

*Maternal and Infant Nutrition Reviews*

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**TUNISIA**

*an International Nutrition Communication Service publication*

**MATERNAL AND INFANT NUTRITION REVIEWS**

**TUNISIA**

*A Guide to the Literature*

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## INTRODUCTION

This monograph reviews the available literature on maternal and infant nutritional status, beliefs, and practices in Tunisia. It also lists current government, USAID, international agency, and private voluntary organization nutrition-related programs and policies.

This is not an all-inclusive listing, but it should provide enough information to enable the health/nutrition planner (our primary target audience) to ascertain quickly what is known (and what needs to be studied) about this subject. The information is organized according to a Maternal and Infant Nutrition Review (MINR) system outlined on page iii.

The map on page iv and Table 1 on page v show the extent to which various regions and specific locations have been surveyed. Pages vii through ix present the highlights of our findings. Pages 1 to 66 contain the data categorized according to the MINR classification system with boldface titles within each category to describe specific listings.

Pages 67 to 79 contain an annotated bibliography with each entry described in terms of type of study (original data or literature review), with methodology, sample characteristics, and location, where relevant, and a summary.

These reviews are limited to documents available to us in the United States working under time constraints. We hope that we will be able to obtain further information and to update the reviews.

Special thanks are extended to Mr. Warren Berggren for reviewing and commenting on this report.

Ron Israel  
INCS Project Manager

## MATERNAL AND INFANT NUTRITION REVIEWS

### CLASSIFICATION SYSTEM

1. Nutrition and Health Status
  - 1.1 General
  - 1.2 Women, Pregnant
  - 1.3 Women, Lactating
  - 1.4 Infants 0-6 Months
  - 1.5 Infants 6-24 Months
  
2. Dietary Beliefs
  - 2.1 General
  - 2.2 About Pregnancy
  - 2.3 About Lactation
  - 2.4 About Breast Milk Substitutes (including bottle feeding)
  - 2.5 About Weaning
  - 2.6 About Illness and Cure
  
3. Dietary Practices
  - 3.1 General
  - 3.2 Women
    - 3.2.1 During Pregnancy
    - 3.2.2 During Lactation
  - 3.3 Infants 0-24 Months
    - 3.3.1 Breastfeeding
    - 3.3.2 Weaning
    - 3.3.3 After Weaning
  - 3.4 Health and Medicine
  
4. Nutrition Status Correlations
  
5. Nutrition and Health Policies and Programs
  - 5.1 Policies
  - 5.2 Programs
  
6. Commentaries

#### Bibliography

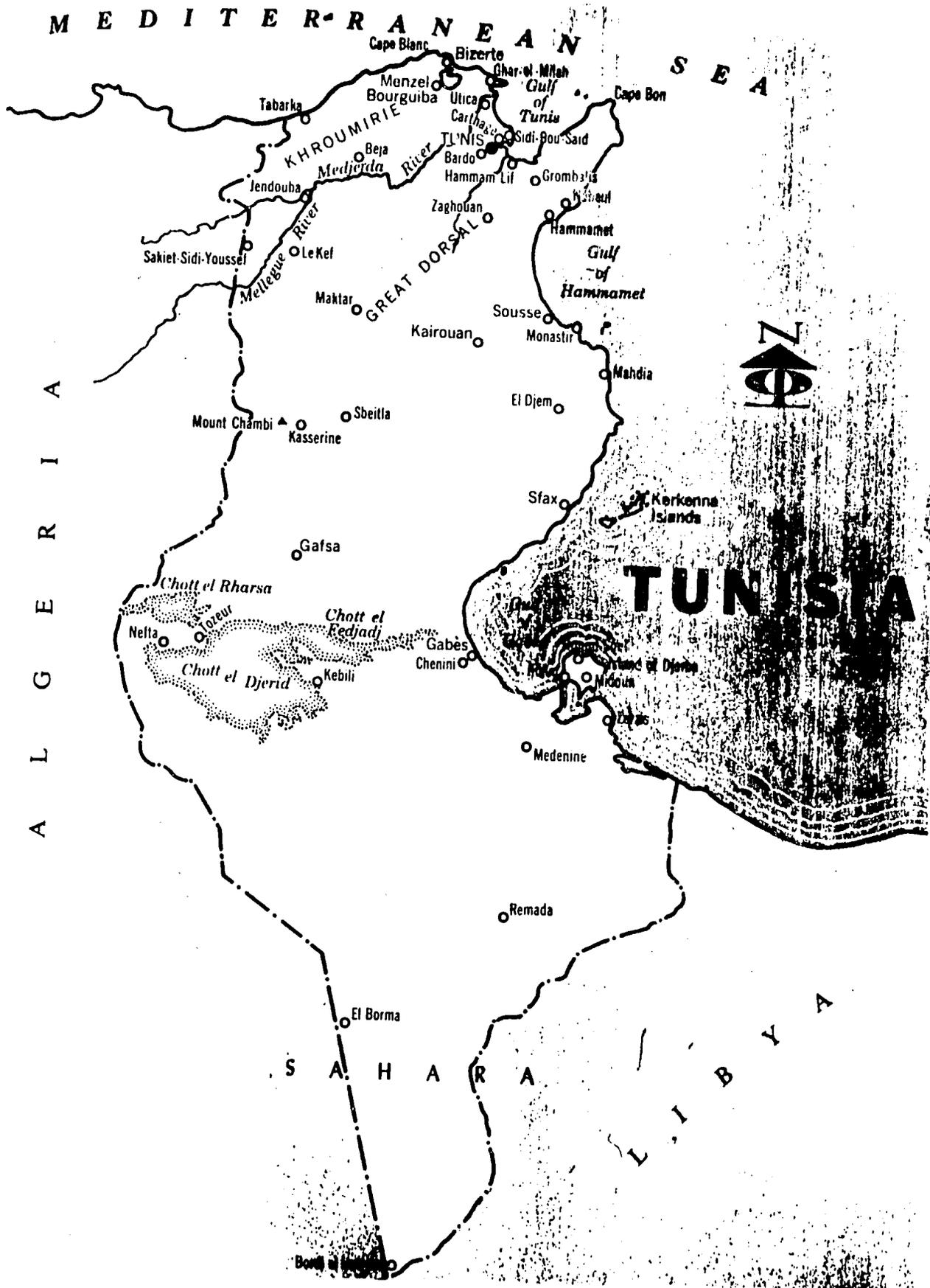


TABLE I  
LOCATIONS STUDIED

	Benamar, 1981	Bouterline, 1973	Bouterline, 1972	el Lozy, 1975	Forbes, 1976	Hamza, 1980b	Inst. National de Nut. et Tech. Al., n.d.	Khadraoui, 1980a	Khadraoui, 1980b	Lakhoua, 1979	Mansour, 1974	Mhenni, 1979a	Mhenni, 1979b	Mhenni, n.d.a.	Rep. Tunisienne 1978	Tesi, 1975	Vemury, 1980
National	X				X										X		
Rural Tunisia																	X
10 rural villages near Chott el Djerid in southern Tunisia		X	X	X			X									X	
Tunis										X				X			
peri-urban Tunis								X	X		X	X	X				
Medjez el Bab						X											
City of Sfax														X			

## HIGHLIGHTS

**1. TARGET GROUP NUTRITION AND HEALTH STATUS:** The infant mortality rate is between 105 and 121 per thousand live births. An average of 9.56% of all births are premature. Weight gain of infants follows international standards to about 5 to 6 months, and then falls below standard. In rural areas, birth weights vary with season, the lowest being reported in August and September. About 45% of Tunisian preschool children fall below the third percentile for weight according to international standards. 21% of children one and two years of age are at high risk of anemia as determined by unsatisfactory hemoglobin levels. Rural anthropometric values collected in the fall are consistently lower than those collected in the spring, suggesting slower growth in summer due to summer diarrhea. 44% of pregnant women have deficient body fat stores as indicated by triceps skinfolds falling below the 15th percentile of the HANES standard. 11% of pregnant and nursing women are at high risk of anemia and 40% of pregnant women are at high or moderate risk of anemia. Endemic goiter is most severe in the Northwest Region, where 23% of women of childbearing age have Grade I or Grade II goiter.

**2. DIETARY BELIEFS:** Many rural people conceptualize foods as being either "strong" or "weak." "Strong" foods are strength-producing when eaten, or contain concentrated sources of energy. "Weak" foods are primarily defined as being weakening when eaten, or needing plenty of water for growth. Fasting during the month of Ramadan is commonly observed by Muslims. In urban areas, many women eat less during pregnancy in the belief that a small baby will facilitate delivery. In rural areas, many women believe that adjusting the quantity of milk consumed when nursing will increase milk production. To prevent or treat swelling of the abdomen, mothers often discard colostrum and give their babies prelactal feeds, such as honey, oil or butter. Many illnesses are thought to be caused by jnun, or evil spirits. Rural mothers believe that boiled milk is beneficial (and eggs and certain animal products harmful) to children under two.

**3. DIETARY PRACTICES:** The main source of calories in the diet is cereal grain, providing 62.2% of total calories. Semolina wheat, in the form of couscous, is the most frequently consumed cereal, followed by barley and rye. Intakes of calories, protein, vitamin C, and thiamin were adequate in the majority of the population, but many Tunisians consume insufficient amounts of iron, riboflavin, calcium, and vitamin A. The Tunis region, a primarily urban area, has lower intakes of most nutrients than other areas. 36.2% of total expenditures are spent for food in urban areas and 45.9% in rural areas. Infants born at home are put to the breast in the first hours; in the hospital, breast feeding often is delayed. A national survey revealed 56% of infants 6 to 9 months were still breast feeding exclusively. 80% of all children under two years are breast feeding (36% exclusively), but there has been a decline in the duration of breast feeding. 20% of children under two consume no breast milk. A large proportion of children are weaned abruptly, most often due to a new pregnancy of the mother. In rural Medjez El Bab, breast feeding duration has increased due to the establishment of an integrated program of medicine and nutrition education in the region. 60% of urban hospitalized infants are breast fed for less than 4 months. Among urban women who stop breast feeding infants between one and six months old, the main reason is lack of milk. 28.9% of rural mothers give fluids in bottles at an average starting age of 5.42 months. In urban areas, 42.7% of mothers feed

## HIGHLIGHTS (Cont.)

with a clean bottle, 25.5% have bottles characterized by poor hygienic conditions and 31.8% don't use bottles. In rural areas, 42.9% of mothers who are ill withhold the breast. Infants who have measles are given a diet based on sugar, water and raisins. Breast feeding is usually stopped when a child develops diarrhea. The newborn infant is generally fed a mixture of butter and honey. A porridge called "bessiesa," made from wheat flour, chick peas, olive oil, and spices is commonly given to babies. In rural areas, cookies and biscuits are often given as first foods. Eggs and animal foods are often not given to infants under two years of age.

**4. NUTRITION STATUS CORRELATIONS:** The nutritional status of infants is positively correlated with male sex, age at weaning, mother's education, father's education, father's occupation, drinking water, sanitation and birth weight. Status is negatively correlated with an age of 12-24 months, artificial feeding, diversity of weaning foods, mother's age greater than 30 years, increasing birth order and family size and gastrointestinal disease. Infant and young child malnutrition tends to increase during the July to December season. In the Northwest and South regions, the prevalence of infant and young child malnutrition is highest. Malnourished, marasmic infants were frequently found to have been improperly artificially fed. The portion of the food budget allocated to cereal grains increases as the size of the household increases.

**5. NUTRITION AND HEALTH POLICIES AND PROGRAMS:** The Tunisian Government plans to integrate nutrition planning into the nation's socioeconomic development process. The current five year plan identifies the need for a nutrition policy. The Government has agreed to establish a national nutrition policy. The Institute National de Santé de l'Enfance (INSE) is a semi-autonomous government organization established to serve the health needs of Tunisia's children. INSE sets standards for the health and nutrition services of MCH centers, and develops education programs and guidelines for health and nutrition education. INSE has created a Service de la Médecine Préventive and a Working Group on Health/Nutrition Education. A policy favoring the promotion of breast feeding has been established. The policy has resulted in the establishment of 110 MCH centers which encourage breast feeding, education through the mass media, and decreased publicity for artificial milks. Maternity leave of one month is provided after birth, and this can be prolonged by up to 30 days with a medical cause. Nursing breaks must be provided, either one hour a day for one year or two hours a day for six months. Each business employing more than 50 women must set aside a room for nursing. The government sets a single price for specific products including bread, flour, semolina, couscous, noodles, meats, milk and milk products, vegetable oil, sugar, tea, coffee, rice and pepper. CARE-Medico and Catholic Relief Services have projects which provide food to 160,000 preschool children 3 to 6 years old. CARE and the Ministry of Foreign Affairs are developing an integrated program of supplementary feeding, preventive health care and nutrition education. Project HOPE has established a community health demonstration center for teaching preventive medicine, public health nursing, sanitation, food inspection, population planning and nutrition. The School of Public Health in Naheul offers courses in nutrition to public health nurses. All MCH centers, in principle, have a nutrition recuperation center headed by a nutritionist. The centers distribute a locally-produced weaning food,

provide oral rehydration with oralyte, and conduct nutrition education. The National Institute of Nutrition (NIN) operates a nutrition education radio program--"Dr. Hakim"--which has been criticized for aiming its messages at the middle and upper classes. In 1975, an integrated medicine and nutrition education program succeeded in increasing breast feeding duration in rural Medjez El Bab. A program of lysine fortification of wheat in Southern Tunisia has not resulted in a significant change in mean birth weight.

## 1. TARGET GROUP NUTRITION AND HEALTH STATUS

### 1.1 TARGET GROUP NUTRITION AND HEALTH STATUS, GENERAL

#### NATIONAL

**IODINE DEFICIENCY:** 3.3% of Tunisians surveyed were classified as high risk because of low urinary iodide excretion. (Forbes, 1976)

**VITAMIN A:** Low incidence of clinical signs and of low serum Vitamin A or carotene values indicate that avitaminosis A is not a problem. (Nutrition in Tunisia, 1978)

**DISEASES:** Some major communicable diseases, including smallpox, typhus, typhoid, malaria, polio, and diphtheria, have been largely brought under control. Major disease problems which still exist are tuberculosis, respiratory infections, gastrointestinal and parasitic infections, schistosomiasis, trachoma and other eye diseases, skin diseases, and venereal diseases. (Pillsbury, 1978)

#### REGIONAL

**GOITER:** Endemic goiter is most severe in the Northwest (Region II). The problem is less severe in the Northeast (Region I) and mild to negligible in the remaining three regions. (Forbes, 1976)

**GOITER:** 23% of women of childbearing age in the Northwest Region had either Grade I or Grade II goiter. Prevalences were about half this in Region I, the Northeast, and were negligible in the other three regions. (Nutrition in Tunisia, 1978)

#### RURAL

**WEIGHT OF WOMEN:** The mean weight of Tunisian women is 50 kg (110 lbs.); the international reference standard is 55 kg. (Tesi, 1975)

#### URBAN

**MEASLES:** In the city of Tunis, from 1964 to 1974, 1429 deaths were attributed to measles, or an average of 130 per year. (Hamza, 1976)

### 1.2 TARGET GROUP NUTRITION AND HEALTH STATUS, WOMEN, PREGNANT

#### NATIONAL

**MATERNAL MORTALITY:** The maternal mortality rate in Tunisia in 1971 was estimated at 2.18 per 1000, but varied by governorate. In Tunis, it was .72 per thousand, in Bizerte 2.6 per 1000, in Beja 3.73 per 1000, in Jendouba 2.39 per 1000, in Le Kef 5.94 per 1000, in Kasserine 3.98 per 1000, in Gafsa 4.72 per 1000, in Medenine 10.01 per 1000, in Gabes 3.9 per 1000, in Sfax 2.35 per 1000, in Kairouan 3 per 1000, in Sousse 2.05 per 1000, and in Nabeul 1.18 per 1000. (Hamza, 1976)

## 1.2 TARGET GROUP NUTRITION AND HEALTH STATUS, WOMEN, PREGNANT (Cont.)

**TRICEPS SKINFOLDS:** 44% of pregnant women have deficient body fat stores as indicated by triceps skinfolds falling below the 15th percentile of the HANES standard (from the national nutrition survey). (Zeitlin, 1979)

**ANEMIA:** 11% of pregnant and lactating women were found to be at high risk of anemia, as measured by hemoglobin levels. 40% of pregnant women were in the high and moderate risk category for anemia. (Nutrition in Tunisia, 1978)

**ANEMIA:** 11% of pregnant and nursing women are at high risk of anemia (hemoglobin below 9 grams/100 ml) and 40% of pregnant women are at high or moderate risk of anemia (hemoglobin of less than 11 grams/100 ml). (Mansour, 1981)

**MACROCYTIC ANEMIA:** 11% of pregnant women had macrocytic anemia, which suggests a mixed etiology of insufficient iron in the diet accompanied by deficiency of folate or vitamin B<sub>12</sub>. (Mansour, 1981)

**GOITER:** 2% of pregnant women had a Grade I (palpable) goiter. Prevalence of Grade II (visible) goiter was 1%. (Forbes, 1976)

**SIGNS OF VITAMIN C DEFICIENCY:** Over 10% of pregnant women, showed signs of diffuse gingival atrophy, recession or inflammation. 2% had bleeding gums. (Forbes, 1976)

**VITAMIN C DEFICIENCY:** Clinical signs of Vitamin C deficiency affect 13% of pregnant women, with a particularly high prevalence in the Northwest, the Northeast, and the city of Tunis. (Mansour, 1981)

**VITAMIN C DEFICIENCY:** 10 to 15% of pregnant women were found to be at high or moderate risk of Vitamin C deficiency as determined by serum Vitamin C levels. (Forbes, 1976)

**NIACIN DEFICIENCY:** 9.21% of pregnant women showed filiform papillary atrophy and 7.9% showed serration and/or swelling of the tongue. (Forbes, 1976)

**RIBOFLAVIN DEFICIENCY:** 7% of pregnant women were judged to be at moderate risk of riboflavin deficiency, based on urinary excretion levels. (Forbes, 1976)

**DENTAL CARIES:** 32% of pregnant women had dental caries at clinical examination. (Forbes, 1976)

### REGIONAL

**GOITER:** Prevalence of Grade I (palpable) goiter was over 9% in Region II, the Northwest and over 6% in the Region I, the Northeast. Prevalence of Grade II (visible) goiter was over 5% in the Northwest Region and 3% in the Northeast Region. (Forbes, 1976)

**VITAMIN C DEFICIENCY:** 50% of pregnant women in the Northeast showed signs of diffuse gingival atrophy, recession or inflammation. About 7% of pregnant women in the Northeast and Northwest regions had bleeding gums. (Forbes, 1976)

**ANEMIA:** 30% of pregnant women in the Southern Region were in the high and moderate risk category for anemia, as measured by hemoglobin levels. (Nutrition in Tunisia, 1978)

### 1.3 TARGET GROUP NUTRITION AND HEALTH STATUS, WOMEN, LACTATING

#### NATIONAL

**GOITER:** 6.67% of lactating women were found to have goiters. Over 5% of lactating women had Grade I (palpable) goiter; 1% had Grade II (visible) goiter. (Forbes, 1976)

**ANEMIA:** 11% of pregnant and lactating women were found to be at high risk or nutritional anemia as determined by hemoglobin levels. 45% of lactating women fell into the moderate and high risk categories. (Nutrition in Tunisia, 1978)

**ANEMIA:** 11% of lactating women were in the high risk and 34% in the moderate risk categories of anemia as determined by hemoglobin levels. (Forbes, 1976)

**ANEMIA:** 11% of pregnant and nursing women were at high risk of anemia (hemoglobin of less than 9 grams per 100 ml), and 45% of lactating women were in the category of high or moderate risk of anemia (hemoglobin less than 11 grams per 100 ml). (Mansour, 1981)

**MACROCYTIC ANEMIA:** 8% of lactating women had macrocytic anemia, which suggested a mixed etiology of deficiency of dietary iron accompanied by deficiency of folate or vitamin B<sub>12</sub>. (Mansour, 1981)

**VITAMIN C DEFICIENCY:** 11% of lactating women had diffuse gingival atrophy, recession or inflammation; 1% had diffuse bleeding gums. (Forbes, 1976)

**VITAMIN C DEFICIENCY:** Clinical signs of Vitamin C deficiency affect 10% of lactating women nationwide. Prevalence is particularly high in the Northwest, the Northeast, and the city of Tunis. (Mansour, 1981)

**VITAMIN C DEFICIENCY:** Over 15% of lactating women were found to be at high and moderate risk of Vitamin C deficiency as determined by serum Vitamin C levels. (Forbes, 1976)

**NIACIN DEFICIENCY:** 11% of lactating women were at high or moderate risk of niacin deficiency as judged by urinary N'-methyl nicotinamide levels. (Forbes, 1976)

### 1.3 TARGET GROUP NUTRITION AND HEALTH STATUS, WOMEN, LACTATING (Cont.)

**DENTAL CARRIES:** 35% of lactating women were found to have dental caries upon clinical examination. (Forbes, 1976)

#### REGIONAL

**GOITER:** 26% of lactating women in the Northwest Region were found to have either Grade I or Grade II goiters. Prevalence of goiter was about half this in Region I, the Northeast, and was negligible in the other three regions. (Nutrition in Tunisia, 1978)

**GOITER:** Over 18% of lactating women had Grade I (palpable) goiters in the Northwest Region; prevalence was 12% in the Northeast Region. Prevalence of Grade II (visible) goiter was over 7% in the Northwest Region. (Forbes, 1976)

**ANEMIA:** 38.3% of lactating women in the Southern Region were at moderate or high risk of anemia. (Nutrition in Tunisia, 1978)

**VITAMIN C DEFICIENCY:** Almost 40% of lactating women in the Northeast Region had diffuse gingival atrophy, recession or inflammation; almost 7% had bleeding gums. Close to 10% of lactating women in the Northwest Region had bleeding gums. (Forbes, 1976)

### 1.4 TARGET GROUP NUTRITION AND HEALTH STATUS, INFANTS 0-6 MONTHS

#### NATIONAL

**INFANT MORTALITY RATE:** The infant mortality rate was estimated at about 114 per 1000 live births. (Zeitlin, 1979)

**INFANT MORTALITY RATE:** The infant mortality rate was 121 per thousand live births. (Hamza, 1976)

**INFANT MORTALITY RATE:** The infant mortality rate was about 105 deaths per thousand live births. (Pillsbury, 1978)

**INFANT MORTALITY RATE:** The infant mortality rate was 125 deaths per 1000 live births in 1976. (Sivard, 1979)

**INFANT MORTALITY RATE:** The infant mortality rate was 106 deaths per 1000 live births. (Family Health Care Inc., 1977)

**INFANT MORTALITY RATES:** The unadjusted infant mortality rate was 52.1 per thousand in 1974; it had been 70.2 in 1966. The adjusted rate in 1971 was 124.5. (Nutrition in Tunisia, 1978)

**BIRTH WEIGHTS:** In 1968, the average birth weight of a newborn was 3.170 kg. By 1973, this weight was 3.21 kg, an increase of 40 grams in five years. This improvement may be attributed to improved nutritional conditions, or may be an indirect result of family planning. (Hamza, 1976)

**PREMATURE BIRTHS:** An average of 9.56% of all births are premature, occurring after 6 to 8 months of gestation and resulting in a birth weight of less than 2500 grams. 16% to 19% of premature infants die before leaving the hospital. (Hamza, 1976)

**GROWTH RATES:** In reviewing a number of studies of weight gain of infants, it was seen that growth follows international standards to about 5 or 6 months, and then weight curves fall below standard. (Hamza, 1976)

**DECLINE IN INFANT MORTALITY:** Between 1940-45, among Moslems, infant mortality was 238 per thousand live births; in 1958, this figure was 148. If the population as a whole is used, including Europeans, the rates were 186/1000 in 1940-45 and 131/1000 in 1958. (May, 1967)

**HEIGHT FOR AGE:** Poor nutritional status already exists by the sixth month of life. The National Nutrition Survey found that 23% of 0 to 1 year old infants fall below 90% of standard height for age. (Zeitlin, 1979)

**NEONATAL TETANUS:** 48% of all cases of tetanus were neonatal tetanus. Neonatal tetanus accounts for 0.5 to 1% of hospitalizations on pediatric services. (Benammar, 1981)

## **REGIONAL**

**BIRTH WEIGHT:** A review of studies of birth weight indicated that the mean in Tunis was 3310 grams; in Northern Tunisia, 3376 grams; and in Grombalia, 3210 grams. 4.9% of infants had low birth weights (2500 grams or less) in northern Tunisia, and 7.3% in Grombalia. (Rates were not available for Tunis.) (Division of Family Health, 1980)

## **RURAL**

**INFANT MORTALITY:** The infant mortality rate is 135 per thousand. (Vemury, 1980)

**INFANT DEATHS:** Among 723 mothers giving birth in rural southern Tunisia, 134 women (18.5%) reported 1 previous infant death; 61 women (8.4%) reported 2 infant deaths; 14 women (1.9%) reported 3 infant deaths; 2 women (0.3%) reported 4 to 6 previous deaths, and 512 women (70.8%) had had no previous infant losses. (Institut National de Nutrition, n.d.)

**NEONATAL DEATH AND BIRTH WEIGHTS:** 11.2% of all infants for whom data was available died before one month of age. Male infants alive at one month had a mean birth weight of 3032 grams. Those who died had a mean birth weight of 2256 grams. (Institut National de Nutrition, n.d.)

**BIRTH WEIGHT:** Mean birth weight in southern Tunisia was 2,945 grams. 119 of the infants had low birth weights (1400 to 2500 grams). Incidence of low birth weight varied from 20 to 23% among the study areas. Participation of mothers in a program of fortification of wheat with

#### 1.4 TARGET GROUP NUTRITION AND HEALTH STATUS, INFANTS 0-6 MONTHS (Cont.)

lysine had no significant effect on birth weight of their infants. (Institut National de Nutrition, n.d.)

**BIRTH WEIGHTS AND SEASON:** Birth weights of rural infants showed a series of fluctuations about the mean value of 2,945 grams, with the lowest weights being reported during August and September, but the changes were not statistically significant. (Institut National de Nutrition, n.d.)

#### URBAN

**MORTALITY RATE:** In the city of Tunis, in 1974, the infant mortality rate adjusted for statistical error was 124.5 deaths per 1000 live births; the unadjusted rate was 70.8. In 1966, the unadjusted rate was 108.1. (Nutrition in Tunisia, 1978)

**INFANT MORTALITY RATE:** The infant mortality rate in Tunis was 100 deaths per 1000 live births in 1966, 99.3 in 1967, 107.6 in 1968, 108.2 in 1969, 90 in 1970 and 110.9 in 1971. (Hamza, 1976)

#### 1.5 TARGET GROUP NUTRITION AND HEALTH STATUS, INFANTS 6-24 MONTHS

#### NATIONAL

**MALNUTRITION:** Over 70% of the children admitted to the Institute of Child Health during 1972 suffered some form of malnutrition. (Nutrition in Tunisia, 1978)

**SIGNS OF PEM:** 1.39% of children less than one year old and 4.45% of children from one to two years showed the PEM sign of hepatomegaly. Other signs, such as the hair sign (dry, depigmented or easily pluckable hair) were found to be negligible. (Forbes, 1976)

**MARASMUS AND KWASHIORKOR:** Results of the national nutrition survey indicated that kwashiorkor and marasmic kwashiorkor were uncommon. (Nutrition in Tunisia, 1978)

**WEIGHT FOR HEIGHT:** Tunisian children fell behind European standards for both height and weight before the end of the first year, but had nearly the same weight for a given height. (Nutrition in Tunisia, 1978)

**WEIGHT FOR HEIGHT:** 2.9% of children one to two years of age were less than 80% of the reference median weight for height, 67.7% were 80% to 90%, 28.3% were 90% to 119% (normal), and 1.1% were 120% or greater. (Forbes, 1976)

**HEIGHT FOR AGE:** At six months, children were found to have an average height which was 97% of normal heights for age, but by 18 months, Tunisian children averaged only 93% of normal height for their age. (Nutrition in Tunisia, 1978)

**HEIGHT FOR AGE:** 22.9% of children between one and two years of age were less than 90% of the reference median height for age; 64.5% were between 90% and 99%; and 12.5% were 100% or greater. (Forbes, 1976)

**WEIGHT FOR AGE:** About 45% of Tunisian preschool children fell below the third percentile for weight according to international standards. (Zeitlin, 1979)

**WEIGHT FOR AGE:** Children one to three years old were found to weigh an average of only 85% of international standards. Standard deviation of 15% for this mean suggests that a significant proportion of this age group would fall below 70% of normal. (Nutrition in Tunisia, 1978)

**WEIGHT FOR AGE:** A review of seven anthropometric studies conducted from 1969 through 1975 found that 36.5 to 48.6% of children between 0 and 5 years were at least 90% of the reference median weight for age; 30.3 to 43.3% were reported to weigh between 75 and 90% of the reference median weight for age; 10.9 to 25.3% fell between 60 and 75% of the reference median; and 0.9 to 4.7% fell below 60% of the reference median. (Mhenni, 1981)

**WEIGHT FOR AGE:** A review of nutritional status studies concerning preschoolers found that the percentage of children below 80% of standard weight for age was 27.8% in a combined sample of local studies, the rate ranged from 28 to 42% in the Harvard lysine study, and was 28.4% in the national nutrition survey. (Mansour, 1981)

**WEIGHT FOR AGE:** Seven local studies carried out between 1969 and 1976 on 7305 preschoolers found that 2.4% were severely malnourished (below 60% of standard weight for age); the range was from 0.9 to 6.3% by locality studied. 12.9% were Gomez class two (from 60 to 75% of standard); the range was 10.9 to 16.6%. 39.5% were Gomez class I (75 to 90% of standard); the range was 34.7 to 45.3%. The remainder, 45.2%, had normal nutritional status; range from 38 to 47%. (Mansour, 1981)

**WEIGHT FOR AGE:** A review of several studies indicated that the incidence of first and second degree malnutrition (Gomez categories) rose during the fifth to ninth months. Incidence was even higher during the 12th through 24th months and then fell slightly after the age of two to three years. (Mhenni, 1981)

**HEIGHT AND WEIGHT:** In the second and third years of life, infants sacrifice growth in height in order to improve weight for height. The amount of nutrients the child is receiving is not enough to permit normal height growth plus establishment of normal body proportions, so the body adapts by stunting and achieves normal weight at the expense of height. (Zeitlin, 1979)

**WEIGHT, HEIGHT, AND AGE:** Height for age decreased relative to standards and remained below standards. Weight for height fell below standards between ages 12 and 24 months, but was normal after age two years. (Mhenni, 1981)

## 1.5 TARGET GROUP NUTRITION AND HEALTH STATUS, INFANTS 6-24 MONTHS (Cont.)

**WEIGHT, HEIGHT AND AGE:** Of 279 children from one to two years of age, there were five (1.7%) who were both less than 80% of the reference median weight for height and less than 90% of the reference median height for age. (Forbes, 1976)

**MALNUTRITION:** A literature review concluded that severe malnutrition affected 1.5 to 2.5% of children, according to type of study and method of evaluation employed. Moderate malnutrition affected a large proportion of children; less than half of Tunisian children had experienced optimum growth and development. (Mansour, 1981)

**NUTRITIONAL STATUS AND WEANING:** Nutritional status of children, as measured by weight for age, height for age and weight for height, is lowest during the weaning period between 1 and 2 years of age (from National Nutrition Survey). (Zeitlin, 1979)

**MEASLES:** 95% of children have had measles by 14 years of age, most of them before two years of age. (Hamza, 1976)

**ANEMIA:** 21% of children one and two years old were at high risk of anemia as determined by unsatisfactory hemoglobin levels. 24% were at moderate risk. (Forbes, 1976)

**RICKETS - BEADING OF RIBS:** Over 3% of children under one year of age showed beading of the ribs, a clinical sign indicative of rickets. Among children one to two years of age, the prevalence was just under 2%. (Forbes, 1976)

**RICKETS - PIGEON BREAST:** 1.7% of children under one year of age showed signs of pigeon breast, a clinical sign of rickets. Among children one to two years of age, prevalence was under 1%. (Forbes, 1976)

**RICKETS - BOWED LEGS:** Less than .5% of children under one year of age had bowed legs. Among children one to two years of age, 1.8% had bowed legs. (Forbes, 1976)

**RICKETS - EPIPHYSEAL ENLARGEMENT OF WRISTS:** 1.4% of children under one year of age had epiphyseal enlargement of wrists. Among children from one to two years of age, over 2% had this clinical sign of rickets. (Forbes, 1976)

**RICKETS - BOSSING OF SKULL:** Over 6% of children under one year of age showed bossing of the skull. Among children from one to two years, the prevalence was almost 4%. (Forbes, 1976)

**RIBOFLAVIN DEFICIENCY:** 9% of children under one year of age were classified at high risk of riboflavin deficiency when judged by urinary excretion levels, and 20% were at moderate risk. (Forbes, 1976)

**MEASLES:** Measles is still an important disease in the country. Measles vaccination was introduced only five years ago. The population is not

yet highly motivated to seek measles vaccination and coverage is limited (only 27% of children 13 to 24 months old had been vaccinated in 1979). Further, in the last months of 1980 and the early months of 1981 there was a measles epidemic in some regions of the country. (Benammar, 1981)

**MEASLES AND AGE:** 43% of cases of measles were found among children aged 9 to 24 months in the year 1980 and early 1981. (Benammar, 1981)

**CAUSES OF DEATH:** The three leading causes of infant mortality are gastroenteritis, respiratory/pulmonary diseases and measles. (Nutrition in Tunisia, 1978)

**GASTROENTERITIS:** Gastroenteritis accounts for 35.4% of consultations in MCH centers, and for 30% of deaths in hospitals, including 50% of deaths on pediatric services. (Hamza, 1980b)

**SEASONAL PATTERNS OF DISEASE:** In a study of diseases in a PMI (maternal and child health) center in Kelibia, 40% of the problems were intestinal infections and skin infections, 45% were respiratory and ear infections, and 15% were due to other illnesses. Respiratory infections were the predominant problem in the winter months, and digestive problems were most common in summer. (Hamza, 1976)

**DENTAL CARIES:** The youngest children, up to three years, were free from dental caries. (Forbes, 1976)

## REGIONAL

**WEIGHT FOR HEIGHT:** In the one to three year age group children in Region V, Tunis, both weight for age and weight for height were greater than in the other regions, which did not differ from each other. (Nutrition in Tunisia, 1978)

**RICKETS:** Young children in the Northeast region showed more clinical signs of rickets than in other regions. Regions V and II were characterized by fewer signs of rickets. Regions III and IV were much less affected, and rickets did not appear to be a public health problem in these regions. (Forbes, 1976)

**RICKETS - BEADING OF RIBS:** In Region V, over 6% of children under one year of age showed beading of the ribs. (Forbes, 1976)

**RICKETS - PIGEON BREAST:** Almost 9% of children under one year of age in the Northeast showed signs of pigeon breast, a clinical sign of rickets. Among children one to two years of age over 5% in the Northeast region showed this sign. (Forbes, 1976)

**RICKETS - BOWED LEGS:** The prevalence of children under one year of age with bowed legs was over 2% in the Northeast Region. 4% of children one to two years of age in Region V had bowed legs. (Forbes, 1976)

## 1.5 TARGET GROUP NUTRITION AND HEALTH STATUS, INFANTS 6-24 MONTHS (Cont.)

**RICKETS - EPIPHYSEAL ENLARGEMENT OF WRISTS:** 4% of children under one year of age in the Northeast and Northwest had epiphyseal enlargement of the wrists. 6% of children one to two years of age in the Northwest Region showed this sign. (Forbes, 1976)

**RICKETS - BOSSING OF SKULL:** 16% of children under one year of age and 15% of children between one and two years of age in the Northeast Region showed bossing of the skull. (Forbes, 1976)

**GASTROENTERITIS:** At Kef, and in the surrounding villages, 1221 cases of gastroenteritis were found among 3259 children examined in 1973, a rate of 37%. Some variation in rates was noted among villages: 42% in Tadjerouine, 22% in Ebba Ksour, 23% in Kalaat Senam and 40% in Sakiet Sidid Youssef. (Hamza, 1976)

### RURAL

**CHILD MORTALITY:** The mortality rate for the age group 1-4 years is 29.6 per thousand. (Vemury, 1980)

**CHILD MORTALITY:** 42% of rural households had at least one child die while under six years of age. (Vemury, 1980)

**CAUSES OF DEATH:** In a study in the regions of Beja, Kasserine and Sfax, 10.5% of children's deaths were due to measles, 23.9% to severe gastroenteritis, 16.8% to respiratory infection, 8.8% to prolonged fever, 9.7% to whooping cough, 3.2% to protein calorie malnutrition and 27.1% to other causes. (Hamza, 1976)

**WEIGHT FOR AGE:** In a study in the village Sakiet Sidi Youssef, a frontier village between Algeria and Tunisia, 26 out of 44 children were mildly malnourished. Half the children 6 to 11 months were malnourished. In the age group 18 to 23 months, all of the 5 children observed were mildly malnourished, at least 20% below the international norms for weight for age (from a Tunisian-Dutch study, undated). (Hamza, 1976)

**WEIGHT FOR AGE:** In a village near Kef, Ebba-Ksour, 18 cases of mild malnutrition were seen among 52 children. The age group most often affected was children 6 to 11 months, 9 malnourished out of 20 cases. Mild malnutrition was defined as weight 20% or more below international norms for weight for age (from a Tunisian-Dutch study, undated). (Hamza, 1976)

**WEIGHT FOR AGE:** 18 of 51 children observed in a village near Kef had weights at least 20% below international norms. The percentage of children with low weights was greatest in the 12 to 17 months age group, in which 5 out of 7 children weighed less than 80% of the normal weight for age (from a Tunisian-Dutch study, undated). (Hamza, 1976)

**WEIGHT FOR AGE:** A study of 4657 children, from birth to four years of age, found 46.3% of the children were normal weight, 39% had mild malnutrition (75% to 89% of the reference median weight for age), 12% had

moderate malnutrition (60% to 74% of standard), and 1.6% had severe malnutrition (less than 60% of standard). 36.4% of children 1 to 2 years and 48% of those 2-3 years were of normal weight (from a Tunisian-Belgian medical team study in 1973). (Hamza, 1976)

**WEIGHT FOR AGE:** 28% to 42% of preschoolers were underweight (weights below 80% of standard weight for age) in rural villages in southern Tunisia. (Institut National de Nutrition, n.d.)

**WEIGHT FOR AGE:** In rural southern Tunisian villages, mean weight for age of preschool boys was 85.44% of standard. Mean weights of preschool girls was 84.18% of standard. (Institut National de Nutrition, n.d.)

**HEIGHT FOR AGE:** 20% to 36% of children under five years of age were stunted (less than 90% of reference median height for age) in rural villages in southern Tunisia. (Institut National de Nutrition, n.d.)

**HEIGHT FOR AGE:** In rural southern Tunisian villages, mean height for age of preschool males was 93.76% of standard, and mean height of females was 92.97%. (Institut National de Nutrition, n.d.)

**HEIGHT AND WEIGHT FOR AGE:** At 3 months of age, rural children had developmental measures at least equal to the mean value of the reference standards. By 1 1/2 years of age, however, both height and weight measurements had fallen to the third percentile level of the reference. (Boutourline, 1972)

**ARM CIRCUMFERENCE:** The mean arm circumference of rural preschool children was generally comparable to the mean value of the reference standard at 3 months of age, but the expected rapid increase during the first year of life did not occur; instead, a slow progressive increase was noted over the next five years, with the mean values for Tunisian children falling between 80% and 90% of the reference standard. (Boutourline, 1973)

**ARM CIRCUMFERENCE:** Mean arm circumference of preschool boys in rural southern Tunisian villages was 87.96% of standard. Mean arm circumference of girls was 87.56% of standard. (Institut National de Nutrition, n.d.)

**HEAD CIRCUMFERENCE:** Mean head circumference of preschool boys in rural southern Tunisian villages was 97.19% of standard. Mean head circumference of girls was 97.15% of standard. (Institut National de Nutrition, n.d.)

**CLINICAL SIGNS OF MALNUTRITION:** It appears that either the preschool children of rural southern Tunisia were not suffering (except for rare cases of marasmus) from any severe and well-defined nutrition deficiency, or that the methods employed in looking for clinical signs were not adequate to reveal it. Further, it was not possible to see any effects of lysine fortification through the medium of clinical examination as conducted for this study. (Institut National de Nutrition, n.d.)

## 1.5 TARGET GROUP NUTRITION AND HEALTH STATUS, INFANTS 6-24 MONTHS (Cont.)

**SEASONAL PATTERNS OF GROWTH:** Anthropometric values collected in the fall were consistently lower than those collected in spring, suggesting slower growth in summer due to summer diarrheas. Morbidity data required to substantiate this hypothesis was not collected. (Institut National de Nutrition, n.d.)

**ANEMIA:** 43.3% of children 12 to 24 months of age were anemic (hemoglobin less than 11 g/100 ml). Anemia was associated with frequent infection and a high prevalence of malnutrition in this age group, constituting a serious public health problem, particularly in Tunis, the Northeast, and Cap Bon. (Mansour, 1981)

**ANEMIA:** Mean hemoglobin ranged from 10.2 to 10.9 gm/100 ml in rural villages in southern Tunisia, indicating a high incidence of mild anemia. The WHO standard for anemia is hemoglobin below 11 gm per 100 ml. (Institut National de Nutrition, n.d.)

### URBAN

**MORTALITY AND MALNUTRITION:** Mortality, in cases of severe malnutrition, is high. In 1966 and 1967, Mlaiki observed 88 cases of severe malnutrition, of which 40.9% died. 30% of cases of malnutrition in the Hospital for Children in Tunis died in 1972. (Hamza, 1976)

**WEIGHT FOR HEIGHT:** Among 89 infants examined in a PMI (MCH) center in Kef, 21 (24%) suffered mild malnutrition. This condition was most common in children 12 to 17 months, 10 out of 21 children (48%) had weights at least 20% less than the standard for their heights (from a Tunisian-Dutch study, n.d.). (Hamza, 1976)

**PEM:** Among peri-urban infants using an MCH center, 1.9% had PEM (severe malnutrition) and 8.9% had moderate malnutrition. (Mheni, 1979a)

**MALNUTRITION:** Of 269 children observed in PMI (maternal and child health) centers in Tunis, 124 (46%) were malnourished. (Hamza, 1976)

**WEIGHT FOR AGE:** In a PMI (maternal and child health) center in Tunis, 55.5% of children five months old had normal weights, and 44.5% were undernourished. (Hamza, 1976)

**HEIGHT AND WEIGHT FOR AGE:** Height and weight of infants from privileged families were comparable to European and American standards for ages birth to two years. These infants were heavier and taller than 1967 French standards and heavier and as tall as American (Falkner) standards. (Lakhoua, 1979)

**NORMAL GROWTH:** 90% of disadvantaged urban children 5 to 9 months of age attending MCH centers had "normal growth." (Mhenni, 1981)

**HOSPITAL ADMISSIONS FOR MALNUTRITION:** 171 children were admitted to the Hospital for Children in Tunis for malnutrition in 1968. 81 of the children were between 1 and 5 years of age. (Hamza, 1976)

**MORTALITY RATE FOR GASTROENTERITIS:** Among children in the Hospital for Children in Tunis, 23.3% of children with gastroenteritis died in 1966, 17.95% in 1969 and 25.86% in 1972. These rates are very high because only the most severe cases are admitted to the hospital, and whenever possible, children are treated at PMI (maternal and child health) centers. (Hamza, 1976)

**GASTROENTERITIS AND HOSPITAL:** At the Hospital for Children in Tunis, 553 of 3281 admissions (16.8%) in 1972 were based on a diagnosis of gastroenteritis, as were 852 of 3940 (21.6%) in 1969 and 780 of 3490 (22.3%) in 1966. Rates were highest in summer and early autumn. (Hamza, 1976)

**DIARRHEA:** 30% of illness treated at MCH centers in the Meillesine sector of Tunis (a very disadvantaged area) are due to diarrhea. Mortality due to infant diarrhea in the INSE hospital was 25% in 1972--this percentage may be high as the hospital takes only severe cases of illness. Environmental conditions causing diarrhea are premature introduction of the bottle, poor sanitation, and premature cessation of breast feeding. (Parlato, 1981)

**RESPIRATORY ILLNESS AND GASTROENTERITIS:** 82 infants from low income families and 24 from privileged families were examined in Tunis. 95% of the underprivileged children had had a respiratory illness, as had 47% of children from privileged families. 66% of the children from poor families and 40% of children from privileged families had had gastroenteritis. (Hamza, 1976)

**IMMUNOGLOBULINS:** Levels of IgA, IgG and IgM are elevated among children under 2 years of age. This elevation occurs from the first weeks of life and is rapidly accentuated revealing a high rate of exposure to communicable diseases. By the second year of life, the infants have an average of 97% of adult values. (Among American children of the same age, the average is only 66% of adult values.) (Khadraoui, 1980a)

## 2. DIETARY BELIEFS

### 2.1 DIETARY BELIEFS, GENERAL

#### RURAL

**FOOD PREFERENCE:** Nearly three fourths of the mothers in Tunisia said that if given the choice they would not eat the foods they are presently consuming. (Vemury, 1980)

**FOOD CLASSIFICATION:** 55% of rural mothers felt that "strong/weak" food classification must be observed all the time; 15.4% felt it only needed to be observed when sick, 12.4% felt it was never necessary to observe this classification, and the remainder had other opinions. (Vemury, 1980)

**FOOD CLASSIFICATION:** Animal protein foods appear on the list of "strong" foods. Foods mentioned as "strong" include beef, lamb, eggs, milk, olive oil, couscous, vegetables, almonds, and chicken. Foods classified as weak include couscous, spaghetti, macaroni, barley, wheat, tea, vegetables, and potatoes. (Vemury, 1980)

**FOOD CLASSIFICATION:** About 2/3 of rural mothers were able to define "strong/weak" foods. "Strong" foods are primarily mentioned as being strength-producing when eaten, or as containing a concentrated source of energy. "Weak" foods are primarily defined as being weakening when eaten, or needing plenty of water for growth. (Vemury, 1980)

**FOOD CLASSIFICATION:** 88.3% of rural mothers were aware of strong/weak food classifications. (Vemury, 1980)

**HARMFUL FOODS:** When 428 mothers were asked which foods were harmful to the family, 11 mentioned wheat, 36 mentioned M'hamsa and couscous, 50 mentioned harissa (hot pepper sauce), 47 lard, and 33 said S'men (clarified butter). (Vemury, 1980)

**BENEFICIAL FOODS:** When 428 rural mothers were asked what foods were beneficial to the family, 100 mentioned boiled milk; 58, beef; 27, chicken; 123, lamb; 95, eggs; 66, couscous; 31, spaghetti and macaroni; 78, vegetables; and 47, fruits or juices. (Vemury, 1980)

**FOOD AVOIDANCE:** 70.3% of rural mothers said they would avoid certain foods if given the choice: 38% mentioned bulgur and couscous; 13.8% mentioned macaroni; .5% mentioned starchy roots and vegetables; 1.4% mentioned beans, lentils or peas; 1.2% mentioned camel, dog and horse meat; and 9% mentioned vegetables. Reasons for avoiding these foods included: food is difficult to cook (.5%), food is expensive (.2%), food is low in prestige (3.7%), the food is considered bad for health (16.6%); and food is not liked (25.4%). (Vemury, 1980)

**RELIGION AND FOOD AVOIDANCE:** Fasting during the month of Ramadan is commonly observed by Muslims. Meals are eaten before and after daylight hours during the entire month. (Vemury, 1980)

## 2.1 DIETARY BELIEFS, GENERAL (Cont.)

**RELIGION AND FOOD AVOIDANCE:** 90.2% of rural mothers reported that their household avoided certain foods due to religious teachings. Foods avoided are pork, mentioned by 67.1% of mothers, improperly killed animal foods (11.7%), and horse (8.4%). 83% of the respondents stated that they avoided these foods because it would be sinful to eat them. (Vemury, 1980)

**RELIGIOUS OBSERVANCE AND FOOD RESTRICTION:** Nearly all households observe food restrictions for religious events. (Vemury, 1980)

## 2.2 DIETARY BELIEFS ABOUT PREGNANCY

### NATIONAL

**GOOD AND BAD FOODS:** Food intake during pregnancy is guided by the belief that foods fall into the categories of "good" and "bad" or noxious. Foods considered "good" include foods rich in protein of animal origin such as milk, eggs, meat; these foods are considered strong or good for the health of women. Foods considered bad include M'Hamsa (a cereal product), couscous, harissa (hot pepper sauce), and acid fruits. These foods are considered bad because they cause sickness, produce gas, increase weight, because they are "weak" foods or because they are difficult to digest. This system is not uniform and varies from region to region and even from one village to another. (Mansour, 1981)

**DIET WHEN ILL:** Most pregnant women reduced food intake during illness. About half said they learned to do this through observing neighbors, one fourth were instructed by their mothers, 20% were advised by their grandmothers or other old women, and 2% had been advised by public health personnel. (Mansour, 1981)

### RURAL

**FOOD RESTRICTION:** 70.9% of mothers interviewed believed a woman should eat less than normal during pregnancy, 14.7% believed she should eat as usual, and 13.3% felt she should eat more than normal. The remainder did not know. If the pregnant woman should become ill, 29.8% felt she should fast, 22.6% felt she should eat less, 30.5% advised the usual diet plus medicinal tea, 3.5% suggested she eat normally, and the remainder had other reasons or did not know. (Vemury, 1980)

**FOODS BENEFICIAL IN PREGNANCY:** Among 471 rural mothers, 133 mentioned boiled milk as beneficial in pregnancy, 29 mentioned yogurt, 17 mentioned beef, 76 said lamb, 14 mentioned chicken, 81 mentioned eggs and other animal food, 68 specified certain vegetables, and 45 said fruits and juices were beneficial. (Vemury, 1980)

**FOODS HARMFUL DURING PREGNANCY:** Among 471 rural mothers, 14 said milk was harmful during pregnancy, 114 mentioned M'hamsa or coucous as harmful, 50 said citrus fruits were harmful, 37 mentioned tea, 29 said salt, 29 said S'men, 27 mentioned lard, 74 said Harissa was harmful, and 55 said pepper was harmful. (Vemury, 1980)

**SOURCES OF DIETARY ADVICE:** 46.4% of rural women reported that their source of advice regarding diet was simply their own observations, 26.3% got advice from their mother, 11.9% from their mother-in-law, 8.9% from another older woman, 1.4% from a health worker, .7% from a local healer, and 4.2% from sources not specified in the text. (Vemury, 1980)

**ILLNESS AND FOOD RESTRICTION:** 2.26% of pregnant women interviewed said they ate less when they were ill. Reasons included "to recover" (19.1% of those who ate less), "to rest body" (24.7%), no appetite (13.5%), bad to eat when sick (7.0%), not known (10.2%), and other reasons (25.4%). (Vemury, 1980)

## **URBAN**

**EATING LESS IN PREGNANCY:** 41% of women reported eating less during pregnancy, because of poor appetite and the wish to have a small baby to facilitate delivery. (Mansour, 1974)

**NO FOODS AVOIDED:** Very few women avoided specific foods during pregnancy. (Mansour, 1974)

## **2.3 DIETARY BELIEFS ABOUT LACTATION**

### **NATIONAL**

**PRELACTAL FEEDS AND COLOSTRUM:** Some mothers give the new born honey, oil, or butter to "lubricate the intestines" and "to prevent or treat swelling of the abdomen." The colostrum is discarded and may also be replaced by other milks. (Mhenni, n.d.b.)

**FOOD TO AVOID:** Foods to avoid are hot, piquant, spicy foods, acid fruits, milk and its derivatives, fish, some vegetables and food which is considered too greasy. These foods are considered bad as they are too strong or difficult to digest or because they reduce production of milk. (Mansour, 1981)

**BENEFICIAL FOODS:** Foods considered beneficial during lactation are foods rich in protein or animal fats and cereal products. Beneficial foods produce more milk. They are considered as having beneficial qualities such as "strength" and are endowed with purgative qualities, healing, repairing, or even purifying. (Mansour, 1981)

**EATING AFTER DELIVERY:** About 90% of women believe that it is necessary to eat immediately after delivery; about 10% believe it is necessary to wait 12 to 24 hours. (Mansour, 1981)

### **RURAL**

**DIETARY ADVICE:** 46.4% of nursing mothers got dietary advice by observing others, 26.3% from their mothers, 11.9% from mothers-in-law, 8.9% from

## 2.3 DIETARY BELIEFS ABOUT LACTATION (Cont.)

another older woman, 1.4% from a health worker, 0.7% from a local healer, and the remainder gave other sources. (Vemury, 1980)

**FOOD AFTER THE DELIVERY:** About three fourths of the respondents felt that food should be given to the mother immediately after birth. (Vemury, 1980)

**REASONS FOR SPECIAL DIET:** 44% of lactating women adjusted the quantity of food consumed when nursing in order to increase milk production. (Vemury, 1980)

**DIET WHEN INFANT IS ILL:** 35% of nursing mothers reduce their own food intake when the infant is ill, 16.3% eat special food, and 18.6% omit certain foods. (Vemury, 1980)

**BENEFICIAL FOODS:** Among 471 respondents, 129 mentioned that boiled milk was beneficial to the nursing mother; 25 mentioned beef; 47, lamb; 10, chicken, hen or turkey; 50, eggs; 29, wheat; 114, M'hamsa or couscous; 28, barley; 51, vegetables; and 24, fruits and juices. (Vemury, 1980)

**HARMFUL FOODS:** Among 471 respondents, 29 said that cucumber was harmful for the nursing mother; 81, citrus fruits; 59, other fruits; 117, harissa; 59, pepper; 29, S'men; and 29, lard. (Vemury, 1980)

**FOODS BENEFICIAL POSTPARTUM:** When 471 rural women were asked which foods were beneficial postpartum, 58 mentioned boiled milk; 32, yogurt; 57, beef; 93, goat, lamb or beef; 70, chicken or hen; 169, eggs; 31, wheat or cereals; and 29, vegetables. (Vemury, 1980)

**FOODS HARMFUL POSTPARTUM:** When 471 rural women were asked which foods were harmful postpartum, 38 mentioned milk; 29, buttermilk; 10, eggs; 63, H'hamsa or couscous; 36, citrus fruit or juices; 27, S'men; 72, Harissa; and 63, pepper. (Vemury, 1980)

## 2.4 DIETARY BELIEFS ABOUT BREAST MILK SUBSTITUTES (INCLUDING BOTTLE FEEDING)

### URBAN

**ARTIFICIAL MILKS:** 43% of working mothers regretted having to use artificial milks at the end of their maternity leaves. 36% felt no qualms about using it, 13% preferred mixed feeding, and 2% preferred artificial milk. (Mhenni, n.d.a.)

## 2.5 DIETARY BELIEFS ABOUT WEANING

### NATIONAL

**AVOIDING EGG YOLK:** Mothers avoided giving the yellow of eggs to their infants because it was believed to stop good mental development, so they exchanged the eggs for biscuits at the grocers. (Mhenni, n.d.b.)

## **REGIONAL**

**PROTEIN FOODS:** 56% of mothers in the Governorate of Siliana believed that eggs were bad for infants and 16% felt that meat was bad. (Mhenni, n.d.c.)

## **RURAL**

**SOURCES OF ADVICE:** 38.5% of mothers learned about child feeding by observing others, 41.7% got advice from mothers or mothers-in-law, 2.8% were advised by health workers, 2.3% from another older women, and the remainder, other or unknown. (Vemury, 1980)

**CHILD FEEDING PRACTICES:** 77.2% of children are fed by their mothers, 14.2% by their grandmothers, 3.3% by an older child, 2.3% by another adult female, other than mother or grandmother, and 2.1% by the father. (Vemury, 1980)

**RAW VEGETABLES:** 97% of mothers felt raw vegetables were good for children. (Nutrition in Tunisia, 1978)

**EGGS:** 56% of mothers believed that eggs were bad for babies, 40% felt they were good, and 4% were undecided. (Nutrition in Tunisia, 1978)

**HARMFUL FOODS:** 49% of mothers felt there were no foods which were harmful to children. 20.5% felt that there were no foods which were harmful for babies. (Nutrition in Tunisia, 1978)

**HARMFUL FOODS:** When asked what foods were harmful to babies, 32.3% said acidic foods, 50% said spicy foods, 14.5% mentioned fatty foods, 32.3% said foods left over from the previous day, 16.6% said meat, and 32.3% said fatty meat. (Nutrition in Tunisia, 1978)

**HARMFUL FOODS:** Among 471 rural mothers, 19 felt eggs and certain animal foods were harmful to children under two years of age. 32 mentioned certain fruits; 33, citrus fruits; 138, harissa; 39, pepper; and 36, lard. (Vemury, 1980)

**EGGS AND MEAT:** In the area of Rohia, in the governorate of Siliana, 56% of mothers believed eggs were bad for nurslings, and 16% believed meats were bad. (Mhenni, n.d.b.)

## **URBAN**

**FOODS IMPORTANT FOR GROWTH:** When asked about foods important for good growth of the infant, about half of the mothers of young children mentioned animal products, milk, eggs, meat or fish; 10% mentioned legumes; 30% said fruits and vegetables; and 10% said cereal products. (Mansour, 1974)

**CHILD FOOD PREFERENCES:** 31.8% of mothers felt that their children preferred animal foods, 15.1% felt their children preferred products

## 2.5 DIETARY BELIEFS ABOUT WEANING (Cont.)

based on cereal, 6.6% said fruit, and 14.9% had noticed no preference. The remainder replied with combinations of animal, cereal and fruit products. (Mansour, 1974)

**FRUITS RESTRICTED:** Some mothers don't give fruits to their young children to prevent them from wetting the bed at night. (Mansour, 1974)

**AGE OF WEANING:** 58% of urban working mothers believed that the ideal age at weaning was greater than one year. (Mhenni, n.d.a.)

## 2.6 DIETARY BELIEFS ABOUT ILLNESS AND CURE

### NATIONAL

**MEASLES:** There is a proverb which says: Wait until the measles has passed before you count your children. (Hamza, 1976)

**MEASLES:** During measles, all medication may be refused, and many prefer using only traditional methods. The amount of food given to the child with measles is reduced and all animal proteins are excluded from the diet. (Hamza, 1976)

**WESTERN MEDICINE:** In Tunisia, things European, especially French, are considered modern and high-class, and termed 'suri'. 'Dwa suri', the Arabic term for western medicine, carries a connotation that one who uses it is himself modern and high-class. Things that are traditional and commonplace are called 'arbi'. Indigenous health practices are referred to as 'dwa arbi'. (Pillsbury, 1978)

**WESTERN MEDICINE:** The technology of western medicine has been accepted by many Tunisians and incorporated into traditional beliefs about illness. For example, an individual diagnosed by a physician as having high blood pressure is believed to have "excessive blood." The special diet prescribed is interpreted as designed to thin or weaken the excessive blood so that a bout of anger will not break the patient's heart. Also, Tunisians take vitamin preparations in the belief that they will strengthen "weak" blood. A physician's drugs or tools that penetrate the skin and enter the blood are believed especially efficacious in treating disease. (Pillsbury, 1978)

**CAUSES OF ILLNESS:** Most Tunisians do not fear contagion. They believe a person visiting a sick relative or friend would become ill only through worry, including worry about becoming ill. Ultimately, illness depends on God's will, "maktub." (Pillsbury, 1978)

**THE EVIL EYE:** Illness may be brought about by the evil eye, which is greatly feared. The harmful effects of the evil eye result from feelings of jealousy, greed, envy and frustration among those who find themselves obliged to admire the better fortune or well-being of others. (Pillsbury, 1976)

**JNUN:** Jnun, evil spirits, cause both physiological and psychological disorders—although most Tunisians do not make this distinction. Some illnesses caused by Jnun are persistent fevers and pains, swellings, periodically recurring illness such as migraine headache, mutism, blindness, sterility and chronic disorders, nervous disorders and some forms of insanity. (Pillsbury, 1978)

**AVOIDING JNUN (SPIRIT) CAUSED ILLNESS:** Precautions are taken to avoid illness caused by jnun, evil spirits. Jnun are automatically summoned when their name is spoken, and so Tunisians avoid mentioning them by name and use euphemisms. Jnun are attracted to four elements: water, blood, fire and dirt. Thus, wells, drains, public baths, slaughter houses, stoves and toilets are all places of potential danger. To warn the jnun of one's presence, one says "Bismillah" (in the name of God). Spilling hot water on the ground, walking on blood, stepping on fire, tripping, or using one of the areas which jnun frequent without first warning them, means risking harming them since jnun do not otherwise know when to get out of the way. If a jinn is injured, the person who caused the injury will fall victim to the same injury. (Pillsbury, 1978)

**DISEASES OF THE BLOOD:** Poor people may have to substitute excessive quantities of cheap red peppers for meat in their diet. Because peppers supposedly produce anger more quickly, poor people are allegedly more susceptible to blood afflictions (which are believed to be produced by strong emotion). Peppers are also believed to stimulate sexual desire and thus account for the larger number of children among the poor—which in turn makes them worry more and makes them more prone to "diseases of the blood" which are precipitated by strong emotion. (Pillsbury, 1978)

**CAUSES OF ILLNESS:** Cause and cure of all illness is ultimately attributed to God. Various intermediaries exist through which illness is caused. These may be 'supernatural,' 'natural,' or 'personal.' Under different circumstances, the same illness may be considered at one time as 'supernaturally caused' at another as 'naturally' caused. Initial diagnosis represents a hypothesis about what causes the illness. This is not proved correct unless the therapy it indicates brings a cure. (Pillsbury, 1978)

**SUPERNATURAL CAUSES OF ILLNESS:** Supernaturally caused illnesses are usually treated by 'dwa arbi', native arabic medicine. It is the omnipresent jnun (plural of jinn, spirit) who are to blame. Other supernatural spirits who cause illness are 'ghwal' (ogres) and 'shayatin' (offspring of Satan). Jnun cause an individual to fall ill either by attacking (striking) or by possessing. A jinn possesses the victim by entering through one of the victim's body orifices. (Pillsbury, 1978)

**PHYSICAL CONTACT:** A doctor is considered to have performed a good medical exam if he touches the patient firmly with his hands on the afflicted body parts. This laying on of hands is believed to heal. Physicians who rush patients through without laying hands on them are suspect. Verbal communication is appreciated, but seems secondary to

## 2.6 DIETARY BELIEFS ABOUT ILLNESS AND CURE (Cont.)

physical contact. Patients are not accustomed to detailed discussion of physical symptoms. (Pillsbury, 1978)

### RURAL

**FOODS AND FEVER:** Foods which mothers felt should be given to children having fever included olive oil, fats, and eggs. Foods are used to make the child feel better and to treat the symptoms. Foods avoided during fever are M'hamsa, couscous, and harissa. (Vemury, 1980)

**ADVICE ON FEEDING ILL CHILD:** Mothers got advice on feeding their ill children from their mothers or mothers-in-law, doctors or nurses, local healers, and husbands or fathers. (Vemury, 1980)

**FOODS AVOIDED WHEN CHILD IS ILL:** Foods which some mothers avoid giving the child who is ill include milk and milk products, harissa and pepper, because the illness gets worse when they are eaten, or the child feels better when the foods are avoided. (Vemury, 1980)

**FOODS GIVEN WHEN CHILD IS ILL:** Foods given to children when they are ill include rice, fenugreek, milk and milk products. These foods are given because they make the child feel better and treat the symptoms. (Vemury, 1980)

### 3. DIETARY PRACTICES

#### 3.1 DIETARY PRACTICES, GENERAL

##### NATIONAL

**CALORIE SOURCES:** Cereals and cereal products (mainly wheat) provide 57% of total calories consumed; oil, 18%; sugar, 6%; and animal products, 7.7%. (République Tunisienne, 1978)

**CALORIE SOURCES:** The main source of calories in the diet is cereal grain, providing 62.2% of total calories. Vegetable oil provides 18.2%; sugar, 5.6%; and animal products, 6.4%. (Nutrition in Tunisia, 1978)

**PROTEIN SOURCES:** 70.2% of proteins came from cereals, 17.3% from animal foods, and 12.5% from other sources. (République Tunisienne, 1978)

**PROTEIN SOURCES:** 73% of protein is obtained from cereals, 1% from potatoes, 3% from legumes, 1% from eggs, 4% from milk or milk products, 2% from fish, 8% from meat and poultry, 6% from fresh vegetables, 1% from fruits, and 2% from other sources. (Institut National de Nutrition, n.d.)

**STAPLES:** Bread has become the staple food, supplying well over 50% of calories and protein in the average diet. It is the cheapest source of calories currently available in the normal diet. (May, 1967)

**FOOD AVAILABILITY:** Rainfall variability causes wide fluctuations in crop production, particularly of cereals. Production of wheat, barley and corn during the 1972-1977 period averaged 1,038,000 metric tons, but varied from 1,245,000 tons in 1975 down to 700,000 tons in 1977. Livestock industry production falls substantially below demand for meat, milk and milk products. Wheat imports average about 200,000 tons per year. (U.S. AID, 1977)

**WATER AND FOOD AVAILABILITY:** Water resources become increasingly scarce as one moves from north to south. Since there is little or no irrigation and the amount of water available for agricultural production is entirely dependent on precipitation, food resources are limited. (May, 1967)

**WHEAT PRODUCTION AND CONSUMPTION:** Wheat consumption (including seed) increased from 970,000 tons in 1973 to 1,350,000 tons in 1978. Production averaged 800,000 tons during the same period, resulting in an increase in commercial imports from 85,000 tons in 1973 to 550,000 tons in 1978, a drought year. (U.S. AID, 1977)

**FOOD PRICES:** The Food Product Index rose from 119.8 in 1973 to 153.7 in 1976. The rate of inflation was high during this period, and the price of food products increased even faster than prices of other consumer goods. (Nutrition in Tunisia, 1978)

**FOOD BUDGET:** 21.4% of the food budget is spent on grains, 18.2% on meat, 15.9% on vegetables, and 11.3% on vegetable oil. When income rises,

### 3.1 DIETARY PRACTICES, GENERAL (Cont.)

cereal, sugar and oil expenses decrease, and expenditures of fruit, meat, fish, milk and eggs increase. (Nutrition in Tunisia, 1978)

**NUTRIENT INTAKE:** Average consumption per person per day is 2543 calories, 72.1 g. protein, 493 mg. of calcium, 17.9 mg. of iron, 616 mg. of vitamin A, 86.3 mg. of vitamin C, 0.86 mg. of B<sub>2</sub>, 1.58 mg. of B<sub>1</sub>, and 28.3 mg. of niacin. (Republique Tunisienne, 1978)<sup>2</sup>

**INTAKES:** In 1961-65, the average Tunisian received 1985 calories, including 52 grams of protein, 52 grams of fat and 327 grams of carbohydrate. In 1974, these figures were 2440 calories, 67 grams of protein, 62 grams of fat, and 403 grams of carbohydrate. (Nutrition in Tunisia, 1978)

**DEFICIENT NUTRIENT INTAKES:** Average calcium intake was found to be 14.9% below FAO/WHO recommended levels; vitamin A, 3.8% below requirements; B<sub>2</sub>, 40.1% below requirements; and niacin, 2% below. Average intakes of calcium, protein, iron, B<sub>1</sub> and vitamin C met or exceeded minimum requirements. (Nutrition in Tunisia, 1978)

**DEFICIENT NUTRIENT INTAKES:** 88% of the population did not meet minimum requirements for riboflavin; 73% did not meet calcium requirements; 65% had inadequate vitamin A intakes; iron intake was inadequate in 55%, and niacin inadequate in 40%. Intakes of calories, protein, vitamin C and thiamin were adequate in the majority of the population. (Nutrition in Tunisia, 1978)

**CALORIE AND PROTEIN SUPPLY:** In 1976 there were 2,657 calories and 73 grams of protein available per person per day. The country ranked 49th in per capita calorie supply and 48th in per capita protein supply among the world's nations. (Sivard, 1979)

**URBAN/RURAL DIFFERENCES IN NUTRIENT INTAKE:** Rural populations were more likely to meet minimal intake levels of calories, iron, thiamin and niacin than were those living in large cities. They were more likely to have inadequate intakes of calcium, Vitamin A and Vitamin C. (Nutrition in Tunisia, 1978)

**CALORIE INTAKE:** Calorie intake was inadequate in nearly one quarter of the households, more often in Region I, Northeast, and Region IV, South. Region IV also had the lowest weight for children under three years old, supporting the likelihood of inadequate food intake being responsible for part of this growth retardation. (Nutrition in Tunisia, 1978)

**PROTEIN INTAKES:** Average daily intake of protein was 64.2 grams, of which 18.9 grams came from animal sources. (Nutrition in Tunisia, 1978)

**IRON:** Households were found to consume less than 70% of the necessary iron. (From le Secretariat d'Etat au Plan et aux Finances 1965-67.) (Hamza, 1976)

## REGIONAL

**CALORIE INTAKE AND REGION:** The highest calorie intake is observed in the Northwest Region, averaging 2457 calories per person per day, and lowest in the Greater Tunis region, 2166 calories. (Nutrition in Tunisia, 1978)

**REGION AND DIETARY ADEQUACY:** 25% of the population of Tunis met requirements for iron intake; the other regions ranged from 40% to 71%. For niacin, 26% of people in the Tunis region met requirements, and 59% to 79% in the other regions. More people in Tunis met the requirement for calcium, 44%, than in the other regions, which range from 17% to 30%. The Northwest Region has much lower percentage meeting Vitamin A requirements, 17%, than other regions, which range from 32% to 49%. (Nutrition in Tunisia, 1978)

**CALCIUM INTAKE AND RICKETS INCIDENCE:** Calcium intake was lowest in Region V, Tunis, the region which had the highest incidence of beading of the ribs--the most specific of the signs for rickets. Intake was highest in Region I, Northeast, where the incidence of all other, less specific, signs of rickets, were most common. This would suggest that calcium deficiency does indeed play a part in rickets development, particularly when calcium intakes are as low as they are in Tunisia, where 75% of households had inadequate intakes. (Nutrition in Tunisia, 1978)

**DIET IN THE DJERBA REGION:** Within the Djerba region, population density is high, and production of food is low. The diet, consisting mainly of European type foods, is based on grains and animal products, and is relatively stable, with little seasonal variation. (May, 1967)

**DIET IN THE COASTAL ZONE AND NORTHERN TUNISIA:** Grains, olive oil, meat, milk, fruits and vegetables are consumed. The diet does not change with season. European types of foods, including preserves, potatoes, candies and macaroni, are served more frequently than in other areas. This zone has the best-fed population. (May, 1967)

**DIET IN THE STEPPE REGION:** The diet is based on cereals and olive oil, and varies with the season. Portions are small and contain little animal protein. (May, 1967)

**DIET IN THE OASES REGION:** Diet is based on dates and other fruit, cereals and oil. Consumption of animal protein is extremely variable; insects are sometimes eaten. There is considerable variation in diet according to season. (May, 1967)

**DIET IN TUNIS AND NORTHWEST AREAS:** The greater Tunis region has the highest food budget and the lowest portion of the budget allocated to cereal grains (16.7%), as opposed to the Northwest region, which has the highest consumption of cereal (25.8%). Greater Tunis spends the largest part of its budget on meat (20.9%). (Nutrition in Tunisia, 1978)

### 3.1 DIETARY PRACTICES, GENERAL (Cont.)

#### RURAL

**COMMON FOODS:** Wheat (often prepared as couscous) is the most frequently consumed cereal, followed by barley and rye. Common vegetables are carrots, beets, turnips, potatoes, tomatoes, onion, and garlic. Green and yellow vegetables are rarely reported. Foods of animal origin commonly consumed are beef, lamb and goat, with secondary sources from poultry and fish. Legumes are usually chick peas and dry white beans. Fruits are dates, citrus, figs and raisins. Seasonal variation strongly effects fruit consumption. Oils, including olive oil and mixed oils, are used daily. Beverages include tea, coffee and carbonated drinks. (Vemury, 1980)

**TRADITIONAL FOODS:** The most traditional food in southern Tunisia is couscous, a coarse wheat semolina steamed over, and eaten with, a sauce made of water, oil, tomato paste, a few vegetables and occasionally a little meat. (Tesi, 1975)

**DIET:** The diet in rural southern Tunisia was found to be based largely on wheat products which were found to supply 81% of the protein and 66% of the energy in the diet. 66% of the families consumed less energy than recommended by the FAO/WHO expert committee, and 51% consumed less protein than recommended. Calculation of the amino acid composition of the diet showed that, irrespective of the scoring pattern used, the biological value of the protein was limited by its lysine content. (Institut National de Nutrition, n.d.)

**FAMILY DIET:** The family diet in rural southern Tunisia is composed of couscous, which is semolina steamed over a sauce of oil, tomato paste, red pepper paste, a few carrots, some squash, fava beans or chick peas, and eaten with this sauce. Macaroni and bread are also eaten with a similar sauce. (Institut National de Nutrition, n.d.)

**FOOD CONSUMPTION:** In southern Tunisian, daily per capita consumption included 310 grams of cereal, 10 grams of legumes, 93 grams of fresh vegetables, 16 grams of potatoes, 17 grams of fresh fruit, 34 grams of dates, 13 grams of meat, 1 gram of fish, 31 grams of oil, 32 grams of sugar, 20 grams of milk, 8 grams of leghmi (a sweet juice from the date palm), and 12 grams of tomato paste and harissa (a paste made of oil and red pepper). (Tesi, 1975)

**FOOD CONSUMPTION:** 310 grams of cereals, 30 grams of potatoes, 32 grams of sugar, 10 grams of pulses, 93 grams of vegetables, 51 grams of fruits, 13 grams of meat, 1 gram of fish, 20 grams of milk and 37 grams of oil were consumed daily per capita in rural southern Tunisian villages. (Institut National de Nutrition, n.d.)

**FOOD CONSUMPTION DURING RAMADAN:** During Ramadan, there was a decrease in cereal and energy consumption in southern Tunisia. 25% less sugar was used during Ramadan, probably because no tea or coffee was drunk during daylight hours. 16% less flour was consumed, but consumption of milk, meat and dates increased during nighttime meals. (Tesi, 1975)

**FOOD PREFERENCES:** 46.4% of rural women reported that the preferred food of the household was animal foods (milk, eggs, meat), 17.9% mentioned couscous and pasta. Reasons for these preferences included: tastes good (18.6%), expensive or prestigious (17.3%), and good for health (20%). (Vemury, 1980)

**CEREAL PRODUCTS:** In southern Tunisia, cereal products were the principal foods; of these, 97% were wheat products. Only 4.2% of wheat products were from local production; the vast majority were imported from North Tunisia. (Tesi, 1975)

**BREAD:** Although Tunisians prefer white bread, millers are not allowed to add bleaching agents. Consequently, relatively low extraction is expected. Some millers occasionally mix local farina with imported U.S. flour to ensure that the final product is sufficiently white. (Institut National de Nutrition, n.d.)

**OIL:** In southern Tunisia, 63% of all oil used was an imported mixture of 1/3 olive oil and 2/3 other vegetable oils. 37% was consumed as pure olive oil produced locally. 16% of dietary calories came from oil. (Tesi, 1975)

**VEGETABLES:** In southern Tunisia, legumes used are mainly chick peas, fava beans, dried peas and beans, and lentils. The most common vegetables are green beets, squash, carrots, turnips and onion. Potatoes are used in small quantities. (Tesi, 1975)

**ANIMAL PROTEIN:** 13.6% of women in rural areas reported consuming beef, lamb or goat daily; 23.5%, 3-4 times per week; 22.6%, 1-2 times per week; and 36.1%, 4 times a month. 48.7% cited cost as the limit on their frequency of consumption. (Vemury, 1980)

**USE OF MEAT:** In southern Tunisia, during the 30 days of Ramadan, meat appears in 17% of all meals; at other times of the year, it appears in 5% of all meals. (Tesi, 1975)

**SOURCES OF CALORIES AND PROTEIN:** Cereals provide 60% of dietary energy in southern Tunisia; oil, sugar, legumes and fresh vegetables provide 28%. 85% of dietary protein is provided by cereals. (Tesi, 1975)

**SOURCES OF PROTEIN:** In rural areas, 77.1% of protein in the diet came from cereals; 5.1% from legumes; 3.8% vegetables; 1.3% fruits; 4.3% meat; 0.6% fish; 5.4% milk and milk products; 0.1% fats and oils; and 2.3% from snacks and drinks. (République Tunisienne, 1978)

**LYSINE:** Wheat products supply about 65% of the energy, 82% of the protein, and 61% of the lysine in the diet in rural southern Tunisia. The only other significant sources of protein are meat (supplying 5% of the protein and 16% of the lysine) and pulses (5% of the protein and 11% of the lysine). Even with the contributions from pulses and meat, lysine is the limiting amino acid in the diet. (el Lozy, 1975)

### 3.1 DIETARY PRACTICES, GENERAL (Cont.)

**FOOD AVAILABILITY:** Over 1/3 of households produced more than 75% of their own food needs. (Vemury, 1980)

**FOOD EXPENDITURES:** 45.9% of expenditures are devoted to food in the average rural household. It is likely that for those below the poverty level, food represents 60% of total expenditures. (U.S. AID, 1977)

**FOOD EXPENDITURES:** Food is a major expense in the average family in southern Tunisia. Cereals, which account for 51% of all food expenses, have a low cost per calorie. 1 MJ (millijoules) of energy from cereals costs 1.5 cents. Oil, costing 1.1 cents per MJ, was the least expensive source of energy. Sugar costs 1.3 cents per MJ. (Tesi, 1975)

**FOOD EXPENDITURES - MEAT:** Despite its high price, \$2.70 per kg, meat accounted for 19% of all food expenditures. (Tesi, 1975)

**MARKETING:** 28% of households marketed daily; 13%, 3-4 times a week; 50.6%, once a week, and the remainder did not reply. In 70.4% of households, the wife went to market; in 18.4% the husband, and in the remainder, no reply. (Vemury, 1980)

**FOOD STORAGE:** 76.7% of households stored uncooked, dried staples in sacks, pottery containers, tins or boxes. 54.5% of households stored perishables, such as vegetables, using straw baskets or pottery containers. 48.7% of households stored leftovers in gourds, pottery jars, woven vessels, buckets or tin cans. 39.6% of households stored preserved foods, such as salted foods, using plastic baskets, sacks, bottles or jars. (Vemury, 1980)

**FOOD PREPARATION:** The most common dish, couscous, is prepared by placing oil, water and vegetables in the bottom half of a double boiler and semolina flour in the top half. After cooking the semolina with steam, the vegetable-oil mix is added to make a sauce. (Institut National de Nutrition, n.d.)

**FOOD PREPARATION:** The mother was responsible for food preparation in 72.5% of households, an older child in 21% of households. (Vemury, 1980)

**COOKING FREQUENCY:** 54.1% of respondents said they cooked three times each day; 40.6% cooked twice a day; and 4.4% cooked only once a day. (Vemury, 1980)

**BREAD BAKING:** 71.3% of households baked bread daily, or baked all the bread that was consumed. 18.2% baked occasionally; 10% did not bake at all. (Vemury, 1980)

**MEAL PATTERNS IN SOUTHERN TUNISIA:** In southern Tunisia, the main meal usually consists of a single dish of couscous or pasta. When bread is eaten, it is usually eaten with a vegetable stew called chakchouka. Pasta sauce contains a smaller quantity and less variety of vegetables,

but is quite similar to chakchouka. These two sauces occasionally contain a little meat. Meat is almost never eaten alone. (Tesi, 1975)

**NUMBER OF MEALS:** 93.7% of adults and children over six years of age ate three meals per day, according to adult women's responses to questionnaires. (Vemury, 1980)

**SNACKS:** 60.8% of rural women reported that their households ate snacks. 49.2% reported that one or two snacks were usually eaten daily by adult members of the household, and 55.9% reported that children received one or two snacks. (Vemury, 1980)

**EATING TOGETHER:** 58.7% of rural mothers reported that the household ate as a group, 36% said that members of the household ate separately, and 2.8% said that household members sometimes ate together. (Vemury, 1980)

**EATING SEPARATELY:** In 36% of households, family members did not all eat together. 18.6% reported that men ate separately from women and children; in 13.5% of households, males ate separately from females, and in the remainder, other combinations. Reasons for eating separately were: custom, and because males are more important. (Vemury, 1980)

**COMMON POT:** 77.6% of rural mothers reported that the family ate from a common pot, 14.5% reported using separate plates, and the remainder did not respond. (Vemury, 1980)

**FIRST PREFERENCE FOR HIGH RISK GROUPS:** 23.8% of rural women reported that pregnant women would be given first preference in food; and 23.8% reported that lactating women would be given first preference in food. (Vemury, 1980)

**FATHER GETS THE BEST:** 73.9% of rural women reported that the husband received the best portions of the meal. 4.9% mentioned older boys, 3.7% mentioned children under six years, and the remainder did not respond. The reasons given for this favored treatment were: wage earner (44.3%), or head of household (11.9). (Vemury, 1980)

**CALORIE INTAKE:** Calorie intake for rural families as a whole is 24% above the minimum requirement, probably because of direct access to the food which they produce. 30% of the rural population in the governorate of Medenine and 20% of those in Kasserine were not able to obtain their minimum required calorie intake. (U.S. AID, 1977)

**ENERGY INTAKES OF AGRICULTURAL FAMILIES:** Families entirely dependent on agriculture met at least 90% of their energy needs in all social strata during the winter months when dates were plentiful. Energy consumption was reduced to less than 80% of calculated requirement during the summer, a time of scarcity, in low income households. (Tesi, 1975)

**NUTRIENT INTAKE:** Average intake in rural areas was 2315 calories per person per day. Protein intake was 63.7 grams, including 7.4 grams from

### 3.1 DIETARY PRACTICES, GENERAL (Cont.)

animal sources and 56.3 grams from vegetable sources. Fat intake was 55.2 grams per day. (Basta, 1977)

**NUTRIENT INTAKE:** Average consumption per person per day was 2652 calories, 79.2 grams protein, 483.5 mg. calcium, 21.1 mg. iron, 517.3 mg. Vitamin A, 71.8 mg. Vitamin C, 0.89 mg. B<sub>2</sub>, 1.73 mg. B<sub>1</sub>, and 32 mg. niacin. (République Tunicienne, 1978)

#### URBAN

**NUTRIENT INTAKE:** The Tunis region, a primarily urban area, had lower intake for most nutrients compared to other regions, with the exception of Vitamin A, riboflavin and Vitamin C. (Nutrition in Tunisia, 1978)

**NUTRIENT INTAKE:** In urban areas, average intake was 2432 calories per day, 66.6 grams of protein, 431 mg of calcium and 15.0 mg of iron, 688.7 RE Vitamin A, 92.7 mg Vitamin C, .79 mg Vitamin B<sub>2</sub>, 1.34 mg Vitamin B<sub>1</sub>, and 25.1 mg Niacin. (Nutrition in Tunisia, 1978)<sup>2</sup>

**NUTRIENT INTAKE:** In the major cities, average consumption per person per day is 2416 calories, 64.2 g protein, 565.8 mg calcium, 13.3 mg of iron, 672.7 mg of Vitamin A., 105.9 mg of Vitamin C, 0.86 mg B<sub>2</sub>, 1.27 mg B<sub>1</sub>, 23.3 mg niacin. (République Tunisienne, 1978)

**CALORIE, PROTEIN AND FAT CONSUMPTION:** Average calorie consumption in urban areas was 2550 calories per person per day. Protein consumption was 67.7 grams, 15 from animal sources and 52.7 from vegetable sources. Fat intake averaged 77.5 grams. (Basta, 1977)

**SOURCES OF PROTEIN:** In cities, 61% of protein in the diet is obtained from cereals, 1% from potatoes, 5% from legumes, 2% from fish, 12% from meat and poultry, 6% from fresh vegetables, 2% from fruits and 2% from other sources. (Institut National de Nutrition, n.d.)

**SOURCES OF PROTEIN:** In the largest cities, 55.5% of the protein in the diet came from cereals; 6.4% legumes; 6.7% vegetables; 1.4% fruits; 10.7% meat; 3.9% fish; 10.6% milk and milk products; 0.3% fats and oils; 4.5% from snacks and drinks. (République Tunisienne, 1978)

**FOOD EXPENDITURE:** 36.2% of total expenditures go to food in urban households. (U.S. AID, 1977)

**HOUSEHOLD BUDGET FOR FOOD:** 20.3% of the household budget for food is spent for foods of animal origin, 30.8% is spent on cereal products, 17% of the household food budget went to non-nutritive substances such as coffee, tea and condiments. (Mansour, 1974)

**COOKING AREA:** In the winter, 32% of peri-urban families had a separate room for preparing food, 6% had a separate room, but used tht room also for other things, 53% cooked in the same room where they slept, 2% cooked in the courtyard, 7% shared cooking area with neighbors. In summer, 32% had a separate room, 5% had a room for cooking but used also for other

purposes, 20% had one room for cooking also used for sleeping, 36% cooked in a courtyard and 7% shared a cooking area with neighboring households. (Mansour, 1974)

**COOKING METHODS:** 85% of families cooked on kerosene stoves, 3% used charcoal, 11% used gas, and 1% cooked with wood. (Mansour, 1974)

### **3.2 DIETARY PRACTICES, WOMEN**

#### **3.2.1 DIETARY PRACTICES, WOMEN, DURING PREGNANCY**

##### **NATIONAL**

**DIET OF PREGNANT WOMEN:** The diet of pregnant women is characterized by monotonous consumption of bread, semolina, vegetables, fruit (only in season), and no meat. Their diet is high in carbohydrates with little fat of animal origin and low in protein. (May, 1967)

**DIET RESTRICTED IN PREGNANCY:** A review of five studies concluded that there was a very strong tendency to reduce food intake during pregnancy. This restriction was found in both urban and rural samples but appeared to be slightly more marked among rural women. Reasons given were fear of having a large baby, having difficulties during delivery or simply a lack of appetite. (Mansour, 1981)

**SUPPLEMENTS:** A 1973 UNICEF study reported that only 12% of pregnant women supplemented their regular diet in any way during pregnancy. (Parlato, 1981)

##### **REGIONAL**

**DIET IN CAP BON:** The diet of 22 pregnant and lactating women in Cap Bon provided on average 99% of the recommended allowance for calories, 90% of protein (mainly from vegetable foods, 9.6% from food of animal origin), and 18.3 mg. of iron (also provided mainly by cereals and green vegetables). Diets provided 67% of the recommended calcium and 48% of riboflavin. Few women in the study ate eggs, milk or milk products. Intake of vitamin A and C was found to be relatively sufficient due to intake of fresh green vegetables which were widely available during the season of the survey. Intakes of niacin and thiamine were adequate due to intake of cereal. (Mansour, 1981)

##### **RURAL**

**DIET IN PREGNANCY:** 11.9% of women in Beja, Kasserine and Sfax ate more protein and more carbohydrates during pregnancy, 54.5% did not change their diets, and 33.6% ate less carbohydrates. (Hamza, 1976)

### **3.2.1 DIETARY PRACTICES, WOMEN, DURING PREGNANCY (Cont.)**

#### **URBAN**

**CHANGES IN DIET:** 36.1 to 50.5% of women in Tunis ate less during pregnancy; 6.9 to 17.2% ate more; and 40.8 to 48.6% made no changes. (Figures varied depending on zone of city.) (Mansour, 1981)

**PROTEIN AND VEGETABLE INTAKE:** A study of 435 pregnant women in Tunis evaluated the frequency of consumption of certain foods rich in nutrients. Vegetables were eaten almost universally. Cheese and fish were eaten irregularly or were even absent from the diet. About half of the women had a satisfactory consumption of milk (eaten three times a week or more), about one third had "adequate" egg consumption, and 28% ate meat three times a week or more. (Mansour, 1981)

**DIET DURING ILLNESS:** Illness during pregnancy seriously affected food intake. About one third of the women reduced their intake and another third stopped eating completely. (Mansour, 1981)

### **3.2.2 DIETARY PRACTICES, WOMEN, DURING LACTATION**

#### **NATIONAL**

**DIET DURING ILLNESS:** Illness during pregnancy seriously affected food intake. About one third of the women reduced their intake and another third stopped eating completely. (Mansour, 1981)

**INCREASED INTAKE:** Among lactating women there is a marked tendency to increase dietary intake, particularly among rural women. The main reason given for this increase is the desire to increase the amount of milk produced for the infant. About half of the women reported eating as usual; a small number, ranging from 4 to 10%, reduced intake. (Mansour, 1981)

#### **REGIONAL**

**DIET IN CAP BON:** The diets of 22 pregnant and lactating women in Cap Bon provided, on average, 99% of the recommended allowance for calories, 90% for protein (only 9.6% of protein was from food of animal origin). 18.3 mg. of iron (provided mainly by cereals and green vegetables) was the average intake. Diets provided 67% of the recommended calcium and 48% of recommended riboflavin; few women in the study ate eggs, milk, or milk products. Intake of vitamin A and C was found to be relatively sufficient due to intake of fresh green vegetables which were widely available during the season of the survey. Intake of niacin and thiamine were adequate due to intake of cereal. (Mansour, 1981)

#### **RURAL**

**DIET CHANGES:** 22.4% of rural mothers ate as usual when lactating, 4.2% ate less than normal, 72% ate more than normal when lactating, and the remainder did not know. (Vemury, 1980)

**DIET CHANGES:** 76.8% of women in Beja, Kasserine and Sfax did not change their diets during lactation, 21% ate more protein and more carbohydrates, and 2.2% ate fewer carbohydrates. (Hamza, 1976)

## **URBAN**

**CHANGES IN DIET:** 10.2 to 17.2% of women in Tunis (depending on zone of city) ate less when lactating; 9.9 to 41% ate more; and 41.9 to 74.1% made no change. (Mansour, 1981)

**FRESH FRUITS:** 25 to 51% of lactating women in Tunis (depending on zone of city) had consumed some fresh fruit during the preceding three days. (Mansour, 1981)

**AVERAGE NUTRIENT INTAKES:** Lactating women consumed 75.3% of the FAO recommended allowance for calories, 62.5% of the allowance for protein, 34.6% of the recommended amount of calcium, 64.7% of the recommended allowance for phosphorus, 80.3% of the allowance for iron, 80.3% of the recommended amount of retinal, 116.8% of the allowance for thiamine, 49.5% of the allowance for riboflavin, 55.1% for niacin and 120% of the recommended allowance for Vitamin C. (Mansour, 1974)

**ADEQUACY OF INTAKE:** The diets of 188 lactating women in the city of Tunis provided the following percentages of the recommended allowances: calories, 75%; protein, 63%; calcium, 35%; iron, 80%; vitamin A, 80%; vitamin B<sub>1</sub>, 117%; vitamin B<sub>2</sub>, 50%; vitamin B<sub>6</sub>, 55%; and vitamin C, 120%. (Mansour, 1981)

**PROTEIN CONSUMPTION:** 13.2 to 28.4% of lactating women in Tunis (depending on zone of city) had meat two or more times per week; 4.3 to 12.2% had fish two or more times per week; 49 to 64% had milk two or more times per week; and 82.7 to 100% had legumes two or more times per week. (Mansour, 1974)

**ILLNESS:** Diet during lactation is often influenced by illness. During illness of the infant, 35% of women reduced their intake, 16% ate special foods and 19% excluded certain foods from their diet. (Mansour, 1981)

### **3.3 DIETARY PRACTICES, INFANTS 0-24 MONTHS**

#### **3.3.1 DIETARY PRACTICES, INFANTS 0-24 MONTHS, BREAST FEEDING**

## **NATIONAL**

**FEEDING AT BIRTH:** Infants born at home are put to the breast in the first hours. In the hospital, breast feeding often is delayed. (Mheni, n.d.b.)

**INITIATION OF BREAST FEEDING:** The child is put to the breast soon after delivery in the majority of cases. (Mhenni, 1981)

### 3.3.1 DIETARY PRACTICES, INFANTS 0-24 MONTHS, BREAST FEEDING (Cont.)

**BREAST FEEDING AND HOSPITALIZATION:** In a study of 100 infants from birth to two years of age who had been hospitalized, 18% were not breast fed at all, 49% were breast fed less than 3 months, and 60% were breast fed less than 4 months. (Mheni, n.d.b.)

**EXCLUSIVE BREAST FEEDING:** 56% of infants 6 to 9 months of age were still given only breast milk (from INS 1968). (Hamza, 1976)

**DURATION OF BREAST FEEDING:** 99% of infants are breast fed at three months, and 36% are still breast fed at 2 years (from a 1968 study of a national sample). (Hamza, n.d.)

**DURATION OF BREAST FEEDING:** 80% of children under two years of age were breast fed. Of this 80%, 36% had only breast milk, 3.5% had breast milk plus artificial milk, and 40% had breast milk plus food (from INS 1968). (Hamza, 1976)

**DURATION OF BREAST FEEDING:** There has been a decline in the duration of breast feeding. (Mhenni, 1981)

**NO BREAST MILK:** 20% of children under two years of age consumed no breast milk (from INS 1968). (Hamza, 1976)

**ABRUPT WEANING:** A large proportion of children are weaned abruptly, most often due to a new pregnancy of the mother. (Mhenni, 1981)

**ABRUPT WEANING:** Weaning is abrupt for most children, usually imposed because of a new pregnancy. (Hamza, n.d.)

#### **RURAL**

**PRELACTAL FEEDS:** The practice of giving foods to the newborn within a few hours of birth is common; the usual foods are s'men (clarified butter) and butter. (Vemury, 1980)

**BEGINNING BREAST FEEDING:** The majority of mothers do not believe that the infant should be given the breast immediately after birth. More than 3/4 of the mothers began breast feeding during the first day after delivery. (Vemury, 1980)

**FIRST BREAST FED:** 68.3% of rural mothers in Beja breast fed immediately after delivery, and 79.3% of mothers in Kasserine did so (from UNICEF 1973). (Hamza, 1976)

**FIRST BREAST FED:** In the villages of the governorate of Sfax, 64% of infants are put to the breast just after delivery (from INSE, n.d.). (Mheni, n.d.b.)

**FIRST BREAST FED:** In the village of Side Smail, in the governorate of Beja, 68.3% of infants are first put to the breast directly after delivery and 81.6% are breast fed for the first time in the first day of life (from INSE). (Mheni, n.d.b.)

**PREVALENCE OF BREAST FEEDING:** 96.7% of infants in Beja, 99% in Kasserine, and 98.5% in Sfax, had been breast fed for some period (from UNICEF 1973). (Hamza, 1976)

**DURATION OF BREAST FEEDING:** 2.3% of mothers weaned their infants at age 6 to 9 months; 4.7% at 9 to 12 months; 20.9% at 12 to 18 months; 44.2% at 18 to 24 months; 23.3% at 24 to 36 months; and the remainder did not specify. (Vemury, 1980)

**DURATION OF BREAST FEEDING:** 75% of infants were breast fed in the first three months of life. In the second three months, 59% were breast fed, 29% had mixed feeding, and 12% were artificially fed. From 12 to 18 months, 60% were breast fed, mixed feeding accounted for 20%, and artificial feeding for 20%. At 18 to 24 months, 52% were breast fed, 22% had mixed feeding, and 26% had artificial feeding (from Nianou 1973). (Hamza, 1976)

**DURATION OF BREAST FEEDING:** In the governorate of Beja, 30.2% of infants continued to receive breast milk beyond two years of age; in Kasserine, 49%; and in Sfax, 24% (from UNICEF 1973). (Hamza, 1976)

**DURATION OF BREAST FEEDING:** In the rural area of Cap-Bon, 88% of infants were breast fed for the first six months, and 73% were breast fed through age 12 months (from a study by a Tunisian-Belgian team, n.d.). (Hamza, 1976)

**DURATION OF BREAST FEEDING:** In the village of Sidi Smail, in the governorate of Beja, 30% of infants were breast fed beyond two years of age (from INSE). (Mhenni, n.d.b.)

**DURATION OF BREAST FEEDING:** In rural areas of Kasserine, 99% of newborn infants are breast fed, and 50% are still breast fed at two years of age (from INSE, n.d.). (Mhenni, n.d.b.)

**DURATION OF BREAST FEEDING:** Average duration of breast feeding for the first baby is 14 to 25 months, and for the fourth, 16 to 26 months (from I.N.N. 1973-75). (Hamza, n.d.)

**DURATION OF BREAST FEEDING AND NUTRITION EDUCATION:** In 1975, 91% of children in rural Medjez El Bab were breast fed at birth, 86.5% at 3 months, 72% at 6 months, 44% at 12 months, and 22% at 18 months. In 1980, rates of breast feeding in this area had increased to 100% through one month, 85.5% at 3 months, 84.5% at 6 months and 55.3% at 12 months. This improvement in rates of breast feeding may be explained by the establishment of an integrated program of medicine and nutrition education in the region. (Hamza, n.d.)

**AGE AT WEANING:** 3.6% of infants were weaned at one year, 25.7 at 1.5 years, 57% at two years, 5.4% at 2.5 years, 6.4% at three years, and 1.8% at four years, in the north of the country in the rural areas of Jendouba. (Mhenni, n.d.b)

### 3.3.1 DIETARY PRACTICES, INFANTS 0-24 MONTHS, BREAST FEEDING (Cont.)

**AGE AT WEANING:** Median age at weaning was about two years in rural areas. (Mhenni, 1981)

**DECREASE IN DURATION OF BREAST FEEDING:** In rural areas, duration of breast feeding seems to be declining. In southern Tunisia, a study done in 1971 found that 85% of children under one year were breast fed; four years later, a study carried out in the same circumstances found that the rate had fallen to 61%. (Hamza, n.d.)

**GRADUAL WEANING:** 74% of mothers weaned gradually: 15% reported that weaning began before the 8th month and was completed between the 12th and 30th months, 9% began at the 12th month and completed by the 18th, 24% began to wean at 12 months and finished at 24 months, 14% began weaning at 18 months and finished at 24 months, 12% weaned gradually but did not fit any of the previous models, and the remainder did not wean gradually. (Institut National de Nutrition, n.d.)

**ABRUPT WEANING:** 26% of mothers weaned abruptly: 8% reported that they weaned their child abruptly at around 18 months of age, 16% reported abrupt weaning at about 2 years, and 2% weaned abruptly beyond 2 years. (Institut National de Nutrition, n.d.)

**ABRUPT WEANING:** 89% of children in the region of Kasserine were weaned abruptly (from UNICEF 1973). (Hamza, 1976)

**METHODS OF WEANING:** 38.2% of rural mothers reported that they weaned their children by introducing new foods gradually. 11% introduced new food abruptly, 0.9% sent the child away, 27.3% applied a bitter substance to the breast, 2.3% withheld the breast, and 3.7% used a punishing method to wean their children (remainder in categories 'other' and 'unknown'). (Vemury, 1980)

**WEANING AND PREGNANCY:** 79.5% of mothers in rural Beja weaned their children because of a new pregnancy, as did 85.6% of mothers in Kasserine and 77.1% of mothers in Sfax (from UNICEF 1973). (Hamza, 1976)

**REASONS FOR WEANING:** 63.2% of rural mothers said they weaned their child because of a new pregnancy, 1.6% because of a new birth, 6.3% because of illness of mother or child, 10.5% because the child was eating other food, 2.8% because they had insufficient milk, 1.4% because the child refused the breast, 0.5% weaned because of the mother's work, and 13.7% were other or unknown. (Vemury, 1980)

**REASONS FOR WEANING:** 52% of mothers weaned because of a new pregnancy (median age of 18 months), 39% because the child was the right age for weaning (median age 23 months), 5% because they no longer had milk (median age 16 months), 3% because mother was ill (median age 15 months), and 1% did not reply. (Institut National de Nutrition, n.d.)

## URBAN

**FIRST BREAST FEEDING:** Among children born in the hospital, 20% were first breast fed in the first six hours of life, and 57% waited until 24 to 48 hours after birth. Information was not available on the 6-24 hour interval, nor on how many mothers waited more than 48 hours. (Mhenni, n.d.a)

**FIRST BREAST FEEDING:** 29% of infants of working mothers were first breast fed within six hours of birth, 48% between 6 and 24 hours of birth, 14% 24 to 48 hours after birth, and 9% beyond 48 hours. (Mhenni, n.d.a)

**PREVALENCE OF BREAST FEEDING:** Over 90% of disadvantaged urban mothers initiated breast feeding. (Mhenni, 1981)

**DECLINE IN BREAST FEEDING:** Some studies indicate that urban breast feeding practices are in significant decline, with an estimated 16 to 17% of infants zero to three months old receiving only infant formula and an estimated 35% receiving only formula between 3 and 6 months. (Parlato, 1981)

**BREAST FEEDING AND WORKING MOTHERS:** 89% of mothers who worked in a hospital reported that they had breast fed, and 93% of mothers working as civil servants or in business reported that they had breast fed their infants. (Mhenni, n.d.a.)

**NUMBER OF BREAST FEEDS AND WORK:** 70% of working mothers reported that when they returned to work there was a reduction in the number of times a day they nursed their baby. The 5% of women who did not report this reduction in number of breast feeds lived very close to their place of work. 16% gave no reply. (Mhenni, n.d.a.)

**DURATION OF BREAST FEEDING:** 16.2% of urban mothers using PMI (Maternal and Child Health) Centers never breast fed at all, 20.8% breast fed for one to six months, 15.5% breast fed for six months to one year, and 47.5% breast fed for more than one year. (Hamza, 1976)

**DURATION OF BREAST FEEDING:** 49% of hospitalized infants had been breast fed less than 3 months, 60% less than 4 months (from Mhenni 1973). (Hamza, 1976)

**DURATION OF BREAST FEEDING:** 95% of the mothers breast fed: 26.1% for one to six months, 15.8% for seven to twelve months, 13.8% for 13 to 18 months, and 39.6% beyond 18 months. (Mansour, 1974)

**DURATION OF BREAST FEEDING:** In a study of 200 women using a PMI (Maternal and Child Health) Center in Medjez El Bab, 91.5% of urban women initiated breast feeding. Half the women breast fed for more than one year. (Mhenni, n.d.b.)

### 3.5.1 DIETARY PRACTICES, INFANTS 0-24 MONTHS, BREAST FEEDING (Cont.)

**DURATION OF BREAST FEEDING:** In Tunis and its suburbs, nearly all infants are breast fed, but the average duration of breast feeding is only three months (from Djedidi 1978). (Hamza, n.d.)

**AGE AT WEANING:** Median age at weaning was less than 12 months in urban areas. (Mhenni, 1981)

**REASONS FOR PROLONGED BREAST FEEDING:** When asked why they breast fed for a prolonged period, 58.1% of mothers said they did so because of its contraceptive effect, 10.6% because the infant refused to stop, 8.4% because they felt the child was too young, 3.9% because it was an easy way to feed, 2.2% because it was economical, and 16.8% gave no answer. (Mansour, 1974)

**AGE AT WEANING:** 30.8% of infants were weaned from the breast before age six months, 15.9% at 6 to 12 months, and 53.3% after 12 months. (Mansour, 1974)

**AGE AT WEANING:** In a study of recent arrivals to a peri-urban area, average age at weaning was 8.7 months. (Hamza, n.d.)

**AGE AT WEANING AND WORKING MOTHERS:** 30% of working mothers weaned their infants during the first three months, and 20% continued to breast feed through 12 months. (Mhenni, n.d.a.)

**REASONS FOR WEANING:** Among women who stopped breast feeding infants between one and six months old, the main reason was lack of milk. Women who stopped breast feeding between six months and one year most often stopped due to a new pregnancy. (Hamza, 1976)

**REASONS FOR WEANING:** 23.1% of mothers weaned because they had insufficient milk, 21.7% due to a new pregnancy, 19.7% due to illness of the mother, 10.7% because the mother decided to do so, and 24.8% for other reasons. Among infants weaned before six months, the most common reason was insufficient milk. For infants weaned after six months, the most common reason was a new pregnancy. (Mansour, 1974)

**REASONS FOR WEANING:** Among mothers using PMI (MCH) centers, 33% of mothers who weaned their child at 1 to 3 months of age and 43.4% who weaned at 4 to 6 months gave insufficient milk as the reason for weaning. After six months of age, the occurrence of a new pregnancy is the most prevalent reason for weaning. (Mhenni, n.d.b.)

**METHOD OF WEANING:** 22.2% of infants were weaned abruptly, 72.9% were weaned gradually, and 4.9% were never breast fed, and therefore not weaned. Abrupt weaning occurs most frequently among children under 6 months. (Mansour, 1974)

### 3.3.2 DIETARY PRACTICES, INFANTS 0-24 MONTHS, WEANING FOODS

#### NATIONAL

**DIET:** The newborn infant is generally fed a mixture of butter and honey. Following the seventh day, and for several months thereafter, they may be fed the nut of the pine cone, sesame seed, and chestnuts crushed with oil and sugar. A porridge called bessissa, made from wheat flour, chickpeas, olive oil and spices, is commonly given to babies. Children are also given starchy water mixed with orange blossoms. (May, 1967)

**BOTTLE FEEDING:** Labels on some brands of commercial formula had no graphic instructions for safe preparation. Others made no mention of the superiority of breast milk and encouraged putting cereal into each nursing bottle from the first month. (IBFAN, 1981)

**ENCOURAGING ARTIFICIAL FEEDING:** Pharmacists' health services personnel sometimes encourage artificial feeding. (Mhenni, 1981)

**SUPPLEMENTS AND AGE:** Several studies indicate that only 44% of mothers give any food supplements at all to children between the ages of 6 to 9 months and this is usually in the form of bread or cookies soaked in milk. (Parlato, 1981)

**FOOD SUPPLEMENTS AND AGE:** After the age of one year, most children are given some kind of food supplement and by 15 months most are eating an adult diet. (Parlato, 1981)

**INTRODUCTION OF FOODS:** A review of several studies found that there was a great variation in the age of introduction of the first supplements to mother's milk, from less than three months to more than 24 months. (Mhenni, 1981)

**DIET DURING WEANING:** Introduction of foods such as eggs, meat and vegetables was often delayed until after the child was 12 months of age. Diet was based mainly on cereals with very little fruit or meat. Many children no longer received milk after weaning. (Mhenni, 1981)

**FAMILY FOOD:** By the age of 10 to 12 months, most children are eating the family food. (Mhenni, 1981)

#### RURAL

**BOTTLE FEEDING:** 28.9% of rural mothers gave fluids in bottles. The average age at starting bottle feeding was 5.42 months. (Vemury, 1980)

**ARTIFICIAL FEEDING:** Artificial feeding in rural southern Tunisia is limited to situations such as the death or severe illness of the mother or early failure of lactation. It occurs in 3.7% of cases. Proprietary brands of milk powder are given. Artificial feeding does not continue beyond 9 months, the mean being around 3 months. The child is then given goat's milk and biscuits. (Institut National de Nutrition, n.d.)

### 3.3.2 DIETARY PRACTICES, INFANTS 0-24 MONTHS, WEANING FOODS (Cont.)

**REASONS FOR INTRODUCING THE BOTTLE:** 1.9% of mothers introduced the bottle because the child needed other foods, 12.8% because mother did not have milk, 1.2% because child refused the breast, and the remainder were listed as "other" or not known. (Vemury, 1980)

**INTRODUCTION OF MILK PRODUCTS:** In Cap-Bon, supplementation with cows' milk or powdered milk generally began at about 3 months. At 5 months, yogurt was given twice a week. (Mhenni, n.d.b.)

**MILK USED IN BOTTLE FEEDING:** When milk was used in bottle feeding, 13.8% of mothers used evaporated, dry or condensed milk, 7.9% used fresh milk, and 78.2% were not known or neither of the above. (Vemury, 1980)

**FIRST FOODS:** 17% of rural children began weaning by eating the family diet (median age 12 months); 44% began weaning by eating the family diet plus biscuits (median age 12 months); 3% received family diet and milk (median age 8 months); 19% received biscuits (median age seven months); 8% received biscuits plus milk (median age 8 months); and 9% had milk only (median age 5 months). (Institut National de Nutrition, n.d.)

**FIRST FOODS:** 38.2% of children received cookies or biscuits as first foods, 14.9% got rice, flour, bread or bulgar, 42.4% received gruel or porridge, and the remainder, other or unknown. (Vemury, 1980)

**FIRST FOODS:** Wheat cereals were the first solid supplements offered in Cap-Bon. Bread and biscuits dipped in water were frequently given. Consumption of vegetables and fruits was low, although Cap-Bon is a major producer of these foods. Eggs were introduced late, and meat and fish were not used in feeding children below the age of one year (from Selinus 1969). (Hamza, 1976)

**FIRST FOODS:** The first foods introduced in Cap-Bon are generally biscuits or cereal, at one to two months. From one to three months, chick peas are introduced. Fruits are given at about three months. Yogurt, milk products, eggs, bread, potatoes and legumes are introduced at about 4 months, rice at about five months, meat and fish at 6 months and couscous at 9 months. (Hamza, n.d.)

**FIRST FOODS:** In the region of Kasserine, the first foods given are usually cereals or sorghum, with or without milk. If bread is given without milk, it is moistened with water. Biscuits are also given after being dunked in water. Eggs are not generally given until after one year (from INSE, n.d.). (Mhenni, n.d.b.)

**FIRST FOODS:** 60% of infants in Sfax were receiving foods other than mother's milk by four months of age. 57.2% were given a cereal of sorghum. 20.6% received biscuits until old enough to eat the family meal. 54.5% received eggs before one year of age. Fish was eaten by 33% of infants before one year of age (from INSE, n.d.). (Mhenni, n.d.b.)

**SOLID FOODS:** From age four months, fruits and vegetables are eaten daily. Next, eggs are introduced. Meat, fish and foods rich in vegetable protein are rarely eaten before one year. Among these infants, weaning is delayed and cereals, vegetables, yogurt and eggs are introduced early (from a study of healthy infants in Cap-Bon). (Mhenni, n.d.b.)

**CEREALS:** Cereals are introduced very early in Cap-Bon. Biscuits are offered first, sorghum is introduced at about five months, and rice at about six months. (Mhenni, n.d.b.)

**INTRODUCTION OF ANIMAL PROTEIN FOODS:** 38.7% of rural children had eggs before one year, 38.7% between one and two years, and 17.8% after two years; 4.8% did not have eggs. 15.5% had meat before one year, 59% had meat between one and two years, and 23.5% were not introduced to meat until after 2 years; 2% never had meat. (Hamza, 1976)

**ANIMAL PROTEIN:** 10.4% of supplementary foods given in Jendouba contained protein of animal origin (from Mecker, n.d.). (Mhenni, n.d.b.)

**AGE AT INTRODUCTION OF FIRST FOOD:** The average age for introducing solids was 10.4 months. 14.6% of mothers introduced solids before the infant was three months old; 29.3% between 4 and 6 months; 12.1% between 7 and 9 months; 21.7% between 10 and 12 months; 19.3% between 13 and 24 months; and 1.7% after 25 months. (Vemury, 1980)

**AGE OF INTRODUCTION OF FIRST FOOD:** In the region of Sfax, 26.9% of children received food other than mother's milk during their first month of life; 33.1% at 2 to 4 months; 23% at 6 to 12 months; and 17% at one to two years of age (from UNICEF). (Hamza, 1976)

**AGE AT INTRODUCTION OF FIRST FOOD:** In rural Beja, 1.7% of infants first received food other than mother's milk during their first month, 10.9% at 2 to 4 months, 33.6% at 6 to 12 months, and 53.8% at 1 to 2 years (from UNICEF 1973). (Hamza, 1976)

**AGE AT INTRODUCTION OF FIRST FOOD:** In Kasserine, 2% of children were introduced to food other than mother's milk during the first month of life; 9.2% at 2 to 4 months; 44.9% at 6 to 12 months; and 43.9% at 1 to 2 years (from UNICEF 1973). (Hamza, 1976)

**AGE AT INTRODUCTION OF FIRST FOODS:** 28.5% of children in Jendouba first received foods other than mother's milk between 6 and 9 months of age, 7.8% at 9 to 12 months, 58.4% between 1 and 2 years, and 5.2% were older than 2 years (from Mecker, n.d.). (Mhenni, n.d.)

**SPECIAL FOODS:** 35.5% of infants in Beja received no foods specially prepared for infants before receiving the family food. 21.8% of infants in Kasserine had no special foods, and 19.1% of infants in Sfax had no special foods. The infants who did have special foods for infants usually received cereal or cereal and milk, pureed vegetables, or biscuits (from UNICEF). (Hamza, 1976)

### 3.3.2 DIETARY PRACTICES, INFANTS 0-24 MONTHS, WEANING FOODS (Cont.)

**BENEFICIAL FOODS:** Among 471 rural mothers, 174 believed that boiled milk was beneficial to children up to two years of age; 38, yogurt; 27, butter; 26, cheese; 101, eggs; 15, fruits and juices; 49, cookies; and 33, S'men. (Vemury, 1980)

**REASONS FOR INTRODUCING FOOD:** 26.3% of rural mothers introduced adult or special foods into the child's diet because the child needed more food for growth or health. 26.4% said it was because food was strengthening or blood giving. 14.7% said it was because of insufficient breast milk. (Remainder were listed as other or not known.) (Vemury, 1980)

**REASONS FOR INTRODUCING ADULT FOOD:** 17.9% of rural mothers introduced adult food because they felt the child could digest the food. 10.3% said they did so because the child could chew the food. 18.6% said the child liked adult food. 21% felt that the child needed the food for growth and strength. 4.4% said the child had refused baby food (remainder unknown). (Vemury, 1980)

**ADULT DIET:** 22.21 months was the average age for introducing adult foods. 26.1% of households introduced adult food by 12 months, 54.6% at 13 to 24 months, 13.3% at 25 to 36 months, and 6% after 36 months. (Vemury, 1980)

#### **URBAN**

**REASONS FOR WEANING:** In urban areas, mothers wean at the least problem; if the child has diarrhea or a mild infective illness, medical or paramedical personnel respond quickly to the request of mothers who wish to put their infants on artificial milk. (Mhenni, n.d.a.)

**CLEANLINESS OF THE BOTTLE:** 42.7% of mothers bottle fed with a clean bottle, 25.5% had bottles characterized by poor hygienic conditions, and 31.8% did not use bottles. (Mansour, 1974)

**FIRST FOODS:** In urban areas, foods other than maternal milk are introduced at an average age of 4 to 7 months. (Hamza, n.d.)

**SPECIAL FOODS:** When asked about foods they bought especially for their infants, 40% of parents reported buying milk or milk products, 15% bought biscuits, 8% bought confections, 5% bought meat, and 4% bought fruit and vegetables. (Mansour, 1974)

**SPECIAL FOODS:** 26.9% of mothers reported that they prepared no special foods for their infants, and 73.1% did prepare special foods. Among infants who received a special food, 31% got cereal with milk, 51% got pureed vegetables, and 20.7% received a mixture of cereal, chick peas and vegetables. (Mansour, 1974)

**EATING THE FAMILY FOOD:** 13.2% of infants began eating the family food before six months of age, 78.6% at six to twelve months of age, and 8.2% after 12 months. (Mansour, 1974)

**FRUITS:** 95% of young children received fruits; of these, 24.4% had fruits before six months, 48.9% at six to 12 months, 12.3% after 12 months, and 14.4% gave no precise reply about age. Fruits were given according to season, oranges in winter, peaches in summer. Bananas were highly thought of by mothers, who felt they were a very nourishing food for children. (Mansour, 1974)

**EGG CONSUMPTION:** 18.2% of young children had eggs 2 or 3 times a week, 30% ate eggs about one to two times a week, and 51.8% ate eggs rarely or never. 11.8% began eating eggs before six months, 51.9% at 6 to 12 months, and 5% after twelve months. (31.3% of mothers did not respond to the question.) (Mansour, 1974)

**MEAT CONSUMPTION:** 59% of young children ate meat two or more times per week; 11.6% had meat one or two times in a two week period; and 29.5% had meat rarely or never. 4.7% began eating meat at six months of age or earlier, 79.7% at 6 to 12 months of age, and 8.7% began after 12 months. (For 6.9%, information was not available.) (Mansour, 1974)

**FISH CONSUMPTION:** 58% of young children ate fish 2 or more times per week; 12.3% ate fish less often, one or two times in a two week period; and 29.2% ate fish rarely or never. 7% began eating fish before six months of age, 33% at 6 to 12 months, and 50% after 12 months of age. (Mansour, 1974)

**MILK CONSUMPTION:** 11% of infants were reported to drink more than half a liter of milk each day, 34% drank about one half a liter each day, and 16.5% drank a quarter of a liter each day. 26.9% of the mothers did not reply to this question, and the remainder of the infants had received no milk. (Mansour, 1974)

**YOGURT CONSUMPTION:** 36% of children were reported to eat yogurt more than three times per week. 31.4% had it less than three times per week and 32.7% had yogurt rarely or never. One third of the children ate yogurt regularly before 6 months of age. (Mansour, 1974)

**REFUSING FOODS:** 25% of mothers forced children to eat when they refused food, 10.5% prepared special dishes, and 58.4% did not insist that the child eat. 6.2% did not reply. (Mansour, 1974)

### 3.3.3 DIETARY PRACTICES, INFANTS 0-24 MONTHS, AFTER WEANING

#### RURAL

**THE FAMILY MEAL:** At about nine months, infants in Cap-Bon begin to eat the family meal. (Mhenni, n.d.b.)

### 3.3.3 DIETARY PRACTICES, INFANTS 0-24 MONTHS, AFTER WEANING (Cont.)

**DIET AT COMPLETION OF WEANING:** 77% of children were eating only the family diet at the completion of weaning (median age 22 months), 14% were eating the family diet plus biscuits (median age 17 months), 6% received the family diet plus milk (median age 20 months), and 3% were eating the family diet and egg (median age 20 months). (Institut National de Nutrition, n.d.)

**FAMILY DIET:** 8.2% of infants began eating the family diet before one year of age, 65.8% at one to two years, and 26% at two to three years. (Hamza, 1976)

**FOODS FOR CHILDREN:** In rural southern Tunisia, the nutritional situation is characterized by low availability of foods suitable for young children. Cows' and goats' milk are in limited supply. Family foods are coarse, bulky, and heavily spiced. Fuel for cooking is scarce. Water is also scarce, and requires considerable energy to carry from the spring or well to the home. Each family has only a couple of containers in which all foods are cooked. (Institut National de Nutrition, n.d.)

**SNACKS FOR CHILDREN:** 55.9% of rural mothers reported that children received one to two snacks daily. (Vemury, 1980)

**NUMBER OF MEALS:** 83.4% of rural mothers reported that children under six years ate three meals per day. (Vemury, 1980)

#### URBAN

**FAMILY FOOD:** 66% of infants were free to eat any food which was served to the family once they begin eating family food; the remainder were prohibited from eating foods which were highly spiced. The restriction of foods such as meat, egg or fish is very rare. (Mansour, 1974)

### 3.4 DIETARY PRACTICES, HEALTH AND MEDICINE

#### NATIONAL

**DIET AND MEASLES:** When a child has measles, meat and eggs are removed from the diet for 4 to 6 weeks. In Medjez El Bob, an ill child is given sugar water with a condiment, kerfa. Generally, breast feeding continues if child has not yet been weaned. (Mhenni, n.d.b.)

**BLEEDING:** "Rotten" or "excessive" blood is believed to be cured by bleeding, cupping or use of leeches. This practice is now illegal and is punishable by a small fine. The practice continues in secret, and women let their own blood, and that of their children, at home. (Pillsbury, 1978)

**MIDWIVES:** in 1969, about 1400 qablas (midwives) were still performing over 70% of deliveries in Tunisia. (Pillsbury, 1978)

## **RURAL**

**DIET AND MEASLES:** Infants who have measles are given a diet based on sugar, water and raisins. (Mhenni, n.d.b.)

**BREAST FEEDING WHEN MOTHER IS ILL:** 42.9% of mothers who are ill withhold the breast; 37.8% continue to breast feed as usual; 9.8% still breast feed, but less than usual; 4.9% use a wet nurse; and the remainder is not known. (Vemury, 1980)

**BREAST FEEDING WHEN BABY IS ILL:** 14.5% stopped breast feeding when baby was ill; 54.3% breast fed as usual; 27.3% breast fed, but less than normal; and for 4%, this practice was unknown. (Vemury, 1980)

**DIET AND DIARRHEA:** Breast feeding is maintained, but the amounts of other liquids given may be reduced in the hopes of reducing the diarrhea. (Mhenni, n.d.b.)

## **URBAN**

**FEEDING AND THE SICK CHILD:** 24.3% of mothers gave sick children nothing to eat, or only just rice water and vegetable water. 20% gave sick children milk or milk products. 13.4% gave special preparations. 38.2% followed the advice of parents or neighbors, and gave the child rose water, almond water, cumin extract and other herbal remedies. 4% had no opinion. (Mansour, 1974)

**FEEDING THE SICK CHILD:** 41.3% of mothers decided how to feed a sick child with the advice of a physician, 20.7% reported that they followed traditional practices, 19.6% said the child refused food, and 18.4% had no particular reasons for their practices. (Mansour, 1974)

**DIET AND DIARRHEA:** Breast feeding is usually stopped when a child develops diarrhea. The amount of liquids given may be reduced in hopes of reducing the diarrhea. (Mhenni, n.d.b.)

#### 4. NUTRITION STATUS CORRELATIONS

##### NATIONAL

**CORRELATIONS WITH NUTRITIONAL STATUS:** The nutritional status of infants was found to be negatively correlated with an age of 12 to 24 months, artificial feeding, diversity of weaning foods, mother's age greater than 30 years, increasing birth order and family size, and gastrointestinal disease. Status was positively correlated with male sex, age at weaning, mother's education, father's education, father's occupation, drinking water, sanitation, and birth weight in a review of several studies. (Mhenni, 1981)

**WEIGHT FOR AGE AND SEASON OF BIRTH:** Among children birth to one year of age in the period January through June 17.9% suffered second or third degree malnutrition (below 75% of standard weight for age), 26.3% had first degree malnutrition (between 75 and 90% of standard), and 55.8% of children were normal. In the period July to December, the rates were 31.3%, 43.8%, and 24.9% respectively. Figures for children one to two years were 22.4%, 43.9%, and 33.7% in the period January to June and 28.3%, 50.1%, and 21.6% in the period July to December. (Mansour, 1981)

**HEIGHT FOR AGE AND SEASON OF BIRTH:** Among children birth through one year of age, during the period of January through June, 85.3% were of normal nutrition status (80% or more of standard weight for height and 90% or more of standard height for age) and 0.3% were severely malnourished (wasted and stunted; below 80% of weight for height and below 90% of standard height for age). In the season July to December, these rates were 75.6% normal, and 0 wasted and stunted. Among children one to two years of age, 76% were normal in January through June and 1.8% wasted and stunted. In the period July through December, 67.7% were normal and 4.4% were wasted and stunted. (Mansour, 1981)

**GROWTH, FEEDING METHOD AND SOCIOECONOMIC STATUS:** Growth of bottle fed infants birth to two years of age from high socioeconomic status families was found to exceed the median of the NCHS/WHO reference standard. (Mhenni, 1981)

**MALNUTRITION AND REGION:** The Northwest and the South are the regions where the prevalence of malnutrition (preschoolers below 80% of standard weight for age) is most elevated; the central and Sahel Regions have a relatively high prevalence but the Northeast and Cap Bon regions and particularly the city of Tunis have lower prevalence rates. When regions are compared on the basis of acute malnutrition, there is little significant difference from one region to the other. This may be explained by the role of infection in the etiology of this type of malnutrition. (Mansour, 1981)

**MARASMUS AND ARTIFICIAL FEEDING:** Malnourished, marasmic infants frequently were found to have been improperly artificially fed. These infants were frequently taken to the hospital with severe gastroenteritis and dehydration. (Mhenni, 1981)

#### 4. NUTRITION STATUS CORRELATIONS (Cont.)

**PREMATURITY AND PARITY:** Incidence of premature infants was found to be greatest among grand multiparas (5 or more births). 40.6% of premature infants were born to grandmultiparas although they constituted only 29.6% of the total sample. (Hamza, 1980a)

**BIRTH WEIGHT AND FATHER'S OCCUPATION:** Infants whose fathers were day laborers or unemployed weighed an average of 3.32 kg at birth; infants of farmers and traders, 3.31 kg; infants of skilled workers, 3.28 kg; infants of overseers, foremen and minor civil servants, 3.29 kg; and infants of government officials and professionals 3.41 kg. The average birth weight for all classes was 3.31 kg. (Hamza, 1976)

**BIRTH WEIGHT AND INCOME:** 10% of infants from families with an annual income below \$3,000 are of low birth weight. In families having an income above \$10,000, only 6.2% of the infants are of low birth weight. (Hamza, 1976)

**FOOD SUPPLY AND SEASON:** The months of September to March are food deficit months in almost all of the country except the oases. (May, 1967)

**FOOD EXPENDITURE AND HOUSEHOLD SIZE:** Expenditures on food per person per year decrease as household size increases. For a household of 1 to 3 persons, the expense is about 286 dinars (39% of expenditures). For a household of 11 or more, about 111 dinars per person per year is spent on food (44% of total expenditures). (Nutrition in Tunisia, 1978)

**FOOD EXPENDITURE AND HOUSEHOLD SIZE:** The portion of the food budget allocated to cereal grains increases as the size of the household increases. 17% of expenditures go to grain in a household of 1 to 3 persons and 23.1% in a household of eight or more. The same tendency is observed for vegetables. The proportion of the budget allocated to food products is about the same for households of different sizes; the portion of the food budget allocated to meat is about 18%. (Nutrition in Tunisia, 1978)

**FOOD EXPENDITURE AND OCCUPATION:** Heads of households who are agricultural laborers spend about 87 dinars per person per year on food. Non-agricultural workers spend 60 dinars per person, which represents over half the entire budget. Among administrative and professional workers, food expenditure is 24% of the total budget. (Nutrition in Tunisia, 1978)

**FOOD EXPENDITURE AND INCOME:** The average household spends 41.7% of its budget on food. In very low income families, 62.1% is spent on food, and in high income families, 25.1%. (Nutrition in Tunisia, 1978)

**EGGS AND INCOME:** The introduction of eggs into the infant diet is related to the economic status of families, according to a 1973 UNICEF study. If this is corroborated (there is much dispute), it would imply that an understanding of the importance of early introduction of eggs does exist in the population but the means to effect action does not. It

could also mean that well off families are better educated and know about the importance of animal protein for children. Little valid information is available concerning the relationship of income to infant weaning practices. (Parlato, 1981)

**INTAKE AND SEASON:** Summer is a difficult nutritional period in southern Tunisia, which is an agricultural economy based on a single winter crop. Mean daily cereal consumption of the spring and winter months (per adult male equivalent) was reduced by 80 grams in the summer. The reduction in protein was 9 grams. (Tesi, 1975)

**FOOD EXPENDITURE AND SOCIAL STATUS:** Energy consumption increased with socioeconomic status. Only the most privileged classes met the calculated energy requirements in all seasons of the year. Food expenses increased during Ramadan, but only in the privileged classes was the increase statistically significant. (Tesi, 1975)

## **REGIONAL**

**PEM AND PARITY:** In Cap Bon, in the Northeast of the country, a child's risk of protein calorie malnutrition increased with mother's parity. (Hamza, 1980a)

**FETAL DEATH AND MATERNAL FACTORS:** In a study carried out in Medjez-El-Bab in the north of the country the maximum number of fetal deaths occurred when the mother was over thirty years of age, a primipara or a grand multipara (5 or more births). The pregnancies at minimum risk were women of second or third parity; 2.4% of these pregnancies ended in a stillborn child as opposed to 3.1% of grand multiparas or 3% of primiparas. (Hamza, 1980a)

**LOW BIRTH WEIGHT AND PARITY:** In a study conducted in Medjez-El-Bab about half of all low birth weights occurred in infants of primiparas. Children born to mothers of second or third parity were at the lowest risk. (Hamza, 1980a)

**BIRTH WEIGHT AND PARITY:** A study conducted in Sousse found that children of primiparas or grand multiparas (5 or more births) were at highest risk of being low birth weight. The salary of the fathers was not found to be an intervening factor in this. (Hamza, 1980a)

## **RURAL**

**MALNUTRITION AND SEASON:** Among children below five years of age living in the village of Azmour, 44.4% had normal nutrition status (90% or more of standard weight for age) in February and 37.7% in October; 38.9% had first degree malnutrition (between 75 and 90% of standard) in February, 42.7% in October; 12.7% had second degree malnutrition (60 to 70% of standard) in February, 13.3% in October; and 3.9% were third degree malnourished (below 60% of standard) in February, 6.3% in October. (Mansour, 1981)

#### 4. NUTRITION STATUS CORRELATIONS (Cont.)

**INTAKE AND INCOME:** In rural households with incomes under 30 dinars per person per year, average daily intake was 2058 calories and 65.2 grams of protein. Calorie and protein intake rose with income. In households earning 400 dinars or more per person per year, intake was 3351 calories and 97.5 grams of protein. (Republique Tunisienne, 1978)

#### URBAN

**PEM AND SEX:** Female infants were twice as likely to suffer malnutrition as male infants. (Mheni, 1979a)

**PEM AND AGE:** Infants between the ages of 18 and 24 months were found to have a higher risk of moderate or severe malnutrition. (Mheni, 1979a)

**PEM AND AGE AT WEANING:** Infants weaned in the first three months were found to be at higher risk of malnutrition than infants weaned later. (Mheni, 1979a)

**PEM AND ARTIFICIAL MILK:** Infants fed artificial milk were at greater risk of having PCM than were breast fed infants. (Mheni, 1979a)

**PEM AND FEEDING METHOD:** 18.7% of artificially fed children 6 to 12 months of age suffer second and third degree malnutrition. 7.1% of breast fed infants in this age group are malnourished. Rates of malnutrition are 2.5 times greater in artificially fed children. (Hamza, 1980a)

**PEM AND PARENTS' OCCUPATION:** Infants of day workers were nine times more likely to have PCM than children of civil servants. Children of civil servants were the group least likely to have the severe forms of PCM. (Mheni, 1979a)

**PEM AND LIVING CONDITIONS:** Infants were at greater risk of PCM if they lived in poor conditions, lived in a rural area, or if they came from a family with poor economic conditions. (Mheni, 1979a)

**PEM AND FAMILY FACTORS:** Children of illiterate parents were more at risk of PCM, especially children of illiterate mothers. Mother's age was also a risk factor, children of mothers from 30 to 39 years of age being more at risk of PCM. Birth order was a risk factor; the fifth child or greater runs a higher risk of having PCM. (Mheni, 1979a)

**PEM AND AGE OF MOTHER:** 10.5% of mothers 20 to 29 years old had children suffering second or third degree malnutrition, and 11.26% of mothers 30 years or older had children suffering malnutrition in the periurban area of Ariana. (Hamza, 1980a)

**NUTRITIONAL STATUS AND SEX:** Among 969 children weighed at an MCH center, 65.8% of the boys had a normal weight for age, and only 46.8% of the girls had normal weight for age. 28.6% of boys were Gomez class I (between 75 and 90% standard weight for age) and 44.2% of girls; 5.6% of boys were Gomez II (60-75% of standard) and 8.8% of girls; none of the

boys were severely malnourished, Gomez class III (below 60% of standard), but 0.2% of girls were. (Khadraoui, 1980b)

**GROWTH, SES AND USE OF MCH CENTERS:** 90% of disadvantaged urban children 5 to 9 months of age, attending MCH centers, had normal growth. (Mhenni, 1981)

**MALNUTRITION AND FAMILY SIZE:** In the zone of Bellevue, 78% of undernourished children came from families having four or more children; these families constituted 69% of the sample. (Hamza, 1980a)

**UNDERWEIGHT AND PARITY:** Among mothers of first or second parity in peri-urban Tunis, 10.2% of their children were malnourished (below 75% of standard weight for age). 9% of children of mothers of third or fourth parity were malnourished, and 13.8% of children of mothers of fifth or greater parity. (Hamza, 1980a)

**INFANT MORTALITY AND FAMILY SIZE:** In a study of 1431 families in a suburb of Tunis, 95.4% of deaths among children birth to one year of age occurred in families having five or more children. Families of this size constituted 84% of the total sample. (Hamza, 1980a)

**FETAL DEATH AND MATERNAL AGE AND PARITY:** In a study carried out on a representative sample of women in Tunis, the average number of stillborn children increased with the age of the mother and with the number of pregnancies. (Hamza, 1980a)

**BIRTH WEIGHT AND MOTHER'S AGE:** Incidence of birth weights greater than or equal to 4000 grams increases with maternal age. Incidence of high birth weight babies was 0 among mothers who were less than 20 years old; 4.3% between 20 and 29 years; 5.17% at 30 to 39 years; 7.87% at 40 to 49 years; and 5.1% at over 50 years, among women in the city of Tunis. (Hamza, 1980a)

**BIRTH WEIGHT AND NUTRITIONAL STATUS:** 33.3% of children reported to have had a birth weight below 2500 grams were found upon weighing at an MCH center to be of normal nutritional status as indicated by weight for age, 40.7% of children reported to weigh between 2500 and 3000 grams at birth had normal nutritional status and 70.1% of children weighing over 3000 grams at birth had normal nutritional status. (Khadraoui, 1980b)

**ANEMIA AND MOTHER'S AGE:** A study carried out in Ariana, periurban Tunis, on 266 infants aged 6 months to 6 years found anemia only in children of mothers aged more than twenty years. Maximum incidence, 43.7%, occurred in children of mothers aged 30 to 35 years; overall incidence was 20%. (Hamza, 1980a)

**ANEMIA, FAMILY SIZE, AND BIRTH ORDER:** Anemia was not found to depend on either number of siblings or on birth order. Mean hemoglobin of only children is 10.7%, that of children having one to four siblings, 9.3%, and more than four siblings, 9.9%. (Hamza, 1980a)

#### 4. NUTRITION STATUS CORRELATIONS (Cont.)

**ANEMIA AND ARTIFICIAL FEEDING:** Anemia is more frequent among artificially fed infants. Such feeding was generally imposed due to an early new pregnancy or because of lack of milk, and often reported by mothers taking oral contraceptives. (Hamza, 1980a)

**VACCINATION AND BIRTH ORDER:** Among first born children, almost old enough to begin school, 71% had a complete vaccination record, 24.4% had incomplete vaccinations, and 4.4% had received none. Among children of second or third birth order rates were 69.1%, 23.6%, and 7.3% respectively; for fourth, fifth, and sixth children the record of vaccination was 65.4%, 25.6%, and 9%; for a birth order of 7 or greater, the record was 57% completely vaccinated, 33.95% incompletely vaccinated, and 9% had received none. (Hamza, 1980a)

**GASTROENTERITIS AND NUMBER OF SIBLINGS:** In Ariana, in peri-urban Tunis, the incidence of gastroenteritis among children with four or more siblings was five times the rate among children who had only one to three siblings; 25.4% versus 5.2%. (Hamza, 1980a)

**GASTROENTERITIS AND ORAL REHYDRATION:** Among 24 infants with moderate dehydration, oral rehydration brought about a cure in all cases. Among 42 infants with severe dehydration, recovery was obtained for 88.1% with oral rehydration, 2.4% received intravenous rehydration, and 9.5% died. (Hamza, 1980a)

**DIARRHEA AND FAMILY SIZE:** A retrospective study of patient records in an MCH center in Ariana found that among children 22 to 26 months of age, 5.2% of children having two or three siblings had had 7 or more episodes of diarrhea in one year; 25.4% of children with a large number of siblings and 8.2% of single children reported seven or more episodes of diarrhea in one year. Among children 10 to 14 months old, there were no great differences. This is explained by the use of breast milk in feeding children of this age. (Hamza, 1980a)

**DECISION TO BREAST FEED AND MEDICAL FACTORS:** The mother's choice to breast feed or not was not influenced by prenatal medical care, delivery in a medical setting or the mother's nutritional status. (Mheni, 1979b)

**DURATION OF BREAST FEEDING AND MOTHER'S AGE:** 64% of mothers over 35 years of age breast fed beyond one year, as did 52% of mothers aged 25 to 35 years and 54.3% of mothers under 25 years. (Mansour, 1974)

**BREAST FEEDING AND SOCIOECONOMIC FACTORS:** Women were more likely to breast feed if they had had three or more pregnancies, came from a modest socioeconomic level and were illiterate. (Mheni, 1979b)

**BOTTLE FEEDING AND SOCIAL AND EDUCATION FACTORS:** Women were more likely to use artificial milk if they had few children, came from the middle or higher socioeconomic levels and had attained a secondary education. (Mheni, 1979b)

**ENERGY AND PROTEIN INTAKE AND INCOME:** In urban areas, among groups earning under 30 T dinars per person per year, the average daily intake was 1545 calories and 41.3 grams of protein. Calorie and protein intake rose to 3165 calories and 87.4 grams of protein in groups earning 400 T dinars or more. (Nutrition in Tunisia, 1978)

**ENERGY INTAKE AND INCOME:** The energy consumption of the lowest economic group in rural southern Tunisia was 2100 calories per adult equivalent, while for the most economically advantaged group, it was 2820 calories per adult equivalent. (el Lozy, 1975)

**CALORIE INTAKE AND HOUSEHOLD PER CAPITA EXPENDITURES:** In households spending 60 to 80 dinars per person per year, calorie intake was 2082 in the largest cities, and 2162 in other urban areas. When expenditure was 30 to 60 dinars, calorie intakes averaged 1627 and 1975 respectively; for expenditures below 30 dinars, calorie intakes averaged 1226 in the largest cities and 1545 in urban areas. (République Tunisienne, 1978)

**PROTEIN INTAKE AND HOUSEHOLD PER CAPITA EXPENDITURES:** In households spending 60 to 80 dinars per person per year, per capita daily protein intake averaged 52.8 grams in the largest cities and 59.8 grams in urban areas. When expenditures were 30 to 60 dinars, intakes were 42.1 and 52.5 grams respectively, and when expenditures fell below 30 dinars, protein intakes fell to 33.5 and 41.3 grams. (République Tunisienne, 1978)

## 5. NUTRITION AND HEALTH POLICIES AND PROGRAMS

### 5.1 NUTRITION AND HEALTH POLICIES

#### NATIONAL

**NUTRITION PLANNING:** The Tunisian Government plans to integrate nutrition planning into the nation's socioeconomic development processes. The current five year plan has addressed problems and plans for a nutrition policy for the first time. The GOT has agreed to establish an inter-ministerial committee with responsibilities for design and implementation of a national nutrition policy. (U.S. AID, 1977)

**INSE:** The Institute National de Santé de l'Enfance (INSE) is a semi-autonomous government organization established to serve the health needs of Tunisia's children. By government decree, the Institute oversees operations of all MCH centers; sets standards for health and nutrition services of the MCH centers; provides technical assistance and inservice training; develops education programs and guidelines for health and nutrition education; and is responsible for data collection concerning child health and development. It also runs a large children's hospital. (Parlato, 1981)

**INSE INFANT HEALTH, NUTRITION EDUCATION, AND TRAINING:** The Infant Health Nutrition Education, and Training unit was created to set standards for all education programs, centralize production of audio-visual materials, develop methodologies to evaluate materials, provide technical assistance and establish procedures for training medical personnel. (Parlato, 1981)

**INSE WORKING GROUP ON NUTRITION EDUCATION:** The Institute National de Santé de l'Enfance has recently formed a Working Group on Health/Nutrition Education which has been responsible for overall planning and execution of both local (Tunis) and national programs for health and nutrition education. This group is responsible for execution of regional training seminars, and preparation of guidelines to be used for teaching and for the development of audio-visual materials to be used both in the classroom and in the field. (Parlato, 1981)

**INSE PREVENTIVE MEDICINE SERVICE:** INSE has made a renewed commitment to the concept of preventive health care. It has created a Service de la Médecine Préventive to review and evaluate all MCH centers in the country. Its goals are improved management, better coordination with other government organizations, improved health education, and reaching populations not served by the public health system. (Parlato, 1981)

**COORDINATION OF NUTRITION EFFORTS:** The National Institute of Nutrition (NIN) and the Office National de la Population et du Planning Familial are two major institutions in the country providing complementary service to INSE. NIN has operated a successful radio program, "Dr. Hakim" providing information on nutrition. There is little desire on the part of the Institute of Nutrition to collaborate or even cooperate with the INSE on matters of nutrition education, but collaboration with the Office National de la Population et du Planning Familial is quite good. (Parlato, 1981)

## 5.1 NUTRITION AND HEALTH POLICIES (Cont.)

**NATIONAL COMMISSION ON INFANT FEEDING:** In December 1980 this commission was formed by presidential decree in response to the international movement toward a return to breast feeding and increasing concern with proper infant feeding. Each medical region of the country has a regional commission; the commission in Sfax has been very active in research. (Parlato, 1981)

**BREAST FEEDING LEGISLATION:** Leave of one month is provided after birth, and this can be prolonged for up to 30 days longer with a medical cause. Nursing breaks must be provided, either one hour a day for one year or two hours a day for six months. Each business employing more than 50 women must set aside a room for nursing. (This provision of the law is rarely carried out.) (Hamza, n.d.)

**BREAST FEEDING POLICY:** A policy favoring promotion of breast feeding has been established. This policy resulted in establishment of 110 MCH centers which encourage breast feeding, education through the mass media, and decreased publicity for artificial milks. A national committee in favor of breast feeding was created in August of 1980. Regional seminars for the personnel of MCH centers, emphasizing the importance of breast feeding, have been conducted since 1975. (Hamza, n.d.)

**GOVERNMENT POLICY AND ORALYTE:** The Ministry of Health does not encourage Oralyte home distribution. A mother whose child has diarrhea and comes to the MCH center is obliged to return to the center each day until the episode subsides. This decision ensures medical attention and does not leave home preparation of Oralyte to chance. Home preparation of rehydration solution is discouraged, and Oralyte is not subsidized at pharmacies. No simplified procedure by which a mother gets Oralyte for her child at the MCH center has been tried. At present, a mother must wait at least three hours (average waiting time for any MCH consultation) to be seen by the doctor. (Parlato, 1981)

**MEDICAL EXPENDITURES:** During the fourth plan, only 1.9 million T dinars (9% of the health budget) went to preventive medicine, while 13.8 million T dinars (53%) was spent on infrastructure and equipment. (Nutrition in Tunisia, 1978)

**HEALTH POLICY:** The Government of Tunisia has developed a policy of integration to improve access to and efficiency of the rural health care delivery system. Curative and preventive services are being integrated into one system which includes pediatric routine care, pre and postnatal care, labor and delivery, nutrition and health education, immunization, routine adult care, malaria screening, water supply testing, family planning and dog control. (Christie-Shaw, 1978)

**HEALTH POLICIES:** Health services are physician-centered. Legal statutes require that an individual have a medical degree to legally practice curative medicine--and health services are overwhelmingly curative. Tunisia's auxiliary health workers, the primary staff of rural

facilities, are prevented by law from engaging in the curative medicine that is the substance of Tunisia's health care system. (Pillsbury, 1978)

**MIDWIVES AND GOVERNMENT POLICY:** Government policy on midwifery appears to be ambivalent. There is a requirement that examinations in MCH centers be conducted only by OB/GYN specialists, but very few specialists practice in rural areas. In 1974-77, a program was to improve this situation by giving greater responsibility to midwives. (Pillsbury, 1978)

**REGULATION OF HEALTH CARE:** The Government's declaration that it is illegal to practice medicine without a license meant that all traditional practitioners were "practicing illegally." Indigenous midwives may be an exception. One source states that they have been outlawed since 1958. Another indicates that the government may be willing to accept their role, and not consider it "practicing medicine." (Pillsbury, 1978)

**VACCINATION:** Until about 1978, vaccination of preschool children was organized in the form of annual campaigns. Due to the development of health services and improved methods for keeping vaccine cold, vaccination has been integrated into the activities of health centers and mobile teams for preventive health for the last three years. (Benammar, 1981)

**VACCINATION:** Vaccination against the following diseases is obligatory: small pox, polio, diphtheria, tetanus, whooping cough, typhoid fever (among certain groups of the population), and measles. Vaccination against rabies is given upon exposure. (Benammar, 1981)

**FOOD PRICE CONTROLS:** The government sets a single price for specific products including: bread, flour, semolina, coucous, noodles, meats, milk and milk products, vegetable oil, sugar, tea, coffee, rice and pepper. The marketplace governs the prices of fresh fruits, vegetables and legumes. Subsidized products are grains, fertilizer, sugar, meat, coffee, and vegetable oil. (Nutrition in Tunisia, 1978)

## 5.2 NUTRITION AND HEALTH PROGRAMS

### NATIONAL

**IMPLEMENTING NUTRITION EDUCATION:** The regional seminars held by INSE (Institut National de la Santé de L'Enfance) are of high quality. A good slide/tape instructional series has been made by INSE and another is in the preliminary design phase. The Pediatrics Department of the Sousse regional hospital has designed a brochure for public distribution on breast feeding and infant nutrition. The Pediatrics Department at Sfax has prepared a questionnaire concerning nutrition knowledge, attitudes, and practices; the same department is planning to evaluate the paramedical staff. (Parlato, 1981)

**INFORMAL NUTRITION EDUCATION:** Nutrition education is an intended part of the health care delivery system in most maternal and child health

## 5.2 NUTRITION AND HEALTH PROGRAMS (Cont.)

centers. Many large centers have hired nutritionists or trained nurses for the express purpose of teaching mothers the proper methods for feeding their babies. (Nutrition in Tunisia, 1978)

**MASS MEDIA AND NUTRITION EDUCATION:** Nutritional messages are broadcast by radio four times a day. In the past, these messages were primarily aimed at the educated middle or upper classes. There has been no attempt to measure the effect of these messages on nutrition knowledge or food habits. (Nutrition in Tunisia, 1978)

**DR. HAKIM RADIO MESSAGES:** Dr. Hakim is a personality from a Radio Nutrition Project. This project was an attempt to use radio to create awareness of improved nutrition and to change related behavior. (Kulakow, 1979)

**SCHOOL OF PUBLIC HEALTH:** Courses in nutrition are taught in the School of Public Health in Nabeul, consisting of ten lectures given to public health nurses. Courses are also given at the Institute of Nutrition and Food Technology in Tunis in dietetics, food technology and community nutrition. The Institute offers a B.S. in nutrition. Short non-degree courses are occasionally offered for teachers, nurses, midwives and agricultural workers. (Nutrition in Tunisia, 1978)

**CARE-CRS TITLE II FOODS:** CARE-Medico and Catholic Relief Services have projects which provide food to 160,000 preschool children 3 to 6 years old. There is also a program that distributes WSB (wheat-soy blend) to 17,000 children up to three years of age on a curative basis. (U.S. AID, 1977)

**CARE:** CARE implements a school feeding project through which PL 480 flour, oil, rice and milk are distributed to 156,630 school children. CARE has pre-school feeding projects distributing PL 480 foods to about 98,000 preschool children at 275 nutrition/health centers. Health services and nutrition education are also provided at the centers. CARE and the Ministry of Foreign Affairs are developing an integrated program of supplementary feeding, preventive health care and nutrition education. In FY 1980, baseline dietary data and program evaluation of the effectiveness of delivery of feeding supplements are being carried out. (CARE, 1980)

**PL-480 TITLE II FOODS:** 11,094,000 pounds of food (vegetable oil, wheat, wheat protein concentrate, non fat dried milk, rice and soy-fortified bulgur) worth about \$1,896,000.00 is planned for distribution in FY 1982. (Anonymous, 1981)

**PROJECT HOPE:** Project HOPE has established a community health demonstration center for teaching preventive medicine, public health nursing, sanitation, food inspection, population planning, and nutrition. (TAICH, 1975)

**AMERICAN JEWISH JOINT DISTRIBUTION COMMITTEES INC.:** This organization supports a program of infant feeding and also runs 2 dispensaries. (TAICH, 1975)

**FOOD PRICES AND SUBSIDIES:** Between 1970 and 1976, the price of sugar increased 78.8%; fruits and vegetables, 58.2%; and meat, 45.1%. The price of cereal increased only 18.5%, because of the subsidy allocated to grains. (Nutrition in Tunisia, 1978)

**FOOD SUBSIDIES:** Food price subsidies, worth 82.8 million dollars annually, benefit all the population, but proportionally are of greater benefit to the poor. (U.S. AID, 1977)

**FOOD SUBSIDIES:** The population with the lowest expenditure, less than 30 dinars per person per year, benefit little from the subsidy of food. They received 1.7% of the allocations for cereal, .3% of the allocations for meat, and 1.3% of allocation for oil. (Nutrition in Tunisia, 1978)

**PROTECTION MATERNELLE ET INFANTILE:** There are 94 Protection Maternelle et Infantile (PMI) (Maternal and Child Health) Centers. Twenty-two more are planned for construction, and 7 existing ones are planned for renovation. These centers provide pre- and postnatal health care, care of children through six years of age, and education in hygiene and nutrition. (Hamza, 1976)

**USE OF MCH CENTERS:** Over 90 MCH/Family Planning Centers exist. As of 1975, they were heavily utilized for children but not for their mothers. There is a requirement that examinations be conducted only by OB/GYN specialists, but only 2 of the 18 Tunisian gynecologists and a few foreign specialists practiced in rural areas. (Pillsbury, 1978)

**NUTRITION RECUPERATION CENTERS:** In principle all MCH centers have a nutrition recuperation center headed by a nutritionist. This system is not completely in place and the presence of a full-time nutritionist is not guaranteed. These centers feed malnourished children, give take home food (the locally produced weaning food SAHA), and give nutrition education focusing on change in dietary patterns and oral rehydration with OralYTE. (Parlato, 1981)

**DISTRIBUTION OF SAHA:** An indigenous weaning food called SAHA has been produced from semolina, hardwheat flour, fishmeal, lentils, sugar and skim milk. It is enriched with vitamins A, D, C, B<sub>2</sub> and iron. It is available at health centers, dispensaries and MCH centers throughout the country, and is aimed at children 6 to 24 months of age. Individual demonstrations are given to mothers at health facilities and the food is available on site and on a take home basis. This program is funded jointly by the government and the U.N. (Austin, 1978)

**PROGRAMME D'ASSISTANCE A L'ENFANCE:** This program, available through hospitals, dispensaries and MCH centers, provided feeding and nutrition education through food demonstrations and education concerning balanced diets. The program served about 160,000 people. (Austin, 1978)

## 5.2 NUTRITION AND HEALTH PROGRAMS (Cont.)

**LE PROGRAMME ELARGI DE VACCINATION:** Le Programme Elargi de Vaccination was established in 1978. The objectives of this program were to improve vaccination coverage, to ensure the quality of vaccines through proper refrigeration, to integrate vaccination coverage into the MCH centers, to educate the public and to evaluate the extent and effectiveness of vaccination in the country. (Benammar, 1981)

**MEDICAL RESOURCES:** In 1976 there were 4,947 persons per physician (rank of 85 among the nations of the world) and 441 persons per hospital bed (a rank of 75 among the nations of the world). (Sivard, 1979)

**PEDIATRICIANS:** In 1971, there were 52 pediatricians. 32 of them were in general hospitals and institutes, 14 in regional hospitals and 6 in district hospitals. Most doctors practice in the big cities. (Hamza, 1976)

**PHARMACISTS:** The most widespread "primary health care workers" in the modern system currently practicing are probably pharmacy sales boys or clerks. They give consultations and injections and recommend medicines. The village store owner in small rural communities does the same to the best of his ability. (Zeitlin, 1981)

**EDUCATION FOR PHARMACISTS:** Pharmacists and village store owners often give medical advice as well as sell medicines. Certain officials in the government recognize this and envision a health education program for pharmacy clerks. In particular, they would like to discourage pharmacies from promoting infant formula. It is believed that their profit margin on formula is low enough that they may agree. (Zeitlin, 1981)

**TRADITIONAL HEALTH PERSONNEL:** Traditional healers include bone setters; the Meddeb, a wise man or Quranic specialist; herbalists, who are proprietors of Arab pharmacies; saints, who have achieved sainthood through Sufi mysticism; and barbers. (Pillsbury, 1978)

**KNOWLEDGE, ATTITUDES, AND PRACTICES STUDY:** A knowledge, attitudes, and practices study will be designed and implemented at either regional or national levels. At present, Sfax is in the process of developing an in-depth nutrition and health survey for its region. (Parlato, 1981)

### REGIONAL

**HEALTH CENTER NUTRITION EDUCATION PROGRAM:** At health centers in Siliana and Sidi Bou Zid Provinces midwives provide nutrition education for pregnant women and mothers and children. (Family Health Care Inc., 1977)

### RURAL

**HARVARD LYSINE PROJECT:** A program of lysine fortification of wheat in southern Tunisia did not result in a significant change in mean birth weight, in weight gain during the first month of life, or on linear

growth velocity in the first month of life. (Institut National de Nutrition, n.d.)

**EFFECTS OF WHEAT FORTIFICATION:** Fortification of wheat with vitamins and iron or vitamins, iron and lysine, did not have any effect on the nutritional state of children under five years, as estimated by anthropometric methods. (Institut National de Nutrition, n.d.)

**HEALTH CARE SERVICES:** Quantity and quality of formal health care in the rural areas is low, despite the existence of facilities and a hierarchical health care structure. Most rural dispensaries are visited only two or three times a week by a physician. The physician-patient ratio in the southern governorate of Beja is only 1 to 23,000. (Pillsbury, 1978)

## 6. COMMENTARIES

### NATIONAL

**EXPANDING NUTRITION EDUCATION SERVICES:** Midwives now provide nutrition education for women and children. It has been suggested that a variety of clinical workers now staffing first aid stations and dispensaries as well as hygiene personnel be retrained and begin providing nutrition education including information on breast feeding and treatment of mild diarrhea. (Family Health Care Inc., 1977)

**PROBLEMS FOR NUTRITION EDUCATION:** Information available concerning the knowledge, attitudes, and practices of the population is not sufficient for planning nutrition education programs. Most important, little is known about traditional weaning practices. Bottlenecks in the MCH delivery system inhibit effective client education contact. Few educational materials have been produced. Training of health personnel in preventive medicine has not been sufficient and inservice training does not exist. (Parlato, 1981)

**RADIO MESSAGES:** Only one of 21 nutrition education messages broadcast by "Dr. Hakim" concerned the food practices of vulnerable groups, whereas 6 of the messages were targeted to the problems of the affluent: hyperlipidemia, obesity and cardiovascular diseases. Moreover, the one weaning message tells mothers not to feed butter to the infant because fats are harmful for the development of the infant, although it is often the lack of fats which may be responsible for severe calorie deficits during weaning. (Zeitlin, 1979)

**REASONS FOR HIGH INFANT MORTALITY:** INSE cites the following phenomena as reasons for the continued high rate of infant mortality, estimated to be between 80 and 120 per 1000 live births: a dramatic decline in breast feeding, especially in urban areas; a high rate of infant diarrhea; high rates of malnutrition; and an incomplete program of vaccination. (Parlato, 1981)

**SEASONAL VARIATION IN MALNUTRITION:** Seasonal variation of the incidence of malnutrition is very marked, especially during the first two years. The cause is certainly the prevalence of infection, especially diarrhea during the hot season. Further research is necessary to study the relationships between nutrition, infection, and mortality. (Mansour, 1981)

**NUTRITION REHABILITATION UNIT:** Emphasis at the National Nutrition Institute has focused on the problems of over nutrition of the affluent minority. The very real problems of under nutrition have not received adequate attention. One possibility for making the problem of under nutrition visible is establishing a nutrition rehabilitation unit next to the institute to motivate staff to learn about and work on this problem. (Zeitlin, 1979)

**REASONS FOR MALNUTRITION:** A large number of infants are malnourished as a result of improper or inadequate traditional weaning practices; insufficient nutritional surveillance; inadequate suggested weaning food

## 6. COMMENTARIES (Cont.)

recipes; high rates of infant diarrheas; and premature cessation or interruption of breast feeding. (Parlato, 1981)

**RECIPES USED BY THE NUTRITION REHABILITATION UNITS:** The recipes used by the Nutrition Rehabilitation Units have insufficient calories and protein with respect to volume. The percent of calories provided by fats is 20% compared to 40% provided by human or cow's milk. Cereal-based porridge prepared with vegetable water simply does not contain high quality protein to rehabilitate a malnourished infant. Systematic improvement of these recipes is required. (Mhenni, 1981)

**WEANING FOOD RECIPES:** A review of INSE recommended recipes for infant weaning foods indicated a high bulk to total calorie ratio -- a diet not necessarily adequate for all children, particularly those malnourished. (Parlato, 1981)

**LACK OF GROWTH CHARTS:** Although children are systematically weighed upon entrance to an MCH center, no continuous record (weight chart) is kept. Thus, many cases of malnutrition, even second degree, escape surveillance of the doctor. Since only a small percentage of malnourished children are actually identified, few mothers are even asked about their breast feeding habits. No remedial diets of any kind are given to the mothers and the MCH nutritionists are underutilized. (Parlato, 1981)

**BREAST FEEDING:** The rate of decline in breast feeding seems to have slowed, probably because of health personnel's increasing support of breast feeding. The adoption of strong legislation encouraging breast feeding would reinforce this trend. (Hamza, n.d.)

**UNDERSTANDING BREAST FEEDING:** The training of both doctors and midwives puts little emphasis on the importance of breast feeding and even less on socioeconomic reasons for bottle feeding. With incomplete understanding of the role of breast feeding in infant health and nutrition and with little appreciation of current environmental conditions, personnel are ill-equipped to relate to clients at the health centers. (Parlato, 1981)

**HEALTH CARE AND BREAST FEEDING:** The present MCH system which is still a largely curative system and does not permit the time needed for the doctor to provide useful and credible information on breast feeding. Doctors who do provide information do not take into account the complex factors leading to a woman's decision to breast feed and do not attempt to help formulate mixed breast and bottle programs for individual patients. (Parlato, 1981)

**GROWTH CURVES AND METHOD OF FEEDING:** The growth curve of Tunisian children from birth to six months very closely corresponds to that of American children. Four studies done both in Tunis and other regions indicate this clearly. However, Hamza states that 16 to 17% of infants aged 0 to 3 months receive only formula. It is hard to see how growth curves could be so close to American standard with that much bottle feeding, particularly in urban areas where bottle feeding rates must be even higher. (Parlato, 1981)

**WEANING AND ANEMIA:** Anemia is the second most important public health problem. The prevalence of anemia during the second year of life suggests that improved methods of weaning and providing a greater diversity of food for the child at this age are necessary. (Mansour, 1981)

**CAUSES OF ANEMIA:** The National Food Consumption survey conducted in 1975 showed that the iron in the Tunisian diet (averaging 17.9 mg per day) came mainly from cereal products, 23% came from vegetables and only 7% from foods of animal origin. It is possible that the widespread anemia in the country is due to the limited bio-availability of iron from these sources due to the high fiber content of the food and the binding of iron by phytites and phytates, which inhibit absorption. The deficiency of vitamin C in the diet is another factor which would inhibit absorption of iron. (Mansour, 1981)

**WEIGHT GAIN AND BIRTH WEIGHTS:** A 1973 UNICEF study reported that only 12% of pregnant women supplemented their regular diet in any way during pregnancy. The average birth weight of infants was well above three kilograms, a normal weight. Explanations for this discrepancy are that women reduce energy expenditure (unlikely) or that the women are on average overweight -- a fact frequently stated but never confirmed by good data. (Parlato, 1981)

**LEGISLATIVE CHANGES DESIRED BY WORKING MOTHERS:** 53% of working urban mothers proposed that maternity leave be lengthened. 27% suggested that the number of hours set aside for breast feeding each day be increased. (Mhenni, n.d.a.)

**STUDIES NEEDED:** Two studies have been proposed. One is a national study of breast feeding and weaning, the second an evaluation of the Nutrition Rehabilitation Units of the MCH centers. (Mhenni, 1981)

## **RURAL**

**INTRODUCING NUTRITION EDUCATION:** Personal preventive services (for example, pre- and postnatal care, child health, nutrition education, and clean water) are effectively introduced and made available to the population when linked to curative services for common conditions. By effectively meeting basic needs for care of the sick, primary care services established credibility and the patient and family are more likely to accept preventive services and respond to educational programs. (Bicknell, 1980)

**NUTRITION EDUCATION AND BREAST FEEDING:** In 1975, in Medjez El Bab, a rural area, 91% of children were breast fed at birth, 86.5% at 3 months, 72% at 6 months, 44% at 12 months and 22% at 18 months. In 1980, rates of breast feeding in this area were 100% through one month, 85.5% at 3 months, 84.5% at 6 months, and 55.3% at 12 months. This improvement in rates of breast feeding may be attributed to a program of integrated

## 6. COMMENTARIES (Cont.)

medicine and nutrition education established in the region. (Hamza, n.d.)

**WEANING AND BREAST FEEDING:** It appears clear that in the present economic and environmental situation in rural southern Tunisia, the pattern of prolonged breast feeding and late weaning is the most adequate for the health of the children. (Institut National de Nutrition, n.d.)

**RADIOS:** 79.3% of rural respondents had access to a radio. Therefore, there exists the potential to reach the rural population with nutrition and health education through mass media. (Vemury, 1980)

### URBAN

**OPPORTUNITY FOR NUTRITION EDUCATION:** The same frequency of breast feeding was found among women who received prenatal medical care and who delivered in maternity hospitals as among women who did not receive prenatal care and who gave birth at home. The authors conclude that the opportunity for nutrition education was lost by the health workers and these peri-urban women. (Mhenni, n.d.b.)

**FEEDING PROBLEMS:** The author feels that the two main problems among the urban poor are use of artificial milks and poverty. Artificial milks are considered nutritious, but are not prepared hygienically or diluted properly. Poverty results in the inability to furnish the weanling with vegetables and animal protein foods in sufficient quantity. (Mhenni, n.d.a.)

**REASONS FOR NOT BREAST FEEDING:** The following factors were suggested to explain the decline in breast feeding in urban areas: influence of mother's work, lack of milk due to early introduction of the bottle, psychological problems, actual physical problems, incorrect information, unsupportive hospital and maternity practices, western influence brought back by Tunisian workers from abroad, influence of advertising, women's rejection of traditional roles, new pregnancy, easy availability of powdered milk and influence of pharmacists who encourage mothers to buy this milk. (Parlato, 1981)

**BREAST FEEDING LEGISLATION:** Maternity leave is not preceded by prenatal leave, and maternity leave itself is too short, 30 days at half salary. The one hour daily for breast feeding is also too short, especially for mothers who live far from their place of work and have to contend with the problems of travel. Further, the law requiring a room to be set aside for nursing mothers is ignored. (Mhenni, n.d.a.)

**BREAST FEEDING:** Women in cities are less likely to breast feed than those in the rural areas. When they do breast feed, duration may be quite short. The author attributes these findings to: 1) the insecurity and anxiety of the recent migrant to the city; 2) the necessity of women's working; 3) and the exposure to upper class women who do not breast feed and the desire to mimic these women. (Hamza, 1976)

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Anonymous

- 1981 Fiscal Year 1982 Public Law 480 Title II ISC Approved Quantities Voluntary Agencies/WFP. Food for Peace, U.S.A.I.D., Washington D.C. Unpublished Computer Printout.

This document projects foods to be donated in FY 1982 under PL 480 Title II. Information is available by country and by region and lists: program sponsor, type of program, number of recipients, type of commodity, weight of commodity and dollar value.

Austin, J.E., Mahin, M., Pyle, D., Zeitlin, M.

- 1978 Annotated Directory of Nutrition Programs in Developing Countries. Harvard Institute for International Development, Cambridge, Mass.

This document resulted from a questionnaire mailed to nutrition program personnel in developing countries. Program descriptions were obtained by mail and the results appear in tabular form in this document describing the nutrition programs of those who responded.

Basta, S.S.

- 1977 Nutrition and Health in Low Income Urban Areas of the Third World, Ecology of Food Nutrition, 6:113-124.

Review, not original data.

Data are presented which illustrate the profound differences in health and nutritional status among different income groups in cities of the developing world. The intra-urban differences cited seem to be greater than urban to rural differences. Dependence on wage income, instability of employment and high residential densities contribute to the onset of disease and malnutrition for urban squatter families.

Benammar, R.; Zouair, B.; Souissi, R; and T. Nacef

- 1981 Les Vaccinations en Tunisie

Original data.

Method: Interviews with mothers of young children were carried out between March and June of 1979. Information on vaccinations was obtained from health cards when possible. 26% of mothers had no health card for the study child; information was taken verbally and verified at the source of the vaccination.

Sample: 2373 children 12 to 24 months of age, randomly selected.

Location: National sample.

This paper describes the situation concerning vaccination in Tunisia. It reports on a nationwide study of the extent of vaccination coverage and also reviews available literature on the subject. Also included is information on national policy on vaccination coverage. Tunisia now distributes vaccinations through MCH centers.

**BIBLIOGRAPHY (Cont.)**

**Bicknell, W.J.; Christie-Shaw, S.; Turner, B.; and C. Fort**

- 1980 Tunisia Rural Community Health Project (664-0296), Review and Extension, June 30-July 18, 1980. Unpublished.

This document summarizes a project undertaken for A.I.D. and Government of Tunisia to improve rural health services through retraining of medical personnel and building and renovation of medical facilities.

**Boutourline, E., G. Tesi, G.R. Kerr, F.J. Stare, Z. Kallal, M. Turki and N. Hemaidan**

- 1973 Nutritional Correlates of Child Development in Southern Tunisia II. Mass Measurements Growth, 37:91-110.

Original data.

Method: Baseline data for longitudinal study of the effects of enrichment of wheat. Arm, chest, and head circumference was measured, as well as subcutaneous tissue thickness for all preschoolers in 10 villages.

Sample: 2611 preschool children 3 months to 5 years 9 months of age.  
Geography: ten rural villages in the area of Chott el Djerid, a salt lake.

As part of a battery of investigations, prior to fortification of wheat products with vitamins, iron and the amino acid lysine, the head circumference, chest circumference, arm circumference and subcutaneous tissue thickness were determined. At three months of age, circumferential measurements were comparable to international norms; by one year of age, significant growth retardation was apparent.

**Boutourline, E., G. Tesi, G. Kerr, and F.J. Stare**

- 1972 Nutritional Correlates of Child Development in Southern Tunisia I. Linear Growth, 36:407-424.

Original data.

Method: Measurement of height, weight, sitting height, and leg length of all preschool children in the area. Baseline data for a study of effects of wheat fortification on growth and development.

Sample: 2,853 preschool children, 3 months to 5 years 9 months of age. All preschool children in 10 villages.

Geography: 10 rural villages around the Chott el Djerid in the south of Tunisia.

After one year of age, the stature of children in this area is consistently below that of internationally accepted norms for child development. At this stage of the study, it was not possible to determine whether genetic, nutritional or other environmental factors were the cause of this pattern of development.

CARE

- 1980 Resume CARE Projects Fiscal Year 1980. Unpublished.

This document describes CARE projects in each country it was working in in FY 1980.

Christie-Shaw, S.

- 1978 Final Report Basic Health Centers Rural Community Health Project of Integrated Service in Siliana and Sidi Bou Zid Provinces Tunisia, Unpublished AID Document.

This paper summarizes the efforts of U.S. AID in Tunisia and of the Government of Tunisia to restructure health care in two provinces in Central Tunisia. This paper is concerned with the construction of new facilities and the renovation of old facilities which would provide newly integrated health care services.

Division of Family Health, World Health Organization

- 1980 "The Incidence of Low Birth Weight: A Critical Review of Available Information", World Health Statistics Quarterly, 33(3): 197-224.

Review.

A review of available information on low birth weight world-wide concluded that about 17% of infants are of low birth weight. Tables provide data on birth weights for all countries where studies of birth weight have been carried out.

el Lozy, M.; Hegsted, D.M.; Kerr, G.R.; Boutourline, E.; Tesi, G.; Ghamry, M.T.; Stare, F.J.; Kallal, Z.; Turki, M.; and N. Hemaidan

- 1975 "Amino acid composition of the diet in a Region of Southern Tunisia," Journal of Clinical Nutrition, 28: 1183-88.

Original data.

Method: Five dietary surveys, one qualitative and four quantitative, were carried out. Amino acid content of foods was calculated from the table of Orr and Watt or from FAO tables.

Sample: Preschool children in the 10 study villages, number not specified.

Location: Ten villages in three delegations, Douz, Degache, and Kebilli, in the area of Chott el Djerid, a salt lake.

The average diet provided 1670 calories, 42 grams of protein, and 1280 mg of lysine per person per day. The overall dietary protein supplied only 31 mg of lysine per gram of protein, or about 56% of the level recommended by the FAO/WHO Expert Committee on Protein Requirements. Lysine was the first and threonine the second limiting amino acid in the diet.

## BIBLIOGRAPHY (Cont.)

### Family Health Care Inc.

- 1977 Design Study II: Integrated Rural Health Services in Siliana and Sidi Bou Zid Provinces, Tunisia. Submitted to A.I.D.

This document is a program proposal for the integration of rural health services, both preventive and curative. The thrust of the overall program is to retrain health workers by broadening their skills in preventive and curative health services and to utilize these retrained workers in their new roles in new or renovated facilities.

Forbes, A.L., O. Pellitier, F.W. Lowenstein, M. Lane, W. Keller, T. Jouadi, M. Turki, F. Mezhoud, D. George, R. Walters, S. Chopova, and A. Achour.

- 1976 Preliminary Report of the 1973-75 Tunisian National Nutrition Survey, Tunisian National Institute of Nutrition and Food Technology.

Original data.

Method: Cross-sectional survey, including anthropometry, clinical examination, biochemical analyses.

Sample: Over 13,000 individuals were preselected on a demographic basis to be representative of the entire population; 10,789 were examined.

Geography: National.

The findings reveal that anemia is a problem of major proportions involving all groups nationwide. Other problems include significant growth retardation of Tunisian children, rickets, endemic goiter, vitamin B and vitamin C deficits, and dental caries. Contrary to expectations, many of the problems were more serious in the north than in the south.

### Hamza, B. and H. Mhenni

- 1980a "Incidence de la dimension de la famille et du rang de naissance sur la sante de l'enfant," Revue Tunisienne de Pédiatrie, 3(2-3): 66-69.

According to several studies, maternal age, birth order, and family size have an influence on the development of the infant. This study reviews work carried out in MCH centers in Ariana, a suburb of Tunis, and in several regions of the country which relate PCM, anemia, and gastroenteritis to various maternal and family factors.

### Hamza, B. and H. Mhenni

- 1980b "La Rehydratation Orale dans le Traitement de la Deshydratation Aigue. L'Experience Tunisienne," Revue Tunisienne de Pédiatrie, 3(2-3): 85-89.

Original data.

Method: Oral rehydration of moderately and severely dehydrated

children at an MCH center.

Sample: 66 children, 24 with moderate and 42 with severe dehydration.  
Location: Medjez-EI-Bab

In Tunisia, diarrhea and dehydration are important causes of mortality and morbidity in the first years of life. Thus they are of much concern to MCH centers, especially in summer. Intravenous rehydration is used in severe cases and oral rehydration in light to moderate cases. In Medjez El Bab moderately and severely dehydrated infants were given oral rehydration with very high rates of success. The only children who failed to recover with this treatment were infants of less than three months and those with severe malnutrition.

Hamza, B., N. Chamakh, and H. M'Henni

1976 La Santé Mère-Enfant, Stratégie en Faveur d'une Meilleure Qualité de la vie (Incidences Demographiques, Economiques, Socioculturelles), Maison Tunisienne de l'Édition.

This book reviews studies done in Tunisia on the nutrition and health status of mothers and infants. The authors review studies of breast feeding and weaning, malnutrition, disease and health care.

Hamza, B. and H. Mhenni

n.d. Situation de L'Allaitement Maternel En Tunisie. Paper in preparation.

This paper reviews studies of breast feeding and weaning carried out in urban and rural areas of Tunisia from 1968 to 1980. The author feels that there was a decline in breast feeding but that the situation is now improving, mainly due to improved attitudes of health personnel in MCH centers who are encouraging mothers to breast feed. Strong legislation is needed to reinforce this improved trend in breast feeding.

IBFAN

1981 Infant Formula Promotion. A report by the International Baby Food Action Network which exposes the aggressive promotion of powdered milk products for babies.

This report compiles evidence that infant food companies have not fully complied with 1979 WHO recommendations for marketing of infant formula in third world countries. The evidence is based on statements by health professionals and consumer organizations, missionaries and development volunteers.

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### Institut National de Nutrition et Technologie Alimentaire

- n.d. Final Report of Tunisian Wheat Fortification Study, Tunis: Institut National de Nutrition et Technologie Alimentaire, and Boston, Massachusetts: The Department of Nutrition, School of Public Health, Harvard University, unpublished.

#### Original data.

Method: Residents of Degache received their usual diet; in Kebili, the diet was fortified with vitamins and iron, and in Douz, the usual diet was fortified with vitamins, iron, and lysine. All children under 5 years in 10 selected villages were examined every six months; anthropometric measures, clinical exams, blood and urine samples were obtained.

Sample: About 3000 children under five years.

Geography: Chott el Djerid, a large salt lake that is dry during most of the year. Three delegations (equivalent to counties) were chosen bordering the lake, Degache, Kebili and Douz.

A longitudinal study was conducted in southern Tunisia to determine the effects of lysine fortification of wheat, the major source of calories and protein in the area. Although fortification of all wheat products was feasible, the results failed to demonstrate any clear-cut improvement in the growth or health of the children. The authors suggest that height, weight and other indices are controlled by the great poverty of the area, lack of health care, disease, etc. A multifactorial approach is necessary to bring about improvement.

Khadraoui, S.; Hamza, B.; and J.N. Smith

- 1980a "Valeurs des Immunoglobulines chez le nourrisson Tunisien," Revue Tunisienne de Pédiatrie, 3(2-3): 59-60.

#### Original data.

Method: Blood was collected by finger prick from children attending health centers to be vaccinated. The blood was then analyzed for levels of IgG, IgA, and IgM.

Sample: 148 children 1 to 24 months old.

Location: Suburban Tunis.

IgG, IgA, and IgM values were high compared usually accepted normal values, and reach adult values much more rapidly than in normal American children.

Khadraoui, S.; Badr, A.; Meddeb, S.; and B. Hamza

- 1980b "Infections, Diseases, Nutritional Status and Birth Weight (Morbidity Infectieuse Etat Nutritionnel et poids de Naissance)." Revue Tunisienne de Pédiatrie, 3(2-3): 90-93.

#### Original data.

Method: Review of records of children using an MCH center during the

period of March, April and May 1980, the study looked back over the preceeding year.

Sample: 1003 records of children under six years of age who came to an MCH center.

Location: The city of Ezzouhour, in a periurban zone of Tunis, with low socioeconomic status and little available medical care.

This retrospective study was carried out in order to evaluate the frequency of common infectious diseases, their relationships to malnutrition and the influence of birth weight on nutritional status. The frequency of infections increases with the severity of malnutrition. Malnutrition is more frequent in girls than boys. Birth weight seemed to influence future nutritional status.

Kulakow, A.M.

1979 Trip Report: Tunisia Seminar, Phase II "Dr. Hakim" Project, Academy for Educational Development.

This document is a consultant's report of a trip to Tunisia to attend a seminar on the "Dr. Hakim" project, a mass media nutrition education program.

Lakhoua, R. and M. Hamza

1979 Croissance des Nourrissons Tunisiens Issus de Familles Socio-Economiquement Privilégiées, Revue Tun. Péd.1979:3 159-75.

Original data.

Method: Height, weight and head circumference were taken on healthy infants at regular checkups to establish growth curves.

Semilongitudinal (birth-2 years).

Sample: 1839 infants: 852 girls, 987 boys (under 2 years of age) from the privileged classes of Tunis, living in comfortable surroundings, and coming from small families, no more than 2 or 3 siblings. The parents were well-educated professionals and families had incomes of 150 dinars or more per month. Only healthy infants of Tunisian parents were accepted.

Geography: urban Tunis.

The study was carried out in order to establish growth curves for Tunisia. Results indicated that these infants grew as well as, if not better than, European and American child standards. The authors conclude that Tunisian children from less privileged families fall of in growth, not because of genetic handicaps, but because of social and environmental conditions.

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- 1981 "Situation nutritionnelle des Groupes Vulnérable en Tunisie." Paper presented at Symposium sur la Planification Alimentaire et Nutritionnelle en Tunisie, 22-25 April, 1981. Institut National de Nutrition et de Technologie Alimentaire. Unpublished document.

This paper reviews available information on nutritional status of infants and small children and pregnant and lactating women. It focuses on studies carried out in the last ten years and also provides some information on beliefs about food for these groups.

Mansour, Mohamed

- 1974 Le Développement du Jeune Enfant en Milieu Défavorisé Croissance et développement des Enfants en Tunisie Project Yale-Tunis.

Original data.

Method: longitudinal study of supplementation of infants, diet of nursing mothers observed, pregnant and nursing mothers interviewed concerning food habits of themselves and their families.

Sample: 445 peri-urban households studied concerning hygiene and environment; 600 infants in 4 different supplementation groups, 188 mothers investigated concerning diet during lactation and 435 questioned about food habits; and households studied concerning food expenditures.

Geography: peri-urban Tunis.

This document reports on a longitudinal study of infants receiving four different types of food supplementation at feeding centers. It also reports data from the infants' mothers and households on hygiene, social environment, household economy, food consumption patterns of pregnant and lactating women, and patterns of breast feeding and weaning of infants.

May, J.M.

- 1967 The Ecology of Malnutrition in Northern Africa, Libya, Tunisia, Algeria, Morocco, Spanish Sahara and Ifni, Mauritania. Studies in Medical Geography Volume 7, Hafner Publishing Co., NY.

The author reviews studies of factors which may affect nutrition: climate, food resources, diet, export-import, and disease patterns.

Mheni, H., B. Hamza, and S. Gaiji.

- 1979a La Malnutrition Protéino-Calorique dans une Zone Periurbaine de Tunis (Ariana), Revue Tunisienne de Pédiatrie Vol.2 (3): 216.

Original data.

Method: Infants examined for the first time in a PMI (Maternal and Child Health) center.

Sample: 845 infants; ages ranged from birth to 6 years.  
Geography: Ariana, a suburb of Tunis.

A study conducted in an MCH center in peri-urban Tunis found that children were at greater risk of PEM if they were between 18 and 24 months, female, poor, weaned early, fed artificial milk, living in poor conditions, living in a rural area, or had illiterate parents, an older mother, or a birth order of five or greater.

Mhenni, H., S. Khadraoui, and H. Jedidi

1979b Profil de la Femme Allaitante dans la Banlieue de Tunis, Revue Tunisienne de Pédiatrie 12(13):208-209.

Original data.

Method: not specified.

Sample: women living in the suburbs of Tunis.

Geography: peri-urban Tunis (Ariana and Megrine).

This brief report indicates that social factors do influence a mother's decision to breast feed in peri-urban areas. Medical care did not seem to influence the mother's choice between breast and artificial feeding.

Mhenni, H. and M. Zeitlin

1981 "Identification des priorités en matière d'éducation nutritionnelle en faveur de l'enfant Tunisien." In Mhenni, H.; Parlato, R.; and M. Zeitlin, Consultant Report for Tunisia (March 14-29, 1981). (Recommendations for institution building and survey design.) International Nutrition Communication Service, subcontracted to Manoff International, submitted by Education Development Center to U.S.A.I.D.

This document proposes two studies to be carried out to examine the multifactorial causes of malnutrition among vulnerable groups; to evaluate proposed solutions to problems of malnutrition such as nutrition education at MCH centers and weaning food recipes; and to set priorities for intervention such as encouraging breast feeding, improving weaning and nutritional surveillance. The relevant studies of maternal and infant health and nutritional status were briefly reviewed and two studies were proposed. One was a national study of breast feeding and weaning of children from birth to two years of age; this study would also collect information on pregnant and lactating women. The second was an evaluation of the nutrition rehabilitation units at the MCH centers.

Mhenni, H., L. Chebbi, C.H. Koubaa, and B. Hamza

n.d.a. La Femme au Travail et l'Allaitement au Sein.

Original data.

Method: Questionnaire interview, cross-sectional.

## BIBLIOGRAPHY (Cont.)

Sample: 100 working mothers who were employees or civil servants in hospitals or administration in Tunisia.

Geography: 80 mothers from Tunis and 20 from Sfax.

The average age of the mothers was 27 years. 48% had gone to secondary school, and 33% had gone beyond secondary school. 44% earned over 100 dinars. The average number of living children was 1.77. 56% of these infants were left in the care of grandmothers when mother worked. The author concluded that the mother's work in the first year, and especially in the first six months, had unfavorable effects on breast feeding; it results in fewer feeds per day and earlier weaning than mothers' wish.

Mhenni, H. and B. Hamza.

### n.d.b Alimentation de l'Enfant en Tunisie: Méthodes Traditionnelles.

This paper reviews studies of breast feeding and weaning in Tunisia. The author summarizes the findings and notes which practices should be encouraged (continued breast feeding, putting infant to breast directly after birth, adding animal protein foods to infant diet, sharing family food) and which should be discouraged (withholding food in illness, stopping breast feeding in illness, stopping breast feeding due to pregnancy, using the bottle).

Mhenni, H. and B. Hamza

### n.d.c Place de L'Education Nutritionnelle dans la Lutte Contre La Malnutrition de l'Enfant. Mimeo, unpublished.

For nutrition education to be effective, the educator must know the community's geographic, demographic, and socioeconomic character. The food practices and beliefs of mothers and infants and their place in the family social structure must be discovered and beliefs and customs must be understood. Examples are given from various regions. Planning and evaluation of nutrition education are discussed.

## Nutrition in Tunisia: Plans and Programs

1978 First Annual Report 1978, République Tunisienne, Ministère de la Santé Publique, Institut National de Nutrition et de Technologie Alimentaire.

This report summarizes the results of the national nutrition survey and the national household food consumption survey. It describes the factors involved in nutrition in Tunisia, including income, disease, and food prices, subsidies, and production. It describes various nutrition programs and nutrition education and health interventions, and discusses the goals of the National Institute of Nutrition and the government policy on nutrition.

Parlato, R.

- 1981 "Creation of an Education, Training and Audio-Visual Unit at INSE, the Institut National de Santé de l'Enfance," in Mheni, H.; Parlato, R.; and M. Zeitlin, Consultant Report for Tunisia (March 14-29, 1981) (Recommendations for institution building and survey design.) International Nutrition Communication Service, Subcontracted to Manoff International, submitted by Education Development Center to A.I.D.

This consultant report describes the Institut National de Santé de l'Enfance (INSE) and its functions. INSE has requested funds to develop audio visual materials and buy a computer. The goals of this project are to improve training of health professionals, to educate the public, and to improve the data base on which health decisions are made.

Pillsbury, B.L.K.

- 1978 Traditional Health Care in the Near East, A report prepared for the U.S. Agency for International Development, Washington D.C.

Review, not original data.

This review examines health care in eight near eastern countries. Information about Tunisia is provided on health and population, indigenous health care practitioners and beliefs about the etiology of illness. It examines the cultural settings within which people choose the health care they will use.

Republique Tunisienne, Ministere du Plan

- 1978 "Enquête nationale sur le budget et la consommation des ménages, 1975," Institut National de la Statistique, April, 1978.

Original data.

Method: Food weighing for household; questionnaires; cross-sectional study.

Sample: Stratified random sample of 4962 households; 2409 households were surveyed for food consumption.

Location: National sample.

This document reports on a national study of household expenditure and food consumption. Information is presented concerning expenditures for food, housing, clothing, health and transportation on the national, urban, rural, and regional levels. Detailed information is presented about the categories of foods consumed, cereals, vegetables, fruits, milk, etc. The nutritive values of foods and their ability to meet the nutritional needs of the population are described.

Sivard, R.L.

- 1979 "World Military and Social Expenditures, 1979" Leesburg, Virginia: World Priorities.

## BIBLIOGRAPHY (Cont.)

This document summarizes the world situation in 1979 with statistics concerning military expenditures and juxtaposes these with figures on social underdevelopment concerning poverty, employment, food, health, and education. Extensive statistical tables with figures for every country make up the core of this document.

### TAICH

- 1975 TAICH Country Report: Development Assistance Programs for Tunisia, New York: American Council of Voluntary Agencies for Foreign Services, Inc., Technical Assistance Information Clearing House.

This report describes the assistance programs for Tunisia of 11 U.S. organizations, including volunteer agencies, missions, foundations and other non-profit organizations, which provide the people of Tunisia with assistance in areas such as medicine and public health education.

Tesi, G.; Boutourline, E.; Kerr, G.R.; Hegsted, D.M.; El Lozy, M.; Ghamry, M.; Stare, F.J.; Kallal, Z.; Turki, M.; and N. Hemaïdan

- 1975 "Economic Aspects of Food, Protein and Energy Consumption in a Region of Southern Tunisia," Ecology of Food and Nutrition, 4: 5-14.

Original data.

Method: Direct interview with the head of each family to determine income and amounts of food consumed. Quantitative analysis of food by weighing was done on 150, 185, 288, and 285 families at four different seasons of the year.

Sample: 200 to 300 families.

Location: Villages in an isolated area of southern Tunisia bordering on the Chott El Djerid, a large salt lake in the administrative areas of Kebili, Douz, and Degache.

The food consumption of villages in a southern area of Tunisia was studied. A qualitative survey was done by questionnaire and four quantitative surveys were made on random samples of 200 to 300 families stratified by income. Wheat products supplied 85% of the dietary protein. Dietary energy was also supplied mainly by wheat products (66%) with oil, sugar, legumes, and vegetables supplying 28%. The cheapest source of dietary energy was oil; wheat products were the least expensive source of dietary protein. Energy consumption increased with improved socioeconomic status but 66% of the population consumed less energy than recommended by the FAO or the WHO. 51% consumed less protein than recommended.

### U.S.A.I.D., Tunisia Missions

- 1977 Tunisia Country Development Strategy Statement, 1977.

This document discusses the general country development strategy of Tunisia, and the situation of the poor, especially the rural poor. It

examines the agricultural sector and program development in central Tunisia and the role which A.I.D. can play in the general development strategy.

Vemury, M. (Project Director)

1980 Environmental and social influences on food consumption patterns in six developing countries, CARE New York.

Original data.

Method: Cross-sectional survey random sample using a selected stratified sampling technique. Different questionnaires were employed for mothers and for community influentials.

Sample: 428 mothers and 43 "community influentials" (teachers, informal leaders) from 36 rural communities and 4 Bedouin groups, representing 7 of the 17 governorates.

Geography: The governorates sampled in the North region were Bizerte and Zaghuan; in the central region, Kairouan and Kef; in the Sahel, Mahdia and Sfax and in the South, Gabes.

This survey collected data on country and regional diet patterns in Peru, Colombia, Guatemala, Tunisia, Jordan and Bangladesh. Material was gathered concerning beliefs and behaviors that influence the diet of the nutritionally "at risk" groups in the rural population.

Zeitlin, M.

1981 Tunisia Consultancy March 17-29, 1981. Unpublished mimeo.

This document reports on a consultant trip which included working on the design of an infant feeding survey, reviewing a nutrition education project, working on the results of the national nutrition survey and discussions with the Dr. Hakim group. Interviews with nutrition officials are also described.

Zeitlin, M.

1979 Trip Report.

This trip report describes time spent in Tunisia working on the Dr. Hakim Project. The author feels that the problems of undernutrition are widespread but overlooked. Emphasis has been on the over-nutrition of the affluent minority. Suggestions are made to correct this nutrition strategy.