000 married women of child bearing age. The number of births averted as the result of the national family planning program was estimated at 12,000 in 1971 and is projected to reach 30,000 in 1976. Table 11 provides data on consultations and types of services for the year 1972 by the type of center providing the service. The demographic effect of tubectomies and abortions is reasonably clear. The total number of actual users and thus the effect of other methods is more difficult to ascertain with the possibilities of non-use or misuse of pills and condoms, the possibilities of expelling IUDs, and unwillingness or misunderstanding that might result in advice not being followed. A recent study made by the ONPFP and the Population Council of over 1,200 users of the pill or the IUD in Tunisia found that after one year continuation of IUD use was 72 percent and 45 percent for the pill. After three years the rates were 46 percent for the IUD and 17 percent for the pill.

The family planning goals for 1974 are: 17,000 new IUD insertions; 11,000 new pill users; 8,500 tubal ligations; and 10,000 social abortions. Comparison of these goals with the 1972 results shows a marked increase in the public's use and acceptance of family planning except in the use of oral contraceptives, which has declined.

Some of the difficulties of the family planning program have been the result of manpower shortages, the administrative structure, and failure in managing and promoting the program. It is nevertheless striking that 500 or so health facilities, with tremendous numbers of medical consultations for all purposes, have attracted such a relatively small number of family planning acceptors. For example, the existing 90 MGH/Family Planning Centers are designed to provide, in addition to family planning, prenatal and postnatal care to women and outpatient services to children age 6 and under. Data for 1971 show that compared with the total number of births for the year (192,000) the Centers were little used for prenatal (16,949) or postnatal (5,691) examinations, i.e., for care of women. While 29 centers did provide such services, 38 of the remainder had only 2-20 consultations per week and only 22 had more than 20. Also, in 1972 the Centers provided about 11,000 new acceptors with pills or IUDs. However, 94,328 children under one year of age, or about one-half of the total number of children born that year, were first time visitors to the Centers. Also, for all children ages 0-6 there were 760,155 consultations, although some of these undoubtedly count the same child more than once. It seems clear that the Centers are heavily used for children but very little used by their mothers. Since the mothers accompany these young children to the Centers, it seems that a perfect target group for family planning information and services presents itself to the Centers in large numbers, albeit for the purpose of receiving services for the children, but do not become acceptors of family planning in anything like the total numbers they represent.

The reasons for this are numerous and complex. First, distances from Centers and poor scheduling sometimes require women to make several trips to the Center to receive the services they seek. Second, there has been a general requirement for examinations by OB/GYN specialists, when there are only 18 Tunisian gynecologists (16 of them in Tunis) and a limited number of foreign specialists. This seriously reduces the number of services that can be officially approved although they could be provided by lower level personnel. Third, there is an apparent emphasis on children in the Centers with lack of interest in the mothers. Fourth, the limited availability of counseling and education in the Centers which would be particularly useful if it could be provided while women were waiting with their children (a Dutch team has successfully used such an approach).

The policies and training programs proposed by the ONPFP in its new 1974-1977 Program provide an improved basis for dealing with many of these problems. Greater responsibility is to be given midwives in providing services. Completion of an A.I.D.-financed renovation program will provide better organization of space in the Centers for educational activities, and the Ministry now plans to establish a committee to coordinate family planning, nutrition, and child health activities. Acceptance of surgical means of family planning, and the total of births averted, have increased substantially in the last year.

## HEALTH SYSTEM ORGANIZATION AND RESOURCES

### Health Services Organization

The health services of Tunisia are under the direction of the Minister of Public Health. At the Ministerial level, coordination is maintained with other government departments and with international organizations, foreign governments, and voluntary agencies. An Administration Council composed of cabinet level members advises the Ministry of Health on administrative matters. A Higher Public Health Council composed of the Directors of the Institutes and other eminent physicians advises the Minister on technical matters. It is at the Ministerial level that activities of the various government departments are coordinated: with Education, on standards of training health manpower; with Defense, on hospitalization of military personnel and cooperation for disaster relief; veterinary services with Agriculture; and public health aspects of social assistance and occupational health with Youth, Sports, and Social Affairs.

Below the Ministerial policy setting level is an Inspector General and three major Divisions: General Administration (devoted to administrative, financial and personnel functions), Hospital-Sanitary, and Preventive and Social Medicine. Below these national level Divisions are non-physician Regional Administrators who are charged with overseeing all health activities in their geographic areas of responsibility. As a generalization, the Ministry suffers from lack of continuity in terms of a permanent civil service at the higher levels, lack of technical expertise at both high and mid-levels, and a lack of clear guidelines for the duties and functions of the various subordinate levels.

The Hospital-Sanitary Division absorbs the great bulk of the national health budget and is devoted to curative medicine. It directs the national network of hospitals (general and specialized hospitals, regional hospitals, rural hospitals, and dispensaries which are described in greater detail in Health Care Facilities) and several Institutes: Cancer, Ophthalmology, Nutrition, Lung, Child Health, and the Institute Pasteur.

The Nutrition Institute is a semi-autonomous agency, employing 160 people and occupying a new A.I.D.-financed building. Its budget has been substantially increased and in 1975 it will come entirely from Tunisian Government funds. The research program, with foreign assistance, is well advanced. It also trains dietitians and is starting a health education program in MCH centers and schools.

All of the Institutes mentioned above treat patients, conduct clinical research, and provide training. They appear to be little involved in preventive activities or epidemiological research, either directly or in coordination with the Preventive and Social Medicine Division.

The Preventive and Social Medicine Division has the following functions: campaigns against specific diseases (malaria, trachoma, tuberculosis, schistosomiasis); vaccination, ambulatory treatment and detection of communicable diseases; environmental sanitation including drinking water, campaigns against insects and other pests, sanitary conditions of public places; and school health education. It has about 1,000 employees, almost all with a low level of training, who are supposed to visit every house in their jurisdiction every fifteen days. The Division's principal complaint is shortage of skilled manpower and resources. Only about 8 percent of the total budget of the Ministry of Public Health is devoted to preventive medicine.

Personnel working in preventive medicine operate out of the rural hospitals and dispensaries and in other locations: anti-tuberculosis dispensaries, the 90 MCH Centers, 13 skin disease centers, 12 rabies centers, and 12 border health posts.

Preventive medicine has had some successes, as with malaria control activities, but is receiving little emphasis in comparison with curative medicine. Trained public health physicians are virtually non-existent and it has been difficult to interest young Tunisian physicians in following careers in this field. Health personnel involved in curative medicine have little time for preventive activities, frequently they have slight interest in the field, and their training and bias incline them to curative medicine.

Some interest has been shown in improving the level of preventive medicine and integrating its activities with those of curative medicine. Such integration could provide better general health more efficiently and ease the burden on the curative services.

In an environment in which integration of preventive and curative medicine is not widely accepted, which is directed toward curative specialities, this integration must be brought into being with caution. The basic health services must take on the tasks they can absorb, to which their personnel can adapt, and for which the resources are available. As a first step, the curative services should assume those services which are currently not being performed by the preventive services.

A WHO consultant provided excellent guidelines for the gradual coordination and ultimate integration of services:

1. Formally state the intention of the government to improve preventive medicine.
2. Involve the Institutes in preventive medicine to a greater extent, provide more regional public health physicians, and improve public health laboratories.
3. Develop occupational health through greater involvement of rural dispensaries.
4. Put the malaria service personnel and sanitary aides under the direction of basic health service physicians.
5. Instruct basic health service physicians to: detect communicable diseases, provide ambulatory treatment, and vaccinate; provide health advice during consultations; and report to the head of the Preventive Medicine Division on their activities. Clearer guidelines and better directions should be established regarding the performance of duties to treat patients at the lowest level in the system.
6. To the extent possible involve hospital-based physicians in preventive medicine activities.
7. Assign residents in the basic health services to a minimum of one year service in preventive medicine. Similarly, assign interns to one year of such services.
8. Revise the course of medical studies to include greater emphasis on preventive medicine and include practical training.
9. Consider the utilization of medical assistants.

The MCH Centers merit particular attention in terms of their potential importance in preventive medicine. These Centers are largely autonomous to the extent that they do not use or work with the basic health services. With nearly 200,000 births per year (25-30 percent of them attended), too much reliance is being placed on pediatricians and gynecologists, when general practitioners, nurses, and midwives in the basic health services could perform the necessary work with the specialists serving as consultants and inspectors. Considerable uncertainty and ambiguity surrounds the use of midwives in these Centers.

With the known unwillingness or inability of pregnant women or mothers with young children to travel long distances for medical services, it is not possible to serve the entire country with 90 MCH Centers, or even with a much larger number of centers (a total of 110 are now planned). There are nearly 400 dispensaries which are little used and could greatly augment the services of the MCH Centers. This could be organized in the following fashion:

1. At the village level auxiliary midwives could make examinations and simple deliveries, evacuate complicated cases, and give rudimentary examinations to children.
2. At the dispensary level, both health services and MCH dispensaries, the women and children can be treated by available professional or auxiliary personnel.
3. At the rural hospitals, deliveries can be made which cannot be provided at the lower levels.

Such use of existing facilities would of course require some additional personnel who would have to be attracted to or especially trained for such service. The use of the rural hospitals could also be expanded to provide family planning assistance.

Although some Tunisian health officials have shown interest in preventive/curative integration the plans which appear to be going forward are putting the greatest emphasis on improving the hospitals at the regional level which will be used to an increasing extent for curative care.

In 1972 there were 104 physicians in full-time private practice, and 158 dividing their time between government and private practice. In the main, private practice is limited to large cities and upper income groups. Aside from individual initiatives in such areas as family planning and some educational work, private physicians have not played a major role in Tunisian health development.

#### Health Care Facilities

Health care facilities under the Tunisian Ministry of Health are structured hierarchically with principal or general hospitals in the main cities, regional hospitals in each medical region, and rural (circonscription) hospitals in the small cities of the governorates. There are also hospitals attached to Institutes or devoted to certain specialties. At the other end of the spectrum are the rural and urban neighborhood dispensaries that provide outpatient care. The size and level of sophistication generally follow this hierarchical structure. Table 12 gives the numbers of hospitals, hospital beds, occupancy rates, and the average duration of stay for the various facilities.

The total number of hospital beds available in 1971 (12,571) provides 2.4 beds per thousand population, or excluding psychiatric hospitals, 2.2 beds per thousand. This compares to ratios of 10.3 in Sweden, 6.8 in the Netherlands, and 5.3 in the United States. The distribution of beds per thousand population varies by governorates with 4.5 and 3.2 in Tunis and Bizerte, respectively; to .66 in Kasserine at the other end of the scale. In all of the other governorates the range is 1.3 to 2.3. Buildings and facilities vary from excellent to poor.

Occupancy rates are high and durations of stay expectedly long in the Institutes and specialized hospitals. Principal and regional hospitals are at about the 75.3 percent national average occupancy rate and the rural hospitals have a low rate, generally between 40 and 50 percent. The rate of admissions per 1,000 population is 53 versus 145 in Sweden and 110 in France. Other than for the rural hospitals, the relatively high rate of occupancy and low, by developing country standards, rate of admissions would indicate a shortage of capacity rather than demand. However, efficient allocation of scarce health resources would require evaluation of reduction of demand by a stronger preventive medicine program against satisfaction of demand for curative medicine.

The low level of use of the rural hospitals, which will be treated more extensively in a later section, appears to involve a complex of factors: patients avoiding their use in favor of regional hospitals, multiple visits required, the difficulties of time and distance involved in reaching them, and the attitudes of people of the area toward the services available. Part of this problem of low utilization could be alleviated if the role of the hospitals and levels of care to be provided were better defined and screening by lower level personnel and a referral system was instituted. It has been suggested that these rural hospitals be individually evaluated to determine whether they should be improved or whether it would be more efficient to reduce their status to dispensaries for outpatient care.

The hospital network provides an estimated 7 million consultations and ambulatory care services per year. Rural and neighborhood outpatient dispensaries provide an additional 2.5 million consultations and 7 million ambulatory care services. These rural and neighborhood dispensaries, of which there are 388 spread throughout the country, are staffed by nurses or nurses-aides who work under the supervision of physicians who may be on duty only in one or more dispensaries or who may be attached to a rural hospital and visit dispensaries on a part-time basis. These dispensaries are the point of contact where attitudes are formed for much of the population, particularly the rural population, toward the health system. It is through them that many patients are referred up the chain to the rural or regional hospitals.

The dispensaries have some of the same problems as the hospitals in a more acute form. They are commonly ill-kept, short of personnel, drugs and medicines, and frequently even the modest level of supplies and equipment they are supposed to have are not available. The personnel staffing them are unable or not permitted to provide care. The case load is frequently at impossible levels (perhaps 180-200 consultations in a morning) due to lack of screening and it is aggravated by the fact that, as one observer puts it, "...more than 50 percent of the people who come are not really sick. The dispensary provides an opportunity for many women to meet their friends."

In addition to the health facilities previously cited, there are Maternal and Child Health Centers associated with the national family planning program. There are 90 of these Centers with considerable inequalities in terms of their geographic distribution. For the year 1971 the following were available concerning their consultation case loads: prenatal, 53,563; postnatal, 5, infants (age 0-1), 313,160; children (1-6), 446,995. The numbers do not represent the total number of children receiving care, but rather, the number of consultations, i.e., the same child may be seen on several occasions. Of the number of infant consultations shown, about 94,000 were first time patients of the Centers.

With about 192,000 births in 1971 it appears that less than 30 percent of the mothers received prenatal examinations, and only about 3 percent postnatal examinations, in the MCH Centers. Other data provided show a range of prenatal examinations of one for each two or three births in six governorates with considerably lower rates down to one in 34 births in Kasserine. Clearly there are other possible facilities for the use of pregnant women, mothers, and children, but the data indicate that the MCH Centers are not being well utilized. Part of the explanation lies in the official interest in child care to the exclusion of maternal care.

There are specialized research laboratory facilities available, all of them located in Tunis. The Pasteur Institute conducts studies in serology and immunology, provides some support to the public health services in medical diagnoses, and produces some serums, vaccines, and anti-venoms. The Arloing Institute does research and diagnostic investigations on animal diseases, produces some veterinary biologicals, and inspects food and animals. The Ophthalmology Institute Laboratory conducts research on trachoma and other communicable eye diseases.

The Ministry of Health has been interested for several years in a National Health Laboratory Services project with the assistance of the UNDP and WHO. The project has been put aside

but was reactivated when it became part of overall UNDP country programming. The project was approved in early 1974 and is to be completed by 1979. Plans call for improvement or development of laboratories in Sousse, Sfax, Gabes and Le Kef. When completed it is expected to provide a scientific basis for the control of major diseases prevalent in Tunisia, particularly communicable diseases, environmental health hazards, and other public health problems through laboratory personnel, and control and standardization of drugs and biologicals. The need for strengthening laboratory services and personnel has regularly been mentioned by Tunisian delegates to the World Health Assembly and has been supported by studies of WHO consultants.

#### Health Manpower

In 1973, there were 846 physicians in Tunisia. Of this number, 405 were Tunisians and 441 foreigners. This gives a physician/population ratio of 1 to 6,335 when all physicians are considered, or 1 to 13,000 when only Tunisian nationals are taken into account. Foreigners (mainly from Eastern Europe) are hired on a contract basis and are generally assigned to out-lying areas.

In addition to their relative scarcity, the Tunisian physician distribution follows the familiar pattern of being concentrated in the cities. The two governorates of Tunis are relatively well served with a ratio of 1/2,529; the less developed west and south, e.g., Beja, Kairouan and Kasserine, show much poorer coverage, with the latter governorate's ratio of 1/23,090. For the poor, who make up the great bulk of the population, the inequitable distribution of physicians is probably somewhat less favorable in the cities than the figures would indicate. A larger percentage of those available in the more populous areas are in private practice and thus beyond the financial reach of the bulk of the population. It can be assumed that a number of those who are in the public sector are engaged in administrative, teaching, or other duties which remove them from active practice to a considerable extent. Table 13 provides a breakdown of numbers, locations, and mode of activity of the available physicians.

Prior to 1964, medical training was not available in Tunisia and all physicians had to be trained abroad. In 1964, the Medical Faculty of the University of Tunis admitted the first class of 59 students to its five-year program of study, and graduated 24 in 1969. Medical school is followed by two years of internship. In 1971, an estimated 350 Tunisians were studying medicine abroad. Estimates of Tunisian physicians living abroad, mainly in France, vary from 200 to 400.

Admission to the Faculty of Medicine was expanded to an average of about 330 first-year students in the early 1970s. This is the maximum it can absorb. The percentage of entrants who graduate has remained relatively low; about one-third, compared with 95 percent of first-year students who graduate from U.S. medical schools. This significant difference probably reflects the continental approach which uses a more lenient admissions policy, but equally rigorous training and examinations, thus eliminating a larger percentage of students before graduation.

The Government hopes to increase the number of Tunisian physicians to a 1/4,000 ratio in 1981 and 1/2,000 in 1990 (compared to a U.S. ratio of 1/650). Training is also to be increasingly directed to meet Tunisian needs for more general practitioners and less emphasis on specialties with the exception of general surgery, gynecology, and pediatrics.

To meet this ambitious goal will require about 150 new physicians each year, compared to the 66 who graduated in 1974. Of course, assuming a continuation of the ratio of one-third graduates to entrants, the size of graduating classes in the late 1970s will be considerably larger, although not sufficient to meet the goal. The government's response to this problem has been to create new medical schools at Sousse and Sfax with entering classes of 120-150 first-year students in 1974 in each location. The faculty is bolstered by French professors who spend 3-4 weeks three times a year to give classes several hours per day in their specialty.

during their stay. As a means of drawing students who will more likely practice outside of Tunis, the schools give preference to applicants from their respective regions. As time goes on and there are four classes of students in attendance, these ad hoc measures will have to be supplemented by additional permanent faculty members.

Both cities have hospitals which could, in terms of size at least, serve as teaching hospitals. However, a considerable number of changes and improvements would be necessary before they would be satisfactory for that purpose. As a means of addressing this problem, as well as other concerns such as the medical care needs of tourists, the government proposes constructing a research/teaching hospital at Monastir (20 kms from Sousse) with facilities for neurosurgery, heart surgery, intensive care, etc. A team from the Hope Foundation is now consulting with the Tunisian Government on this project.

National legislation and health plans call for between 0.45 and 0.57 non-physician "care" personnel for each hospital bed. The actual number available is currently estimated at 0.24/bed. Although the nursing profession does attract some students, there are limited funds to provide them positions after training. The profession is handicapped by lack of prestige, low pay, lack of substantive duties, and the indifference of the medical profession and the bureaucracy. Data available through 1972 shows that there were 1,303 nurses, 509 public health hygienists, and 3,472 nurses aides. Specialized nurses are in very short supply and midwives are in critically short supply. For example, the midwife/population ratio is currently 1/132,000 in Medenine. In the seven governorates in which the ratio is less than 1/50,000, less than 20 percent of deliveries take place in health facilities.

WHO's Fifth Report of the World Health Situation provides the following information on the training of nurses and technicians in Tunisia:

	<u>Nurses</u>	<u>Midwives</u>	<u>Laboratory Technicians</u>
Admission Requirements	5 years secondary education	7 years secondary education	5 years secondary education
Duration of study	2 years	3 years	2 years
Number of schools	4 public	3 public	1 public
Students 1971/72	316	31	28
Graduates 1972	271	31	23

Tunisia has 9 government operated schools to train nurses, midwives, nurses aides, and male rural hygienists. These schools are located in areas throughout Tunisia: Tunis, Sousse, Sfax, Kairouan, Nabeul, Menzel Bourguiba, Gabes, Gafsa, and Le Kef. Midwifery programs are in the Avicennes School in Tunis, and in Sfaz and Sousse. The latter two schools started their programs in the fall of 1970 and 1971 respectively.

In September 1974, three nurses aide schools changed their program to provide nurses training by increasing the admission requirements from three years of secondary education to five years, and three other schools dropped the nurses aide programs. The nurses aide programs of Kairouan and Gafsa continue as before.

The Nabeul training school for rural health workers has changed since its opening in 1961 from the training of an auxiliary type of community sanitarian to that of a rural hygienist with more varied responsibilities. These include work in vaccination, tuberculosis, malaria, and general education programs. To date, the school has over 500 graduates. In addition, it

has a two year post basic program in supervision for its graduates. In 1973, a total of 20 were graduated and 17 are to graduate in 1975. There is no assurance that the program will continue beyond the summer of 1975.

The eight nurse and nurses aide schools produce a total of 400 graduates yearly and this number is increasing. In a few years the number of graduates, when added to the estimated 5,500 who graduated from 1960 to 1974, should be sufficient to satisfy the expected need. On the other hand, the three schools of midwifery produced only 53 midwives in 1974. With a total of 200 midwives, including the new graduates, working for the Ministry of Health, the total demand of about 600 is far from being satisfied.

The curriculum of all the schools mentioned and their programs are approved by the Ministry of Health to assure uniformity. The teaching is hospital and sick care oriented. A large proportion of the lectures are given by physicians and are medically, non-psychologically and non-task oriented. Generally, there is a monitor for each class, and the number of students for each class ranges from 25 to 40.

The first post-basic program for training instructors was offered at the Avicenne School in 1964 with assistance from WHO. By the end of 1972, 60 nurses instructors and 3 midwife instructors had graduated. These graduates now form part of the teaching staff for the three schools of midwifery and the 5 schools of nursing. In view of a combined enrollment of over 1,600 students (1972), the number of instructors is too low to adequately supervise and teach students in the clinical areas.

In 1972, a new post-basic program in supervision for midwives began and 12 graduated. In the same year, one midwife and two nurses graduated as instructors. In 1973, this program for training instructors and supervisors came to an end. Thus, the gains which were made between 1964 and mid-1973 toward the improvement of nursing and midwifery education and service programs were halted. Levels of paramedical services are not likely to improve at a time when this will be most needed and the number of health facilities and the demand for services will increase significantly. The government may continue to train an increasing number of nurses and midwives for basic staff positions, but the quality of the training and delivery of most services will improve very little.

Midwifery is a women's profession in Tunisia and nursing is becoming increasingly so. However, the status and financial rewards of these occupations, although higher for midwives than nurses, is low. There is also a great hesitancy on the part of physicians and other officials to delegate to this group of workers the responsibility and authority they should have in a modern health system.

The necessary remedial action would include:

1. Establishing a program in post-basic education for nurses and midwives to include teacher training and supervision;
2. Increasing the two year program in nursing to three years with the last year devoted to public health and preventive services;
3. Broadening the role of the school at Nabeul to make it a Community Health College and Training Center which would include programs for health officers (non-MDs), midwives, nurses, sanitarians, etc.;
4. Developing and distributing programmed instruction material for all nurse and midwifery programs;
5. Establishing within the Ministry of Health a Division of Midwifery and Nursing;

6. Encouraging professional associations for midwives and nurses;
7. Establishing official policies defining and authorizing expanded responsibilities for nurses and midwives.

One other possible means of improving the number of health personnel available for preventive medicine and delivery of services would be training medical assistants. Such personnel have functioned very effectively, under appropriate supervision, in the U.S. Although differing opinions are heard concerning the acceptability of this idea, it does not appear to have widespread support in Tunisia.

Tunisian officials give the clear impression that "health manpower" means physicians with little leeway for the use of auxiliaries or nurses. Further, the foreign assistance now chiefly desired in the health sector is the provision of medical personnel particularly for operational assignments in rural and under-served areas. Consideration is being given to providing hardship bonuses to Tunisians willing to serve in these areas as well as a requirement for medical graduates to accept such duty. There seems to be little likelihood, however, that foreign medical personnel can be replaced by Tunisians in the near future, to say nothing of replicating most health services delivery pilot projects of the kind now conducted by foreigners.

It is difficult to prescribe definite numbers of paramedicals for a country, either per inhabitant, per bed, or per physician. The medical care philosophy which prevails determines numbers needed as well as relations between the types of personnel.

In a country where non-physician personnel work closely with physicians, the number needed may vary from 5 to 10 per physician. In this situation, the physician sees all patients, no matter how superficial his examination may be, and non-physicians are used as helpers closely supervised by the physician. This method is wasteful and prevents development of a more effective division of labor in the provision of health care. In countries where non-physician personnel are given broad but well defined responsibilities, a more efficient structure can be built, using fewer doctors and more non-physician personnel.

Tunisia is by tradition a country of the first type. Consequently in contrast to some other countries, her non-physician personnel are few, with poor motivation and organization, and with limited career expectations. The policy with regard to functions and utilization, however, has been maintained only in the cities where there are physicians to oppose the delegation of more responsibilities to non-physicians. In the countryside, as requirements for service increase without commensurate addition of Tunisian physicians, additional functions have been given to non-physicians, particularly midwives and nurse-sanitarians. This development has not been accompanied by a legal definition of responsibilities, written instructions, or the appropriate training. In view of the fact that most countries now give more prerogatives and authority to non-physician personnel, Tunisia will surely move in the same direction. Eventually, therefore, it will be necessary to establish a public health policy which would create the necessary legal, institutional and educational structures for better use of personnel. Such a move would also give the effect of further increasing the role of women in Tunisian society.

#### Utilization of Health Services

As a general rule the underdeveloped countries are at a disadvantage in comparison with the developed countries in terms of the availability of health resources, the distribution of these resources, especially with regard to rural areas, and the inhibitions frequently shown by rural or traditional people in using the services that are available. In view of these factors a review of the availability of services must consider their spread and the way in which they are utilized. Utilization rates involve a complex of factors; health status, the propensity to seek care, the cost, accessibility and acceptance of facilities, and a variety of economic, social, and cultural factors.

A significant study of the use of health services in Tunisia has been made by WHO which, unlike studies which examine the users or the services, considers both the health services themselves and the population. The Gouvernorate of Nabeul was chosen as a representative site for the study. Although somewhat above average in terms of income and resources, the area has many of the characteristics of the country at large with small cities, farm areas, vineyards, isolated villages, and a virtually inaccessible mountainous area.

Health services of the region show the hierarchical structure typical of the country. These include a regional hospital in the provincial capital, auxiliary hospitals in market towns with populations of about 10,000, dispensaries in smaller towns and the larger villages, and rural dispensaries in the outlying areas.

The study was able to consider both the general population and the health facilities by linking members of the population through their numbered identity cards and their correspondingly numbered health records. To do this, seven sample areas of various facilities were chosen to obtain a range of conditions and attitudes. Of the 13,513 households in the chosen areas, 2,489 urban and 1,319 rural people were interviewed.

Questionnaires were carefully drawn to determine: health care or Social Security identification data; the felt need for treatment and the use of available services; attitudes toward and satisfaction with the health care provided, health personnel, and facilities; degree of self treatment and use of folk medicine; and family socio-economic data.

The information provided in response to health related questions in the interviews was supplemented and verified by use of the medical records available at health services. It is interesting to note that nearly 80 percent of the families interviewed held registration cards entitling them to use the health services with no significant difference between the proportion of rural and urban families. This corresponds with the level of coverage estimated by Tunisian public health officials.

Among the sample group that had used the health services at one time or another in the five-year period 1964-68, the results showed that there were 92.7 visits per 100 rural people and 156.4 visits per 100 urban people. Due to the fact that coverage of both urban and rural population was about the same, i.e., services were equally available in rural areas, albeit services of a less extensive and sophisticated nature, it was concluded that other factors are at work which result in a lower level of use by the rural population. More detailed data show that this difference applies for almost all age and sex groupings.

There were other interesting findings developed by this study. In all of the areas, both urban and rural, about 85 percent of the users visited the health services only once for each diagnostic episode. Only 8 percent made more than three visits for the same diagnostic episode. There was virtually no urban/rural variation in this pattern. There was, however considerable difference in the number of episodes per year for which the services were used. This does not necessarily indicate that the health of urban people is poorer than those in rural areas, but rather that urban dwellers are more frequent users of available services.

The ranking of the conditions diagnosed accords with estimates of their national importance. The data show that nearly one-half of all of the illnesses seen are for respiratory diseases, gastro-intestinal disorders and skin diseases. Most of the conditions diagnosed are acute infectious diseases. The only chronic conditions accounting for more than 1 percent of visits were tuberculosis, rheumatism, and syphilis. Bronchopneumonia, diabetes, and heart disease, as well as surgical problems are seldom encountered in these facilities. Considering the nutritional status of the population, there are very few visits for that problem. Gynecological problems and childhood diseases are also very limited but perhaps this can be explained in part by use of maternal and child health centers. The general impression left by this data

is that the health services are primarily used for relief in connection with relatively common illnesses and the service is used only once for the particular illness. Although there are some urban/rural differences in the incidence of the various diagnoses, these differences are minor.

Reviewing the data developed on several bases provided useful profiles of the characteristics of "high" and "low" use households.

- 1 Urban dwellers were high users with over twice the frequency of rural people.
- 2 In terms of "modernity" the urban group scored significantly higher than the rural, but the rural literate used the services twice as frequently as the illiterate.
- 3 Urban or rural persons who used the services most had good rapport with health personnel, believed staffs were adequate, and did not believe the waiting time was excessive.

It can be concluded from this study that for the population sampled, in addition to a mental set which predisposes use of facilities for a perceived need, the services are most used if the population believes it receives reasonable care from approachable, competent personnel working in adequate facilities and without a long waiting or traveling time involved.

## HEALTH POLICIES AND PLANS

### Fourth Plan for Economic and Social Development, Health, 1973-76

The Plan sees the principal gains during the last ten years as due to the improvement of preventive medicine and the general improvement of the state of public health. This has resulted in a reduction of the incidence of disease and resultant decrease in mortality. Favorable results have been largely due to the training of more health personnel and extension of health services.

In spite of gains, the demands for health care are increasing and funds are always insufficient to meet them. For instance, the number of hospital beds per population is insufficient (1 per 400 persons) and the spread of these facilities is inequitable. Activities under the Fourth Plan will require a balance between budgetary constraints and the needs of the public for health care.

During the previous ten years 1962-71, capital investments in the health sector were just over 10 million dinars, or about one million dinars per year. This amount was scarcely enough to maintain existing buildings and equipment. During the four years of the new Plan, it is expected that nearly 26 million dinars will be devoted to capital investment with the expectation that the facilities to be provided will ultimately cost twice this amount but the balance will be borne in the next four year period. This sum will be supplemented by projected operational funds rising from 16.2 million dinars in 1972 to 24 million dinars in 1976.

The main lines of preventive action proposed for the Fourth Plan period are:

1. Strengthening preventive medicine activities to consolidate and improve upon the gains made against endemic disease, particularly tuberculosis, respiratory diseases, gastrointestinal infections, eye and skin diseases, venereal disease, and malnutrition.
2. Improvement of environmental sanitation, particularly in rural areas.
3. Promoting awareness in the population of the connection between health and family welfare and the need for restrained population growth.
4. A greater number of ambulatory care centers, particularly in the rural areas.

To better improve the delivery of curative health care, the Plan calls for improving the equipment and physical plant of hospitals in Tunis, Sousse, and Sfax in accordance with their status as teaching hospitals and to receive referrals from lower level facilities as well as for the development of health personnel. Four new regional hospitals are to be built starting the last year of the quadrennium (Jendouba, Medenine, Gabes, Mahdia).

A basic consideration in improving the state of public health and meeting the goals of the Plan is the development of health manpower. Special attention is to be directed toward diverting medical education from traditional training toward a greater focus on preparation of physicians who are well adapted to the problems they will encounter in Tunisian practice. This would include more persons prepared for general practice and fewer directed toward medical specialties.

The quantitative objectives are to raise the physician/population ratio from 1/6,400 in 1972 to at least 1/4,000 in 1980 and 1/2,000 in 1990. This will require turning out 150 physicians per year. This goal cannot be met in the current quadrennium; only about 280 will be produced during this period. Plans to expand the University of Tunis Faculty of Medicine have since been superceded by the opening of medical schools at Sousse and Sfax.

The proposed capital investment of 26 million dinars will also be used to provide some funds for centers of preventive medicine and occupational health as well as to expand family planning services by construction of three urban maternity centers and 29 maternal and child health centers. For general ambulatory care, it will be necessary to construct 100 dispensaries in rural areas as well as to improve and modernize regional and local hospitals. In spite of increased operational funds proposed of 24 million dinars in 1976 compared with 16.2 million dinars in 1972, the Plan calls for greater assistance from the public sector and other governmental agencies, e.g., the Social Security system which is called upon to develop its own facilities and thereby lessen the burden on the public system for provision of health services. The Plan also looks for greater participation by multilateral, international and bilateral assistance.

#### Health Planning and Research

Tunisian officials point out that health planning has only a modest part in the development of the overall Economic and Social Development Plan but it is making some headway. Previously, the funds available for the Ministry of Health were allocated in a block with a certain percentage increase over the previous year. It has since been recognized that if political decisions are made for capital projects in the health field, funds must be allocated to meet them. Thus the budget is now provided in terms of capital and current expenditures.

In terms of the rate of increase in the budget, the health sector has fared reasonably well over the last few years. The increase in the current budget in 1973 over 1972 was 17.5 percent and the health portion of the total current budget was 8.8 percent. As previously cited, proposed capital expenditures for the 1972-76 period are to be 26 million dinars (with an equal amount to be spent in succeeding years to complete these projects) compared with 10 million for the period 1962-71. About 66 percent of current expenditures are for costs of personnel, 25 percent for supplies, and 9 percent for administrative and other expenses. About 8 percent of the current budget is devoted to preventive medicine but it is pointed out that some preventive activities are carried out in various curative functions.

There is a concerted effort in the Ministry of Health to encourage the Social Security system, which covers workers in establishments of over 20 employees, to develop its own health facilities. The Ministry does not believe this group pays its way under the present system. Also if the estimated one million involved were not provided care by the Ministry, there would be an obviously reduced demand on MOH facilities.

The current capital budget and conversations at the MOH give a reasonable indication of the direction that the health sector will take over the near term at least. The decision has been made to increase the supply of medical manpower by opening the new medical faculties at Sousse and Sfax. At the same time, substantial capital expenditures are proposed for upgrading hospital facilities at Tunis, Sousse and Sfax. The budget also calls for new regional hospitals at Jendouba, Medenine, Gabes and Mahdia of 200-300 beds each to be constructed toward the end of the Plan period. The proposal is to upgrade and expand university and regional hospitals, and, recognizing the apparent attitudes of the public toward the quality of care (as described in the section on Utilization of Health Services) and the lack of personnel available, rural hospitals are to be de-emphasized. Government plans are to transport patients requiring hospital services to the regional hospitals to an increasing extent. This is considered feasible through means of a reasonably good road network and a capital expenditure over the Plan period of 1.15 million dinars for vehicles of all types and two airplanes.

It does not appear that this decision to emphasize doctor delivered curative services in hospitals was made through any extensive assessment of the overall health sector or of the most cost effective means of delivering health services through varying means. To the contrary, high level political decisions which likely involved various interests, existing administrative

structures, and well meant concern for the people to be served, led to the decisions. Some cost-effectiveness studies were made regarding areas to be served by transportation and other aspects of this policy but basic decisions came from the top rather than evolving from detailed reviews and recommendations by public health professionals.

One of the significant felt needs in national health planning is the lack of good data and documentation to support such efforts. It is recognized that in general the health planning activities will be directed at a suboptimal level, i.e., the determination of the most cost-effective means of realizing previously assigned objectives, without regard for whether the objectives themselves are the most appropriate.

The Planning Office of the Ministry of Health has expressed an interest in a health sector assessment but is uncertain that it has the personnel or resources for such an extensive undertaking. It would also be a consideration that the Ministry is embarked upon a program to emphasize medical education and physician directed curative services at regional hospitals. This apparently firm direction might place a ceiling on the benefits to be gained from such a sector assessment.

An interesting research project in the integration of MCH/Family Planning and the basic health services is now being initiated. The project is to be carried out under a DHEW/HSA contract with WHO, using PL 480 Special Foreign Currency funds of about 350,000 dinars. The study will try to determine in a pilot area the best means of using the limited resources of existing health services and combining them with MCH/Family Planning services to provide a balanced program. The project will also have a training and education component.

#### SUMMARY OF PRINCIPAL PROBLEM AREAS AND CONSTRAINTS IN THE HEALTH SECTOR

Although the health status of the population has improved considerably over the last generation, a number of problem areas remain to be overcome if Tunisians are to enjoy a high standard of health. A brief summary of these follows:

1. There is a high level of infant and childhood mortality with children under 5 years of age accounting for nearly one-half of all reported deaths. This level of mortality is brought about by a complex of economic, social and environmental factors including communicable diseases, sanitation, nutrition of children and mothers, and health care availability.
2. Although the incidence of a number of formerly important communicable diseases has been greatly reduced, they remain a threat of significant proportion. While such diseases as smallpox, typhoid and diphtheria have been greatly reduced, others such as tuberculosis, gastro-intestinal and parasitic infections are equally susceptible to preventive measures including immunization, sanitation, and nutritional programs.
3. Environmental sanitation, closely connected with the foregoing health problems, is at a low level, particularly in the outlying areas. There is a shortage of trained personnel, health education, and support for environmental improvements particularly where they are needed most---in the non-metropolitan areas.
4. Population growth is recognized as a problem area by the Tunisian government and family planning has broad official support. Nevertheless, the number of women who have adopted family planning methods is small in relation to the married population of child bearing age. The major difficulties encountered among the public are apprehension of the unknowns of family planning, poor treatment at often uninviting centers and pronatalist tendencies especially favoring male children.

The new 1974-1977 Program for Family Planning should provide a basis for a more effective development of the national program. Its targets are ambitious but may be feasible in the light of performance since 1972. The most important question is whether the extensive training activities proposed will in fact be sufficient to upgrade the quality of service actually given patients. A second question is whether educational activities of sufficient quality can be developed to touch directly the mass of prospective acceptors.

5. Undernutrition and malnutrition represent serious problems to large numbers of the population, particularly infants, small children, and pregnant and lactating mothers. Feeding programs have made a substantial contribution particularly to the nutritional status of children but low caloric intake, insufficient high grade protein, and lack of vitamins and minerals are very prevalent. A major bottleneck to better nutrition status is the lack of coordination between programs in family planning, MCH, agriculture and nutrition.
6. The health system is not structured to operate in the most effective manner. It is short of physicians at high and mid-levels, does not have enough high level career officials that can continue functioning efficiently through political changes, and in large measure, it operates vertically with little horizontal integration of activities. This latter point is particularly important with regard to the separated curative and preventive services.
7. There is a shortage of physicians and other health manpower and they are congregated

in the cities to a great extent. Many of the physicians that are in outlying areas are foreigners in the country on time limited contracts. Specialization is overstressed in foreigners and Tunisians.

8. Medical education has been greatly expanded by the opening of two additional medical schools at Sousse and Sfax. The curriculum is apparently being revised to provide more training in public health and be more directed toward the problems of the Tunisian environment. The medical schools and the teaching hospitals associated with them will require a considerable increment of faculty, equipment, and nursing staff if they are to function effectively.
9. Para-medical personnel are neither trained nor used at an optimum level. In comparison with more developed health structures, they are underutilized, poorly paid, poorly supervised, and given limited responsibilities. Para-medical schools neglect the training of instructors and supervisors, and themselves suffer from shortages of teachers and practical training facilities. In sum, the use of para-medical personnel has not been integrated into a well thought-out public health planning philosophy.
10. Hospitals, like health manpower, are not equitably spread through the country. The rural hospitals are poorly equipped and staffed and have low utilization rates. There is little regulation of what physicians should or should not treat in a given hospital below the general level. The Tunisian response to the poor spread of curative facilities is to concentrate funds on the university associated hospitals with the intention of extending the amount of patient transportation service to the regional hospitals. This concentrates more facilities in urban areas and stresses curative procedures.
11. There is a great interest in obtaining foreign physicians to provide health services in rural areas with little possibility that the services can be continued, to say nothing of replicated, when the foreigner's tour of duty ends.
12. The MCH Centers are little used for pre- and post-natal services. The services are almost totally directed to children. Opportunities for health education, or family planning counselling could be offered to waiting mothers. There is no screening procedure so much professional time is wasted. Recent initiatives in the Office of Family Planning are seeking to address some of these questions. A ministerial MCH, family planning and nutrition committee has been announced and pilot educational efforts are underway.
13. Low use of outlying facilities is in part due to poor scheduling, long waits, repeat visits, and poor rapport with doctors.
14. Health planning is seriously hampered by lack of a data base. There is not a clear relation between inputs and proposed outputs. Planning appears to be relegated to reviews of implementation after major policy decisions have been made. A thorough sector assessment could provide valuable understanding of the sector which might influence future health decisions.

## ROLE OF FOREIGN ASSISTANCE

### Current Assistance from International Organizations and Non-U.S. Donors

Tunisia receives a substantial level of assistance from international organizations and foreign donors. Much of the assistance provided is actually the contracting of foreign medical personnel to provide services. It is in this area where assistance is most frequently requested: health manpower, most particularly physicians, to go to outlying regions to deliver services. Some 300 foreign physicians now work in Tunisia under various forms of sponsorship. Unfortunately, the Tunisian manpower is not available to assume these duties when the foreigners depart. Financial support, particularly without advice on how to use funds, is acceptable. Advisors and study groups are not especially welcomed. In the Tunisian view, financing and advisors are not their major problems; medical manpower is of primary importance. Table 14 provides a comprehensive listing, by program areas, of assistance provided through international organizations and non-U.S. foreign donors.

Family Planning has received extensive assistance. The IBRD has provided about \$4.8 million through an IDA credit for support of MCH and population programs. Other donors have included the Ford Foundation, the WHO, the Population Council, the International Planned Parenthood Federation, the Swedish International Development Agency, the Dutch International Development Agency, and the German Family Planning Association. Most recently, the UNFPA agreed to provide \$4,000,000 in assistance either directly or through the specialized agencies in the period running from 1974 to early 1978.

Several international and bilateral sources have contributed to the development of environmental sanitation, particularly water supplies, in Tunisia. The UNDP has worked through WHO to help the Ministry of Health create an environmental health service within the Ministry and to help establish a national sanitation program. This Environmental Health Service has been developed to supervise regional sanitation programs and exercise control of hygiene particularly in tourist areas. Thus far, the service has not extended beyond the Ministry itself due to lack of trained staff. The central water supply agency (SONEDE), has recently developed small water control laboratories. Agreement has been reached between WHO and SIDA (Swedish International Development Agency) on a National Plan for Waste Water Treatment and Disposal. Another department in which environmental sanitation has been developed is in the Regional Labor Scheme which has been allocated approximately \$1 million for construction of wells and improvement of solid waste disposal, particularly in the rural areas.

Tunisia has received assistance from a variety of sources for developing health manpower. Since 1961 WHO has provided professors on a full-time basis and periodic consultants to the medical school and other institutions, and assistance to nursing education since 1964. UNDP has provided fellowships in cooperation with WHO. The Population Council, the Ford Foundation, and other voluntary organizations have also provided fellowships. Other bilateral assistance has been provided by France, Italy, the FRG, Belgium and the Netherlands.

Nutrition assistance has been provided by France mainly in the form of training courses, advisors and teachers. The Swedish Government, UNICEF, and the Tunisian Government are building a factory for the production of a high protein weaning food (Saha) which is similar to the Superamine produced in Algeria. Sweden is providing about \$860,000 and the Tunisians slightly more. After production begins in mid 1975 it is expected that Saha will be distributed free in MCH Centers and educational institutions and sold at subsidized prices through commercial outlets.

At the present time there are no nutrition programs provided by WHO. The UNDP, with FAO as the executing agency, is providing a modest level of assistance in eleven nutrition related

projects in agriculture and fisheries improvement about half of which are scheduled for completion in 1974. Contributions of funds, commodities, and services from other donors have been important to the nutrition sector. The combined contributions from UNICEF, WHO, FAO, Canada, West Germany and Belgium amounted to approximately \$160,000. All of these assistance programs have been directed toward strengthening the basic institutional foundation of the Nutrition Institute instead of addressing specific problem areas and constraints identified previously.

#### U.S. Assistance

USAID has played an important role in providing better nutrition to various groups in the population through PL 480 foodstuffs. The "food for work" program which began in 1958 and continued until mid-1973 was the first of its kind in the world. Under the program AID provided wheat which was locally milled and distributed to previously unemployed laborers. The Tunisian Government provided a supplemental cash wage in return for labor by the workers on various development projects. The program thus had the dual purpose of providing useful employment and improving the nutrition of about 70,000 workers per year and several times that many dependents. Over 1 million tons of wheat were provided under this program.

Child feeding assistance has been provided by PL 480 Title II commodities for child feeding programs in schools and through maternal and child health centers for children and pregnant and lactating mothers. In the MCH program, AID is now working in cooperation with CARE/MEDICO, Catholic Relief Services, and the Tunisian Government in a new project to train MCH personnel in nutrition education and to evaluate the use of the MCH centers as a means of delivery of food commodities. The pre-school feeding program for children age 3-6 reaches about 180,000 children through nearly 500 centers, particularly in small towns and rural areas. The principal foods provided under this program are flour, blended foods, and oil. The largest child feeding program is a primary school lunch program which now reaches about 300,000 needy children age 6-12, about one-third of the total enrollment. This program is also conducted in cooperation with CARE, CRS, and the Tunisian Government. The program was reduced in size in 1974, re-directed to focus on the rural poor, and the nutritional content improved. It is expected that the Tunisians will gradually assume the school feeding program and U.S. assistance will be phased out. For 1974 about 34.5 million pounds of food was provided under Title II at a cost of \$3.35 million.

Tunisian Government nutrition activities were originally spread over the Ministries of Health, Social Affairs, Education, Agriculture and Planning. To provide more coherent nutrition activities and planning, the National Institute of Nutrition and Food Technology was established in 1969 with USAID assistance to centralize these functions. The Institute's divisions included Applied Human Nutrition, Food Science and Technology, Food Planning and Economics and Nutrition Education. U.S. assistance provided a headquarters building and initially covered 75 percent of the operating budget, but the Tunisian Government will complete assumption of costs by 1975. Equipment and participant training has also been furnished by USAID.

One of the priority activities of the Nutrition Institute is a National Nutrition Survey to make a more precise determination of the nutritional status of the population and thereby better define existing malnutrition and undernutrition problems, identify regional food availability in order to mesh agricultural production with needs, and to identify means of solving national nutritional problems with national resources. Another important activity of the Institute is a lysine fortification project in southern Tunisia being conducted with the assistance of AID and Harvard University. The purpose is to test the nutritional benefits of lysine fortification of wheat on the local population, the possibility of lysine manufacturing in Tunisia, and the economic aspects of such a fortification project.

Family Planning has received about \$7,000,000 in U.S. assistance to date. This includes \$2,000,000 for the renovation and upgrading of MCH and other family planning facilities,

\$1,000,000 toward local costs of the IBRD/IDA hospital and MCH construction project, operating expense contributions, participant training, equipment and contraceptives, and an advisory team of public health/family planning specialists.

The project has been designed to assist the government on a wide range of problems, with emphasis on supply management, organization of medical and clinical services, training of para-medical personnel, and the development of educational and promotional activities.

Private voluntary agencies have provided substantial assistance in addition to the CARE/MEDICO and CRS work referred to above. This includes curative and educational activities of Project Hope, and extensive well improvement and protection and orthopedic services by CARE/MEDICO. Special foreign currency programs, especially under HEW, have permitted research and some educational work in several important areas such as tuberculosis and trachoma control. Active PL 480 projects in the health field now amount to about \$2,000,000.

The Peace Corps has also provided assistance in the health field including such divergent activities as well construction and protection with CARE/MEDICO, nutrition technicians and nurses.

#### Impact of Current Foreign Assistance on Health Problems and Constraints

The impact of foreign assistance in various problem areas, and some of the constraints, are as follows:

1. Infantile and post-infantile mortality are influenced by any effort to improve water supply and nutrition. The personnel of various nations working in MCH centers contribute to this goal. This is also true for assistance in Family Planning, which permits longer breast feeding and better infant care. Emphasis in preschool age nutrition will bring further progress, since it has been shown that children age 2 to 3 are most vulnerable to malnutrition.
2. Vaccination programs have received particularly significant help from UNICEF and this assistance will remain important.
3. Environmental sanitation requires a mixture of precise technical skills at various levels, money, and the development of a sense of community life and responsibility. This has yet to receive major emphasis. Population increase brings increased pollution and increased water and land use. Irrigation will become more extensive, and one can thus expect a rise of water-borne diseases (diarrheas, typhoid fever, schistosomiasis) unless a major effort is made in sanitation, together with a multi-disciplinary Community Development Program.

Environmental sanitation thus appears a promising field for foreign assistance. A pilot area could serve for university teaching and research programs, as well as for demonstrations of non-formal education methods for men and women.

4. Population growth will have received sizeable assistance by 1978 with completion of that now programmed by the IBRD/IDA, USAID and the UNFPA. The government itself has given substantially increased support to this field.
5. Undernutrition and malnutrition are assisted by USAID in the Lysine and Nutrition Institute project and by various agricultural activities. With the Swedish/UNICEF Saha project some of the available knowledge will be put to work. The USAID-financed Nutrition Survey will provide more refined data for a new stage of work. This will involve teaching the use of new foods and in changing dietary habits, and may require more foreign assistance.

**T A B L E S**

TABLE 1  
DEATHS BY AGE AND SEX, 1969

<u>Age</u>	<u>Males</u>	<u>Rate/ 1,000</u>	<u>Females</u>	<u>Rate/ 1,000</u>	<u>Total</u>	<u>Rate/ 1,000</u>
Under 1	7,903	29.8	7,253	29.4	15,156	29.6
1-4	5,465		5,598		11,063	
5-9	852	2.2	693	1.8	1,545	2.0
10-14	454	1.3	367	1.2	821	1.3
15-19	441	1.7	405	1.7	846	1.7
20-24	312	1.9	358	2.1	670	2.0
25-29	324	5.5	386	5.0	710	5.2
30-34	372		535		907	
35-39	408		571		979	
40-44	503		492		995	
45-49	624		483		1,107	
50-54	788		596		1,384	
55-59	1,355	883	2,238			
60-64	1,526	25.9	1,087	21.7	2,613	24.0
65-69	1,794		1,271		3,065	
70-74	1,427		952		2,379	
75-79	1,159		793		1,952	
80/over	1,811	68.6	1,322	54.2	3,133	61.9
Unknown	721	—	588	—	1,309	—
TOTAL	28,239	11.0	24,633	10.0	58,872	10.5

Sources: United Nations Demographic Yearbook, 1972.  
Bracketed age groups are shown in the source.

TABLE 2

RECORDED VACCINATIONS

Cholera	3,350,916*
Smallpox	1,039,342
Poliomyelitis	873,286
BCG	330,868
Tetanus	192,963
Diphtheria	187,854
Whooping Cough	187,156
Typhoid/Paratyphoid	166,138
Yellow Fever	177

\* In response to a cholera epidemic.

Source: Fifth Report of the World Health Situation,  
WHO, Geneva

TABLE 3

INCIDENCE OF NOTIFIABLE DISEASES1969 - 1970 - 1971

<u>Diseases</u>	<u>Number of Cases</u>			<u>Rate Per 100,000 Inhabitants</u>		
	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>
Tuberculosis	----	1,786	1,979	----	34.8	37.7
Typhoid and Paratyphoid	1,511	1,171	978	30.1	22.8	18.7
Hepatitis	1,033	1,290	1,149	21.0	25.1	21.9
Syphilis	251	1,124	1,034	5.0	21.9	19.7
Meningitis	167	162	403	3.4	3.2	7.7
Dysentery	117	231	219	2.3	4.5	4.2
Hydatid cysts	80	98	92	1.6	1.9	1.7
Poliomyelitis	77	8	101	1.5	0.2	1.9
Diphtheria	57	54	48	1.3	1.1	0.9
Typhus	51	30	47	1.0	0.6	0.9
Tetanus	26	23	48	0.5	0.5	0.9
Leprosy	22	29	32	0.4	0.6	0.6
Rabies	48	14	5	1.0	0.3	0.1
Malaria	167	93	100	9.3	1.8	1.9
Cholera	0	27	0	0.0	0.5	0.0

Source: Ministry of Public Health, Republic of Tunisia

TABLE 4.

COMMUNITY WATER SUPPLY  
(Population in Thousands)

	<u>1962</u>	<u>Percent of Total</u>	<u>1970</u>	<u>Percent of Total</u>
<u>Urban</u>				
With house connections	820	50	1,200	53
By public standposts	<u>580</u>	<u>35</u>	<u>850</u>	<u>38</u>
Total	1,400	85	2,050	91
<u>Rural</u>				
With reasonable access			500	.17
<u>Total Country</u>			2,550	49

TARGETS FOR 1980\*

	<u>Popu- lation</u>	<u>Pop. Change from 1970</u>	<u>Cost/ Person (\$)</u>	<u>Total Cost Millions</u>
<u>Urban</u>				
With house connections	2,138	938	32	30.0
By public standposts	<u>1,832</u>	<u>575</u>	11	<u>6.3</u>
Total	3,970	1,513		36.3
<u>Rural</u>				
With easy access	900	400	13	5.2
<u>Total Country</u>	4,870	1,913		41.5

\* Targets set were: 60% of urban population with house connections; 40% of urban population with public standposts, and 25% of the rural population with easy access to safe water.

Source: United Nations Demographic Yearbook, 1972.

**TABLE 5**  
**SEWAGE DISPOSAL FACILITIES AS OF DECEMBER 21, 1970**  
**(POPULATION IN THOUSANDS)**

<u>Urban</u>	<u>Population</u>			<u>Percent of Total</u>
Connected to Public System				
Conventional Treatment	420			
Without Treatment	266			
Total	686			30
Pit privy, septic tank	1,570			70
Total Urban	2,256			100
 <u>Rural</u>				
With adequate disposal	984			34
<u>Total Country</u>	3,240			63
<u>Targets for 1980 and Estimated Costs *</u>				
<u>Urban</u>	<u>Pop to be Served</u>	<u>Pop Change from 1970</u>	<u>Cost/ Person (\$)</u>	<u>Total Cost Millions</u>
Connected to public System	1,832	1,146	52	59.6
Household systems	2,138	568	7	4.0
TOTAL	3,970	1,714		63.6
 <u>Rural</u>				
With adequate disposal	900		2	
<u>Total Country</u>	4,870	1,714		

\*Targets set were: 40% of the urban population connected to the public sewerage system, 60% of the urban population provided with household systems, and 25% of the rural population with adequate disposal. No changes are shown in the services to rural population in the 1980 target because the rural population with adequate disposal in 1970 (34%) already exceeds the 1980 target figure (34%).

Source: United Nations Demographic Yearbook. 1972.

TABLE 6

AMOUNT OF NUTRIENTS PER CAPITA PER DAY IN TUNISIA (URBAN AREAS)1960

	<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Average</u>
Caloric Intake	2,280	1,580	1,125	1,568
Protein (Gr.)	67.50	40	32	42.3
of which of animal origin	12	2.26	0.9	4.0
Fats (Gr.)	61	36	25	37.2
Carbohydrates (Gr.)	363	270	192	260
Calcium (Mg.)	254	130	98	146.5
Iron (Mg.)	14	8.3	6.7	8.9
Vitamin B <sub>1</sub> (mg.)	1.4	0.95	0.78	0.98
Vitamin B <sub>2</sub> (mg.)	0.68	0.36	0.34	0.43
Vitamin P-P (mg.)	1,220	640	496	718
Vitamin C (mg.)	99	63.5	41	62.5

Source: Un Faubourg de Tunis, Enquête Nutritionnelle et Médicale, Ben Salem, Claudien, Laieb,  
as cited in the Ecology of Malnutrition in Northern Africa by Jacques M. May, p. 108.

TABLE 7

## COMPARISON BETWEEN NUTRIENT REQUIREMENTS AND DIET PER CAPITA

## PER DAY IN TUNISIA (URBAN AREAS) 1960

Nutrients	Requirements	Excess or Deficit in Percentages			
		Group 1	Group 2	Group 3	Average
Calories	2,150	+6	-26	-48	-27
Total Proteins (Grams)	61	+10	-35	-48	-31
Animal Proteins (Grams)	30	-60	-93	-97	-86
Calcium (Mg.)	1,120	-78	-89	-92	-87
Iron (Mg.)	11	+27	-25	-40	-20
Vitamin A (I.U.)	4,150	-47	-77	-83	-72
Vitamin B <sub>1</sub> (Mg.)	1.10	+27	-14	-30	-14
Vitamin B <sub>2</sub> (Mg.)	1.50	-55	-76	-78	-72
Vitamin P-P (Mg.)	11.40	-8	-44	-57	-37
Vitamin C (Mg.)	69	+43	-8	-41	-10

Source: Un Faubourg de Tunis, Enquete Nutritionnelle et Medicale, Ban Salem, Claudian, Laieb, as cited in the Ecology of Malnutrition in Northern Africa by Jacques M. May, p. 108.

**TABLE 8**

**DISTRIBUTION OF CALORIES AND NUTRIENTS**

**BY ECONOMIC AND SOCIAL LEVEL**

**Lower Level**

<u>Calories and Nutrients</u>	<u>Consumption Level</u>	<u>Percentage of the Population</u>		
		<u>Rural</u>	<u>Urban</u>	<u>All Tunisia</u>
Calories	( 2,000	30	12	25
Total Protein	( 5 g	30	12	25
AP*	( 20%	70	34	61
TP				
Calcium	( 400 mg	50	27	44
Vitamin A	( 4,000 IU	50	27	44
Vitamin C	( 55 mg	30	12	25
Vitamin B <sub>2</sub>	( 1.4 mg	70	35	61

**Middle Level**

<u>Calories and Nutrients</u>	<u>Consumption Level</u>	<u>Percentage of the Population</u>		
		<u>Rural</u>	<u>Urban</u>	<u>All Tunisia</u>
Calories	2000 - 2500	30	25	29
Total protein	55 - 70 g	50	50	45
AP*	20% - 40%	39	46	33
TP				
Calcium	400 - 600 mg	10	30	42
Vitamin A	4000 - 5000 IU	30	25	29
Vitamin C	55 - 70 mg	10	40	40
Vitamin B <sub>2</sub>	1.4 - 1.7 mg	20	26	22

**Upper Level**

<u>Calories and Nutrients</u>	<u>Consumption Level</u>	<u>Percentage of the Population</u>		
		<u>Rural</u>	<u>Urban</u>	<u>All Tunisia</u>
Calories	) 2,400	40	63	46
Total protein	) 70 g	20	58	30
AP*	) 40%	1	20	6
TP				
Calcium	) 600mg	10	43	18
Vitamin A	) 5,000 IU	20	48	27
Vitamin C	) 70 mg	30	48	35
Vitamin B <sub>2</sub>	) 1.7 mg	10	30	17

\*Ratio of animal protein to total protein.

Source: Report of the Third African Conference on Nutrition and Child Feeding.

TABLE 9

SOURCE OF CALORIE AND DAILY PROTEIN INTAKE

<u>Type of Calories</u>	<u>Sources of Calories</u> (percent)			<u>Total (Rural)</u>	<u>Total (Tunisia)</u>
	<u>Large Cities</u>	<u>Other Towns</u>	<u>Scattered Units</u>		
Starches	62	67	68	68	66
Proteins	11	11	11	11	11
Fats	27	22	21	21	21
TOTAL	100	100	100	100	100

Average Daily Protein intake  
(in grams)

<u>Proteins</u>	<u>Large Cities</u>	<u>Other Towns</u>	<u>Scattered Units</u>	<u>Total (Rural)</u>	<u>Total (Tunisia)</u>
Total proteins	67.7	59.8	67.3	63.7	64.8
Cereal protein	41.4	43.4	53.5	49.3	47.1
Animal protein	15.0	8.3	7.0	7.4	9.3
Animal protein as a percent of total	22.0	14.0	10.0	12.0	14.0

TABLE 10

TUNISIA FAMILY PLANNING CENTERS, 1972

<u>Governorates</u>	<u>Population (in thousands)</u>	<u>Area (Km<sup>2</sup>)</u>	<u>Number of Centers</u>	<u>Population per Center</u>	<u>Area Served By Center (Km<sup>2</sup>)</u>
Tunis	1,181	5,579	42	28,119	132.8
Bizerte	325	3,604	28	11,607	128.7
Beja	304	5,341	22	13,818	242.8
Jendouba	280	3,031	17	16,471	178.3
Le Kef	343	8,063	20	17,150	403.2
Kasserine	231	9,130	10	23,100	913.0
Gafsa	375	18,400	13	28,845	1,415.4
Medenine	269	56,354	19	14,158	2,966.0
Gabes	228	29,150	32	7,125	910.9
Sfax	497	8,834	38	13,079	232.5
Kairouan	303	6,978	27	11,222	258.4
Sousse	607	6,138	36	16,861	170.5
Nabeul	338	3,008	23	14,696	130.8
<b>TOTAL</b>	<b>5,281</b>	<b>163,610</b>	<b>327</b>	<b>16,150</b>	<b>500.3</b>

TABLE 11

TUNISIA: FAMILY PLANNING ACTIVITIES BY CATEGORY OF CENTER, 1972

Centers	New IUD Insertions		New Pill Acceptors		Tubectomy		Social Abortions		Consultations	
	No.	%	No.	%	No.	%	No.	%	No.	%
Principal and Regional Hospitals	2,788	21	1,334	10	2,250	92	3,455	75	11,586	27
Auxiliary and District Hospitals	930	7	1,753	14	49	2	32	1	4,204	10
MCH Centers	5,255	40	5,732	45	6	-	232	5	15,208	35
Communal Dispensaries	846	7	1,334	10	-	-	-	-	3,531	8
Rural Dispensaries and Mobile Teams	1,101	8	1,719	13	6	-	3	-	4,011	9
Others	2,207	17	1,005	8	146	6	881	19	4,847	11
Total	13,127	100	12,877	100	2,457	100	4,603	100	43,390	100

TABLE 12:

TUNISIAN: OCCUPANCY RATE AND DURATION OF STAY IN HOSPITALS, 1971

<u>Type of Hospital</u>	<u>No. of Hospitals</u>	<u>No. of Hospital Beds</u>	<u>Occupancy Rates (percent)</u>		<u>Duration of Stay (days)</u>	
			<u>General</u>	<u>Ob/Gyn</u>	<u>General</u>	<u>Ob/Gyn</u>
Institutes	4	1,095	85.1	-	26.8	-
Specialized Hospitals	5	1,497	95.3	-	66.1	-
Principal Hospitals	7	4,755	75.9	72.2	10.9	2.9
Regional Hospitals	12	2,876	76.1	87.0	8.6	3.8
Rural Hospitals	54	2,272	56.9	38.0	7.0	2.9
Maternity Homes	<u>7</u>	<u>76</u>	26.6	26.6	3.1	3.1
TOTAL	89	12,571	75.4	65.1	11.6	3.2

Source: Statistiques 1971, République Tunisienne, Ministère de la Santé Publique, Service Central des Statistiques Sanitaires.

**TABLE 13**

**Tunisia: Geographical Distribution of Physicians, 1973**

Governorates	Population 1/ (in thousands)	Physicians							Physician/ Population Ratio
		In Public Sector					Number of Physicians		
		In Private Practice	Part- time	Full- time	Tunisian	Foreign	Total		
Tunis	1,181	68	118	265	297	154	451	2,529	
Bizerte	325	4	4	40	9	39	48	7,104	
Beja	304	1	2	18	4	17	21	14,857	
Jendouba	280	2	-	19	3	18	21	9,198	
Le Kef	343	3	1	25	6	23	29	12,241	
Kasserine	231	-	1	10	1	10	11	23,090	
Gafsa	375	4	-	29	3	30	33	11,818	
Medenine	269	3	2	15	5	15	20	13,850	
Gabes	228	-	4	15	4	15	19	12,631	
Sfax	497	10	14	47	24	37	61	8,081	
Kairouan	303	1	-	17	3	15	18	18,444	
Sousse	607	6	10	60	30	46	76	7,894	
Nabeul	338	1	2	35	16	22	38	9,052	
<b>Total</b>	<b>5,281</b>	<b>103</b>	<b>158</b>	<b>585</b>	<b>405</b>	<b>441</b>	<b>846</b>	<b>6,335</b>	

1/ As of January 1971.

- Sources:**
1. Profils Démographiques Socio-Economiques et Sanitaire Régionaux- République Tunisienne, Ministère de la Santé Publique, INPF et PMI (p.4).
  2. Recensement du Personnel de Santé, 31.12.1972, République Tunisienne, Ministère de la Santé Publique, Service Central des Statistiques (pp.5, 8 and 10)

TABLE 14

HEALTH SECTOR ASSISTANCE TO TUNISIA - 1973

<u>Program Area</u>	<u>Source</u>	<u>Period of Assistance</u>	<u>Total Over Period (\$)</u>	<u>Nature of Assistance</u>
<u>Communicable Chronic Diseases</u>				
Malaria eradication	UNDP/WHO	1969-75	145,000	Expert and supplies
Malaria eradication	WHO	1967-75	451,000	Malariologist and supplies
Schistosomiasis control	WHO	1970-75	186,000	Malacologist and supplies
Cancer control	WHO	1972-75	29,000	Consultant and supplies
<u>Delivery of Health Service</u>				
Medical personnel	Belgium	1964-	76,000 in 1973	3 physicians
Medical team, Menzel Bourguiba	Belgium	1971-76	5,214,000 (includes following 3 projects)	8 professionals at hospital, Fellowships.
Public Health Team	Belgium	1970-75	-	8 physicians for preventive medicine project.
Hospital maintenance	Belgium	1970-74	-	4 technicians.
Surgical team, Sfax	Belgium	1972-78	-	5 professionals.
Medical personnel	Bulgaria	1962-	N.A.	157 physicians throughout the country.
Medical personnel	Canada	1971-75	N.A.	1 pediatrician 9 nurses

TABLE 14 (cont'd.)

<u>Program Area</u>	<u>Source</u>	<u>Period of Assistance</u>	<u>Total Over Period (\$)</u>	<u>Nature of Assistance</u>
<u>Delivery of Health Services</u>				
Medical personnel	China	1973-	N.A.	20 physicians, various specialities, occupuncturists.
Medical personnel	France	Open ended	N.A.	129 physicians, 6 nurses.
Medical personnel	Hungary	Open ended	N.A.	1 physician
Medical personnel	Poland	Open ended	N.A.	21 physicians
Medical personnel	Czechoslovakia	1963-	N.A.	36 physicians
Medical personnel	U.S.S.R.	1967-	N.A.	43 physicians
Medical personnel	CARE/MEDICO	1971-74	120,000	2 physicians, technicians, consultants.
<u>Manpower development</u>				
Nursing education	UNDP/WHO	1969-74	120,000	Personnel and fellowships
Medical education	WHO	1961=	1,015,000 (1967-75)	Professors and fellowships
Medical education	WHO	Open ended	60,000 in 1973	Fellowships
Nursing education	Canada	1972-76	700,000	Personnel for Avicenne school.

TABLE 14 (cont'd.)

<u>Project Area</u>	<u>Source</u>	<u>Period of Assistance</u>	<u>Total Over Period (\$)</u>	<u>Nature of Assistance</u>
<u>Family Planning/MCH</u>				
Family Planning and MCH	UNFPA/WHO	1971-75	168,000	Personnel, fellowships, supplies
Demographic studies	UNFPA/WHO	1971-74	6,000	Two fellowships
Family Planning	FRG	1971-76	250,000	Budgetary support, consultants
Family Planning	Netherlands	1969-74	122,000	Physicians and nurses for service delivery, Le Kef
MCH	Sweden	1971-74	48,100	Training of midwives and nurses aides.
<u>Nutrition</u>				
Child nutrition (SAHA)	Sweden/ UNICEF	1972-75	867,000	Material and equipment for manufacture of protein rich food.
<u>Administration/Other</u>				
Health statistics	UNDP/WHO	1969-74	149,000	Consultant to assist in data collection.

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