Maternal and Infant Nutrition Reviews

SENEGAL and GAMBIA

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MATERNAL AND INFANT NUTRITION REVIEWS

SENEGAL AND GAMBIA

A Guide to the Literature

Compiled by

Ron Israel - Senior Editor
Joanne Nestor - Editor and Principal Reviewer (Senegal)
Ellen Blumenstiel Taylor - Principal Reviewer (Gambia)
Steve Wirtz - Reviewer

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INTRODUCTION

MATERNAL AND INFANT NUTRITION REVIEWS: A RESOURCE FOR NUTRITION PLANNERS AND EDUCATORS

The MATERNAL AND INFANT NUTRITION REVIEWS (MINRs) profile existing data on nutritional status and nutrition-related beliefs and practices of mothers and children in developing countries. MINRs also contain information on current nutrition policies and programs of governments, the United States Agnecy for International Development, and other bilateral, international agencies and Private Voluntary Organizations (PVOs). There are thirty-six MINRs in all, profiling forty-five different countries. (See table on next page.) The reviews for Gambia and Senegal have been printed as one volume because of the close political, economic, and ecological relationships between these countries.

Maternal and Infant Nutrition Reviews summarize important information obtained from available literature, government documents, consultant reports, and personal correspondence. The data are presented in bulleted form under six major headings: nutrition and health status, dietary beliefs, dietary practices, nutrition status correlations, nutrition and health policies and programs, and commentaries. A bibliography at the back of each monograph describes the listed documents in terms of type of study, methodology, sample characteristics and location, and a summary.

Nutrition planners and policy makers can use MINRs to help identify a given country's data base. For example, the information contained in each review enables the reader to identify key planning factors such as problem areas of malnutrition, prevailing beliefs about breast feeding, the extent of bottle feeding, types of weaning foods, the government's inter-agency five-year nutrition plan, the amount of donated food being distributed at MCH centers, and major PVOs involved in administering food and nutrition programs.

MINRs can be used as background documents for consultants going into the field and for program developers in-country. They can provide a frame of reference for an in-country workshop aimed at developing a national nutrition strategy. Technical assistance in organizing a workship of this kind is available through the International Nutrition Communication Service. MINRs can also be used as resource documents in the development of journal articles and textbooks.

MINR data are stored on a computerized word processing system that allows for updates and individualized literature searches on specific topics. Patterns in a particular country or group of countries can be analyzed in accordance with user needs. A nutrition information retrieval service is available free to those working in developing countries and for a small fee to all others. Orders, inquiries, and comments should be addressed to:

Ron Israel
Director
International Nutrition Communication Service
Education Development Center
55 Chapel Street
Newton, Massachusetts 02160, USA

MINR Country Reports:

AFRICA	NEAR EAST	ASIA	LATIN AMERICAN AND CARIBBEAN
Cameroon	Egypt	Bangladesh	Bolivia
Congo	Jordan	Burma	Costa Rica
Gambia and Senegal	Morocco	India	Dominica
Ghana	Tunisia	Indonesia	Ecuador
Kenya	Yemen	Nepal	Guatemala
Lesotho		Pakistan	Haiti
Liberia		Philippines	Honduras
Mali		South Pacific*	Jamaica
Sudan		Sri Lanka	Panama
Tanzania		Thailand	Peru
Zaire			

*South Pacific Region includes the nations of Cook Islands, Fiji, Kiribati, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanatu, and Western Samoa.

MATERNAL AND INFANT NUTRITION REVIEWS

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SENEGAL AND GAMBIA

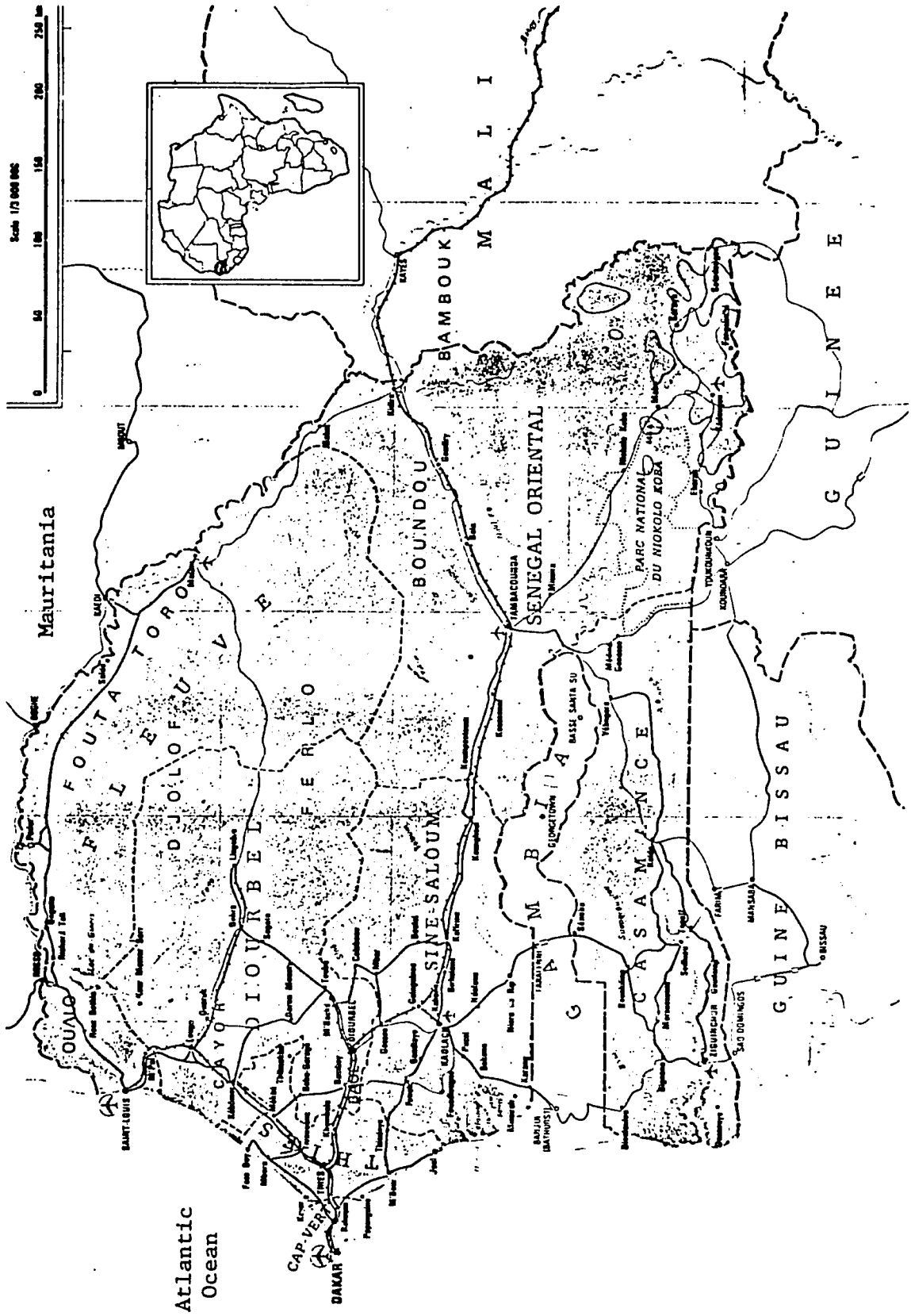

TABLE I

LOCATIONS STUDIED

GAMBIA

	Barrell, 1980	Cole, 1977	Marsden, 1965	Marsden, 1964	McGregor, 1970	Paul, 1979	Rowland, 1981	Rowland, 1979	Rowland, 1978	Rowland, 1977	Spalding, 1977	Tully, 1978	Thomson, 1966	Whitehead, 1978	Whitehead, 1977
Rural Keneba village	X	X			X	X	X	X	X	X			X	X	X
Sukuta, semi-rural village			X	X											
Fajar area plus some rural subjects and others from towns											X				
Rural villages of Keneba, Manduar and Kantonkunda												X			

SENEGAL

	Cantrelle and Leridon, 1971	Cros and Baylet, 1967	Fleury 1982	Teitelbaum 1977
Niayes		X		
North, "around Mbiddi"			X	
Senegal Oriental, Diery				X
Sine-Saloum Fatek	X			

HIGHLIGHTS

1. **NUTRITION AND HEALTH STATUS:** There is a seasonal maternal weight loss in rural areas between July and September (the rainy season). The infant mortality rate is 217 deaths per 1000 live births. There are lower infant birth weights in rural areas between July and September. About 50% of children 6 to 24 months of age die before reaching the age of five years. Marasmus is the predominant form of malnourishment among children admitted to hospitals. During July and August, prevalence of diarrhea is 20.4%.

2. **DIETARY BELIEFS:** Little is known about maternal and infant dietary beliefs in the Gambia.

3. **DIETARY PRACTICES:** Dietary staples include rice, millet, sorghum and maize. Palm oil is the most commonly used oil. The major cash crop is groundnuts. Analysis of common Gambian foods shows relatively low energy concentration due to low fat and high water content. Studies in Keneba (a rural village) reveal that well water and cooking water can be highly contaminated. July and August, the peak period of agricultural work, is the hungry season. Breast feeding is universal up to 18 months. Among rural women, breast milk output decreases seasonally from June to November. Rural infants usually are given water (which may be contaminated) from birth. In rural areas, the traditional practice is to introduce local supplementary weaning foods between the ages of 3 and 5 months. The first foods to be introduced are watery cereal gruels, the most common being made from millet or rice. In the rainy season, the children are often weaned onto cassava. From 3 months to 3 years of age, there is a marked deficit in nutrient and energy intake. Traditional weaning foods and imported milks are subject to heavy bacterial contamination.

4. **NUTRITION STATUS CORRELATIONS:** There is a positive correlation between schooling and nutritional status. The nutrient content and quantity of breast milk varies with the season, reaching its lowest point at the end of the rainy season. Maternal weight and infant birth weight trends can also be correlated by season.

5. **NUTRITION AND HEALTH PROGRAMS:** The Catholic Relief Service (CRS) Food and Nutrition Programme serves 22,000 children and mothers in 60 villages with a monthly program of health and nutrition education, growth surveillance and take-home food supplementation. CRS has plans to expand its program. About 84% of the population living in rural areas is not adequately covered by the present health services. The Keneba Food Supplementation project provides nutrition education and a supplementary food to mothers within a 7 kilometer radius of Keneba. AFRICARE supports a vegetable and fruit production project in three villages (Busura, Penyema and Marakissa). The Ministry of Health, with technical assistance from A.I.D., is currently developing an educational campaign aimed at reducing the high incidence of diarrheal disease.

HIGHLIGHTS

1. **NUTRITION AND HEALTH STATUS:** Anemia affects 45 to 50% of children and adult males, and two-thirds of adult women. In 1975, 41% of the population had goiters; rates were twice as high among women as among men. The infant mortality rate is 159 deaths per thousand live births. In some rural areas infant mortality reaches 181 per 1000. 40% of all children die before reaching age five. Deaths in children, excluding newborns, peak during the wet season (July to October), when diarrhea and respiratory diseases are more common. At least half of the 1,218,000 children under age six are below recommended growth standards, affected by second and third degree PEM.

2. **DIETARY BELIEFS:** Most Sengalese are Muslims and follow the dietary proscription of pork. Children are told not to become "stomach men," concerned primarily with eating. They are told not to sacrifice themselves to their stomachs, lest they become the "least of men." Eggs are considered taboo for women and infants in many areas.

3. **DIETARY PRACTICES:** The chief staples are millet and sorghum, followed by cassava, rice and maize. Peanuts are grown for export, and rice is the major food import. Peanuts, the principal crop, account for half of the total agricultural production and provide 80% of the country's exports. Peanut oil processing is the single biggest industry. Peanuts (groundnuts) are not a popular foodstuff. Agricultural production meets only two-thirds of the nation's foods requirements. Food has to be imported, although much arable land is underdeveloped. 25% of the population have calorie intakes below the critical level. Food balance sheets indicate that the average Sengalese consumes less than the recommended amounts of calcium, riboflavin and vitamin C. The preharvest period, late summer and early fall, is known as the "soudure," and is a time of serious hunger in rural areas. Wild plants are an important nutritional supplement used by the rural Fulani people during the "soudure." Vegetable production through kitchen gardens contributes significantly to nutrient intake in the rural areas. In Dakar, the mean duration of breast feeding was 18.9 months in 1972. In the rural areas, mean duration ragnes from 23.2 to 24 months of age. The weaning of children with porridge made from polluted water or milk and unclean hands is considered one of the primary causes of gastroenteritis. Many attempts have been made to produce a protein-rich, inexpensive commercial weaning food, but the results are discouraging. Most mixtures, when tested, were unsafe or too expensive. In the rural areas, weaning is an abrupt transition to the adult diet of millet and corn gruels to which fresh milk is added.

4. **NUTRITION STATUS CORRELATIONS:** Among children in the Sine (Niakhar) area who did not die before the age of three years, 98% were breast fed for at least twelve months, 81% for at least 20 months, 58% for at least 23 months, and 29% for 27 months or more.

5. **NUTRITION AND HEALTH POLICIES AND PROGRAMS:** The Food Investment Strategy of 1976 called for greater efforts towards food self-reliance. To achieve self-sufficiency in food, Senegal is putting emphasis on hydraulics, rice production and dams. In 1974 the health budget represented 9.2% of the whole national budget, but this decreased to 6% in 1978-79. To remedy health care staffing deficits, the government-intitiated mandatory rural service for all medical personnel receiving financial aid; the recycling of indigenous health

workers into the health system; and a new category of village health worker to be developed through a USAID rural health services development project. CRS distributes $6 million of PL-480 foods each year. The CRS program reaches 75,000 mothers and 123,000 children among the lower-income groups, and is designed to meet 50% of the proten and calorie needs of the child. Local PMIs (Maternal and Child Health Centers) have conducted government-sponsored programs for mothers, teaching them to prepare porridges and other weaning foods based on locally-grown, protein-rich resources. Senegal's Institut de Technologie Alimentaire (ITA) has developed methods of substituting millet flour for up to one-third of the wheat flour in bread, in order to decrease the amount of wheat which must be imported.

1. NUTRITION AND HEALTH STATUS

1.1 NUTRITION AND HEALTH STATUS, GENERAL

NATIONAL

NUTRITIONAL DEFICIENCIES: PEM is more prevalent in rural areas, but it is also common in recent urban migrants. Kwashiorkor is uncommon among milk-drinking nomads. Localized surveys have revealed clinical signs of deficiencies of vitamins A and B_2 (riboflavin). Anemia is common in women and children. Scurvy is said to be rare, despite marginal intakes of vitamin C. Beri-beri has been found in Dakar among recent migrants from Basse Casamance. Goiter is found in a few areas (Sine-Saloum, Tambacounda, Casamance). (Licross, 1979)

GENERAL NUTRITION STATUS: Nutrition is good, on the average, but seasonal and local variations create conditions for malnourishment of members of vulnerable groups. (Menes, 1976)

GOITER: In 1975, 41% of the population had goiters. Rates were twice as high among women as among men: Grade I, 26%; Grade II, 19%; and Grade III, 6%. (Dillon and Lajoie, 1980)

ANEMIA: Anemia affects 45 to 50% of children and adult males, and 2/3 of the adult women. (Worthington and Johnson, 1980)

ANEMIA: The rate of anemia was 51% among adult men and 37% among adult women (criteria not specified) in the South. (Dillon and Lajoie, 1980)

ADULT WEIGHT BY SEX AND RESIDENCE: Urban and rural men did not differ in weight. Urban women were substantially heavier than rural women, virtually as heavy as men. Urban women may be better fed than rural, or may be less active. (Menes, 1976)

LIFE EXPECTANCY: Life expectancy at birth was 44 years; in 1960 it had been 38 years. (Menes, 1976)

DENTAL HEALTH: WHO found the incidence of caries in adults to be 46.4%; in children with deciduous teeth, 36.2% had caries. Fluorosis and dental mottling are found in the areas of phosphate mines. Periodontal disease, osteitis, loss of teeth, malocclusion, noma, and oral cancer were all relatively frequent. (Menes, 1976)

COMMON DISEASES: Diseases of significant incidence include typhoid (mainly in cities), leprosy, tuberculosis, poliomyelitis (over 500 cases in 1974-76), tetanus (in adults in Toucouleur), diphtheria, gonorrhea, trachoma, schistosomiasis, yaws (Casamance), endemic syphilis (Fleuve region), onchocerciasis (Senegal Oriental), and cerebro-spinal meningitis (sporadic outbreaks, February to April). The last major outbreak of yellow fever was in 1965, and of cholera, in 1971-72. (Licross, 1979)

COMMON DISEASES: Malaria, measles, trachoma, tuberculosis, and venereal disease are present at high levels, but yellow fever and smallpox, once major problems, have been eradicated. (Menes, 1976)

MALARIA: Malaria is endemic throughout the country, although there is said to be no risk from January to June in Dakar, and decreased risk in Cap-Vert. 75% of the population is not covered by control measures and the prevalence is said to be increasing. (Licross, 1979)

EFFECTS OF MALARIA: Malaria is the most prevalent infection, initially affecting almost everyone at an early age. Although seldom fatal, it weakens its victims, making them more vulnerable to other diseases. (Menes, 1976)

SCHISTOSOMIASIS (BILHARZIASIS): Prevalence of schistosomiasis ranges from 10% in the delta area to 40% along the Mali border. (Menes, 1976)

RURAL

MALNUTRITION: Among all persons studied in the Niayes region, the prevalence of malnutrition and clinical signs of malnutrition was as follows: overt malnutrition and kwashiorkor, 7.2%; avitaminosis A, 3.8%; avitaminosis B, 6.8%; dental problems, including caries and fluorosis, 14.8%; splenomegaly, 29.6%; hepatomegaly, 10%; and clinical anemia, 5.5%. (Cros and Baylet, 1967)

GOITER: The prevalence of goiter was 44% among 2424 individuals examined biochemically in 1975: 4% Grade III, 14% Grade II, and 26% Grade I. (Dillon and Lajoie, 1980)

GOITER: The prevalence of goiter was 20 to 24% among residents of 10 villages in Haute-Casamance in 1976, as determined by clinical and biochemical analysis. (Dillon and Lajoie, 1980)

GOITER: The prevalence of goiter was 0.3% among 150 adults and 2.0% among 97 school-age children clinically examined during the soudure in 1962. (Dillon and Lajoie, 1980)

SEASONALITY OF FULANI HEALTH PROBLEMS: Among the Diery Fulani, health problems during the rainy season (June to September, known as the "hunger months") include parasitic diseases and dysentery; during the harvest season (October to November), health and nutrition problems are few; during the dry season (December to May), dehydration and communicable diseases are the greatest problems. (Teitelbaum, 1977)

OVERWEIGHT: Overweight is a problem among the Serere, who regard obese wives as status symbols. (Menes, 1976)

ONCHOCERCIASIS (RIVER BLINDNESS): Onchocerciasis is prevalent in river areas suitable to the host fly. During the rainy season, all of Senegal-Oriental is highly infected. Fertile areas near rivers often cannot be settled, or must be abandoned, because of infestation leading to decreased agricultural production and increased malnutrition. (Menes, 1976)

1.2 NUTRITION AND HEALTH STATUS, WOMEN, PREGNANT

RURAL

ANEMIA: 62% of 69 pregnant women examined in the North in 1976 were anemic (hemoglobin less than 10 gm.%). (Dillon and Lajoie, 1980)

CONCEPTION AND HEALTH: In the Sine (Niakhar) area, the October birth rate was 80% greater than the minimum, in June, reflecting a peak rate in conception during the months after harvest, and a minimum during the rainy season. This may be the result of effects of improved dietary intake on mothers' health. (Cantrelle and Leridon, 1971)

URBAN

VITAMIN A DEFICIENCY: Levels of plasma vitamin A in pregnant women in Dakar were 2.5% of normal levels in 1947. (Menes, 1976)

1.3 NUTRITION AND HEALTH STATUS, WOMEN, LACTATING

NATIONAL

ANEMIA: 51% of 150 lactating women examined in the North in 1976 were anemic (hemoglobin less than 12 gm.%). (Dillon and Lajoie, 1980)

1.4 NUTRITION AND HEALTH STATUS, INFANTS 0-6 MONTHS

NATIONAL

INFANT MORTALITY RATE: In 1976, there were 159 deaths of infants under 1 year per 1000 live births. (Sivard, 1979)

INFANT MORTALITY RATE: The infant mortality rate is 159 deaths per thousand births. (Worthington and Johnson, 1980)

INFANT MORTALITY RATE: The infant mortality rate is 93 deaths per 1,000 live births. (Menes, 1976)

INFANT MORTALITY RATE: The overall infant mortality rate is 30 percent. (West African Conference, 1968)

BIRTH WEIGHT: WHO estimates that 9.9% of all infants weigh less than 2500 grams at birth. (WHO, 1980)

CAUSES OF INFANT DEATHS: The leading causes of infant death in 1973 for children under one year were: perinatal deaths; measles; diarrhea and gastrointestinal illnesses; deaths due to undefined causes; avitaminoses; anemia; and malaria. (Menes, 1976)

TETANUS: Tetanus occurs in newborns and is fatal in 90% of cases. The rate has been declining because of immunization programs. (Licross, 1979)

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

TETANUS: Umbilical tetanus is the most common fatal postnatal infection; the case-fatality rate is 90%. Tetanus also follows ear-piercing and quinine injections. (Menes, 1976)

VENEREAL DISEASE: Sexually transmitted diseases contributed to high rates of infant and child mortality. A 1971 WHO study reported 1,069 cases of congenital syphilis in Senegal. (Menes, 1976)

RURAL

MALNUTRITION: Among the 26 children under one year old in the three villages studied, the incidence of malnutrition and kwashiorkor was 7.6%; splenomegaly, 30.7%; and anemia, 3.8%. There were no cases of clinical signs of deficiencies of vitamin A or the B vitamins, and no dental problems or hepatomegaly. (Cros and Baylet, 1967)

INFANT MORTALITY RATE: Infant mortality in some rural areas reaches 181 per 1000. (Menes, 1976)

NEONATAL AND INFANT MORTALITY RATES: In the Sine (Niakhar) area, the infant mortality rate was 210 per 1000. The neonatal mortality rate was 49 deaths per 1000 live births; in the next 11 months deaths by age in months ranged between 10-19 deaths. (Cantrelle and Leridon, 1971)

INFANT MORTALITY RATES: In Ngayorhem, in the Sine Region, infant mortality rates during 1963-1970 peaked at 388 deaths per thousand during the famine year 1969, and were lowest, 192-194 per thousand, during 1965, 1967, 1968, and 1970. (Cantrelle and Ferry, 1978)

INFANT MORTALITY RATES: Studies of mortality found that 21% of all infants died before the age of one year in 1963-67. (Dillon and Lajoie, 1980)

1.5 NUTRITION AND HEALTH STATUS, INFANTS 6-24 MONTHS

NATIONAL

MORTALITY: 40% of all children die before reaching age five. (Menes, 1976)

MORTALITY RATE: In 1979, the mortality rate among children age 1 to 4 years was 31 deaths per 1000; in 1960, the rate had been 41 per 1000. (World Bank, 1981)

MORTALITY RATE: In 1977, there were 32 deaths per 1000 children 1 to 4 years. (World Bank, 1979)

MORTALITY RATES: The overall mortality rate, 30% before age 1, increases with age, peaking at 2 years. (West African Conference, 1968)

MORTALITY RATES: The mortality rate for children age 1 to 4 years was 101 per 1000 in 1964 and 325 per 1000 in 1965 in Khombole-Thienaba region. (Dillon and Lajoie, 1980)

SEASON AND CHILD MORTALITY: Deaths in children, excluding newborns, peaked during the wet season (July to October), when diarrhea and respiratory diseases are more common. (Menes, 1976)

PEM: At least half of the 1,218,000 children under age six are below recommended growth standards, affected by second and third degree PEM. (Worthington and Johnson, 1980)

PEM: From 9 to 14% of the children age 1-4 suffer from moderate to severe PEM. (Menes, 1976)

KWASHIORKOR: The kwashiorkor rate is 3%, and the rate of "pre-kwashiorkor" is 25%. (West African Conference, 1968)

ANEMIA: A thorough hematological study in 1968 found a serious iron deficiency problem among young children, a rate of 20%. This finding disagreed with data from food consumption studies, which indicated that individual iron requirements (for adults) were fully satisfied. (Dillon and Lajoie, 1980)

MEASLES: Measles mortality rates in various villages ranged from 2% to 33%. Nationwide, the case mortality is about 13%. In 1971, 69% of all cases occurred in children age one to four years. Measles vaccination programs are hampered by lack of resources. (Menes, 1976)

RURAL

MORTALITY RATES: In the Sine (Niakhar) area, the mortality rate during the second year of life was 202 per 1000 births. The rate for age 1-5 is 355 per 1000, leaving 510 survivors at age 5 for each 1000 live births. (Cantrelle and Leridon, 1971)

MORTALITY RATE: In Ngayorhem, in the Sine Region, the mortality rate for children age 1-3 years during 1963-1970 peaked at 246 per 1000 during the famine year 1969, and was lowest, 70 per 1000, in 1967. (Cantrelle and Ferry, 1978)

MORTALITY RATES BY YEAR: The mortality rate among children age 1 to 4 years in various studies was 81 to 108 deaths per 1000 children in 1963-65, 110 per 1000 in 1964-66, 93 per 1000 in 1965, 133 per 1000 in 1966, 128 per 1000 in 1967, and 105 per 100 in 1968. (Dillon and Lajoie, 1980)

MORTALITY RATES BY AGE: In 1963-67, mortality rates were 210 deaths per 1000 children under 1 year; 202 per 1000 age 1-2 years, and 129 per 1000 age 2-3 years. (Dillon and Lajoie, 1980)

MORTALITY - FULANI: Among the Diery Fulani, fewer than 50% of children survive to the age of five years. (Teitelbaum, 1977)

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

SEASONAL MORTALITY RATES: In the Sine (Niakhar) area, the infant mortality rate peaked in October, at the end of the rainy season. The risk of death was highest for infants age 9-15 months during September, October, and November. (Cantrelle and Leridon, 1971)

MALNUTRITION: A 1975 WHO study in Sine-Saloum found kwashiorkor in 0.5% of children age 0-2 years, and a "pre-kwashiorkor state" in 15.0%. (Menes, 1976)

MALNUTRITION: Among the 31 children age 1 to 2 years in the three villages studied, the incidence of clinical signs of malnutrition were as follows: malnutrition and kwashiorkor, 25.8%; signs of vitamin A deficiency, 0; signs of B vitamin deficiencies, 22.5%; dental problems, 0; splenomegaly, 48.3%; hepatomegaly, 0; and clinical signs of anemia, 19.3%. (Cros and Baylet, 1967)

KWASHIORKOR: Among 134 children under four years old examined in three villages over a period of ten months, two cases of frank kwashiorkor were found. (Cros and Baylet, 1967)

DISEASE DURING THE RAINY SEASON: Kwashiorkor kills many weakened children during the rainy season, June through September. It is also the epidemic season for measles and malaria. (Teitelbaum, 1977)

MEASLES: During 12 months following a measles vaccination campaign, the number of measles cases in 14 of the 17 dispensaries studied fell by 96 percent. (Helmholz, 1975)

MEASLES: Children in densely populated areas got measles at an earlier age. The percentage of measles cases in children age 5 years and above was highest in less densely populated areas. (Helmholz, 1975)

MEASLES - SEASONALITY: Incidence of measles peaks in March and is lowest in August through December. (Helmholz, 1975)

URBAN

KWASHIORKOR: The incidence of kwashiorkor among patients hospitalized in Dakar in 1969-72 ranged from 0.1% to 0.5%. (Cantrell and Ferry, 1978)

2. DIETARY BELIEFS

2.1 DIETARY BELIEFS, GENERAL

NATIONAL

RELIGION: Most Sengalese are Muslims and follow the dietary proscription of pork. The remaining 20% of the population are Christians, or follow traditional animist religions. (Worthington and Johnson, 1980)

NO CHILD'S PLATE: It is considered antisocial for a child to have his own plate; it makes the child self-centered. (N'Doye, 1980)

FOOD DEEMPHASIZED: Children are told not to become "stomach men" concerned primarily with eating. They are told not to sacrifice themselves to their stomachs, lest they become "the least of men." (N'Doye, 1980)

MEALTIMES: Although Europeans treat mealtimes as special occasions, sitting around a table, even changing clothes for the occasion, the African never takes so much time; there are other things to do in life, besides eat. (N'Doye, 1980)

TRADITIONAL COOKING VS. WESTERN: Although African cooking has historically been appropriate and nutritious, African housewives suffer a demonstration effect from observing Western cooking in their midst. They feel a dichotomy as a result of colonization, and need to find some coherence in their traditional ways. (N'Doye, 1980)

LIMITED IMPACT OF TABOOS: Food taboos are not a major constraint on the diet, because they are often largely offset by compensatory habits when one moves from one region to another. (West African Conference, 1968)

RURAL

WARTHOGS PROHIBITED: The most ubiquitous source of wild meat for the Diery Fulani is the warthog, which, as a member of the pig family, is prohibited. (Teitelbaum, 1977)

2.2 DIETARY BELIEFS ABOUT PREGNANCY

2.3 DIETARY BELIEFS ABOUT LACTATION

NATIONAL

EGGS: Eggs were believed to prevent women from nursing. (West African Conference, 1968)

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

2.5 DIETARY BELIEFS ABOUT WEANING

NATIONAL

EGGS: Eggs are forbidden because it is believed that they prevent the child from speaking at an early age. (West African Conference, 1968)

2.6 DIETARY BELIEFS ABOUT ILLNESS AND CURE

3. DIETARY PRACTICES

3.1 DIETARY PRACTICES, GENERAL

NATIONAL

STAPLE FOODS: The chief staples are millet and sorghum, followed by cassava, rice, and maize. Peanuts are grown for export, and rice is the major food import. More than 90% of all land under cultivation in 1970 was used for sorghum, millet, or groundnuts, all of which grow satisfactorily under the common conditions of poor soil and low and erratic rainfall. (Menes, 1976)

BASIC DIET: Staple foods are millet and rice (local and imported). Other foods consumed, depending on ethnic group, season, or region, include maize, sweet potatoes, sorghum, and wheat (as bread in urban areas). Supplementary foods include groundnuts, beans (niebe), yams, green leaves, tomatoes, and onions Peanut oil, the major fat, is used heavily when available. Milk and milk products are consumed mainly by the pastoralists and eastern rural populations. Meat is consumed mostly in urban areas, and depends on availability and economic level. Dried or smoked fish are used in rural areas. Canned meat is not acceptable. (Licross, 1979)

CEREALS: Cereals, chiefly millet and sorghum, are important food crops produced for local consumption, but rice, also a staple, must be imported in large quantities. (Worthington and Johnson, 1980)

MILLET: Millet is popular among many farmers because it is one of the first cereals available in autumn, when stores from the previous season have been consumed. (Menes, 1976)

LOCAL PRODUCE: Local produce, varying in importance according to season and area, includes corn, sorghum, beans, groundnuts, potatoes, citrus fruits, cassava, green vegetables, and baobab leaves. (Menes, 1976)

ETHNIC GROUPS: The Wolof, concentrated chiefly in the northwestern portion of the country, make up 36% of the population. The Serer make up 19%; the Peul (including Fulbe and Fulani) and Toucouleur, 22%; the Diola, 7%; the Manding and Bambara, 6%; and other groups, less than 2% each, including Sarakole, Diankhanke, Lebou, Bassari, Maures, Cape Verde Islanders, Europeans (chiefly French) and Lebanese. (Menes, 1976)

SEASONAL AGRICULTURAL PRODUCTS AND ACTIVITIES: In the North, sorghum, corn and sweet potatoes are available from November to January; from February to May, stored foods are used, and free time is used to collect and store salt. During June and July crops are planted, to be watered by August floods. By the end of summer, stored foods are exhausted and diets are based on wild leaves and berries. (Menes, 1976)

ERRATIC RAINS AND CROPS: In the North, rains in a good year will be 250 to 300 mm, but rainfall in erratic patterns results in some villages getting plenty of rain for their crops, while others get none at all. (Fleury, 1982)

3.1 DIETARY PRACTICES, GENERAL (Cont.)

CONSUMPTION TRENDS: Recent feeding and consumption trends include: decline in millet consumption in favor of rice; increase in fat consumption, supported by a preference for fats; increasing demand for stimulants such as coffee, tea, and colas ("Coca-Cola would be the ruin of our States"); and, finally, a positive change: increased trend toward fresh vegetables, compatible with increased promotion of market-gardening. (West African Conference, 1968)

SAUCES: Sauces are made with a variety of ingredients, providing many flavors for the food they are used with. Some sauces will keep for 9 to 12 months without spoiling. (N'Doye, 1980)

NETETOU: Netetou (called soumbara in the Bambara language) is a black gruel made of fermented nere or nete grain. A traditional staple, it has fallen out of favor in recent years. (N'Doye, 1980)

PEANUTS (GROUNDNUTS): Peanuts, the principal crop, account for half of the total agricultural production and provide 55% of the country's exports. Peanut oil processing is the biggest single industry. (Worthington and Johnson, 1980)

YAM SNACKS: Roasted yams or manioc are eaten as between-meal snacks. (Menes, 1976)

WILD FOODS: Wild, uncultivated foodstuffs, rich in protein, minerals and vitamins, are widely used throughout the country. (Menes, 1976)

PROTEIN SOURCES: Fish, when available, is used for sauces served with millet, rice or sorghum. Meat is eaten once a week or less, even among groups which raise livestock. Peul cattle herders use milk, fresh or fermented. (Menes, 1976)

FISH: 250,000 tons of fish are caught annually along Senegal's 360 miles of coastline, accounting for 5% of the GDP and 9% of exports. 80% of production is in the traditional (small-scale) sector; 85% of their production is consumed fresh by people living near the coast, and the rest is preserved. (Menes, 1976)

CONCERN FOR ANIMAL PROTEIN: The total protein/animal protein ratio of 3.1 is large enough to cause concern. These figures show that Senegal does not suffer from overall quantitative hunger, but rather from a specific, well-known, and deplorable lack of animal protein. (West African Conference, 1968)

MEAL SHARING: Men and boys over eight are served first. Each person's share of a meal is based on sex, age, and productivity. Usually the sexes eat separately. (Menes, 1976)

FOOD SUPPLY: Agricultural production meets only two-thirds of the nation's food requirements. Food has to be imported although much arable land is underdeveloped. Inadequate storage and distribution facilities inhibit effectiveness of demand. (Menes, 1976)

FOOD SUPPLY: Per capita food intake is declining. (Menes, 1976)

IMPORTED FOODS: The most popular imported foods are wheat, rice, and sugar. (Menes, 1976)

AGRICULTURE LABOR: The proportion of the labor force employed in the agricultural sector was 76% in 1979 and 84% in 1960. (World Bank, 1981)

AGRICULTURE VARIABILITY: Since the economy is based on rainfed agriculture in a drought-prone region, production varies from year to year, contributing to unemployment among the 77% of the labor force engaged in agriculture. (Worthington and Johnson, 1980)

SAHEL DIET DIVERSITY: Interaction among farmers, herdsmen, and fishermen helps provide dietary diversity in the Sahel. (Menes, 1976)

FOOD PRODUCTION: During 1961-70, per capita food production decreased 4.7%, but in 1970-75, it increased 6.7%. (FAO, 1977)

PRODUCTION: From 1970 to 1977 the increase in agricultural production averaged 4.0-4.9% per year. (FAO, 1979)

FOOD PRODUCTION INCREASE: Per capita food production was 4% greater in 1975-1977 than in 1969-1971. (World Bank, 1979)

AGRICULTURAL TRADE: Rice and sugar were among the principal imports. Peanuts and peanut products made up almost half the total exports; canned fish were also major exports. (Menes, 1976)

GROUNDNUTS: Senegal relies on groundnuts (peanuts) for 80% of its export earnings. (APHA, 1981)

GROUNDNUTS: 50% of the fertile land is devoted to groundnut cultivation. (Steady, 1980)

GROUNDNUTS: Groundnuts, a good source of protein, are widely grown but are not a popular foodstuff; most of the crop is sold for export. The rate of infestation with the aflatoxin-producing mold, Aspergillus flavus, is high. (Menes, 1976)

NEW CROPS: Sugar cane, carrots, and pineapples have been introduced as cash crops. (Menes, 1976)

ALCOHOL: Palm toddy, the principal alcoholic beverage, causes considerable intoxication. (Menes, 1976)

3.1 DIETARY PRACTICES, GENERAL (Cont.)

DEFICIENT INTAKES: Food balance sheets indicate that the average Senegalese consumes less than the recommended amounts of calcium, riboflavin (vitamin B_2), and vitamin C. Mean caloric intake was 2500 calories. (West African Conference, 1968)

VITAMIN A INTAKE: Vitamin A intakes in 1947 were very low, except during mango season, when night vision problems disappeared. (Menes, 1976)

PROTEIN AND CALORIE SUPPLY: In 1976, per capita supplies were 2,228 calories and 64 grams protein. (Sivard, 1979)

PROTEIN AND CALORIE SUPPLIES: 25% of the population (1,053,000 people) had calorie intakes below the critical limit. In 1972-74, per capita supplies averaged 2181 calories (92% of requirement) and 61.7 grams protein. (FAO, 1977)

CALORIE SUPPLY: The supply of calories available in 1977, 2,261 per capita, met 95% of the requirement estimated by FAO. (World Bank, 1981)

CALORIE SUPPLY: The estimated average daily calorie requirement is 2380 calories. Because of variations in agricultural productivity in the early 1970s, the actual supply of available calories was 91% of the requirement in 1970, 94% in 1971, 84% in 1972, 94% in 1973, and 97% in 1974. (FAO, 1979)

RURAL

PREHARVEST FOOD SHORTAGES - SOUDURE: The preharvest period, late summer and early fall, is known as the "soudure" and is a time of serious hunger in rural areas. Most adults cannot maintain adequate caloric intake. (Menes, 1976)

PREHARVEST FOOD SHORTAGES - SOUDURE: The Casamance Region, south of the Gambia, produces a greater variety of grains, vegetables, and fruits than northern regions, and is more likely to avoid hunger during the preharvest period, "soudure." (Menes, 1976)

HUNGRY SEASON: The rainy season, June through September, is known as the "hunger months." This is also the time when land is cleared and crops are planted. Cultivation is initiated at the most nutritionally precarious point in the year: grain stores are depleted and animals are weak and starved. This is the time when the greatest output of work energy is required to prepare land and crops. Cultivation is done by men and women. (Teitelbaum, 1977)

ANIMAL FORAGE IN THE DRY SEASON: During the dry season in the North, October to June, green leaves may be the only forage available. Animals are taken to deeply bored wells, of which there are over 70, at 30 to 40 km intervals. Towards the end of the dry season, leaves and edible pods (such as those of the acacia) make up about half of the diet of the region's goats, camels, and cattle. The woody plants and ground covers in the areas around the deep wells are subjected to extremely heavy

grazing, and during the drought that came in 1972, most of the cover was destroyed. (Fleury, 1982)

MEALS: Breakfast is usually made from leftovers of the previous supper. Lunch, often eaten in the field, consists of flour balls, fried or moistened with sauce. Supper, the main meal, is eaten after dark. Little meat or fish is eaten. (Menes, 1976)

STAPLE FOODS: Field crops are supplemented by kitchen garden produce, including "niebe" beans, yams, sweet potatoes, and other vegetables and condiments. Vegetable production has been increasing rapidly. (Menes, 1976)

STAPLE FOODS: The rural dietary staple, millet, is being replaced by imported and domestic rice for the non-farm population. (Menes, 1976)

WILD PLANTS: Wild plants and fruits, gathered by women, provide significant supplements to scanty food supplies at the beginning of the rainy season. Grass seeds are added to millet; wild leaves are added to sauces. (Cloud, 1977)

GARDEN VEGETABLES: Women often have small gardens in which they grow carrots, red peppers, onions, garlic, tomatoes, eggplant, and beans to make the accompaniments and sauces which make millet more palatable and more nutritious. (Cloud, 1977)

MAJOR TRIBAL GROUPS: The Wolof make up 36% of the population; Peul, 17.5%; Serere, 16.5%; Toucouleur, 9%; Diola, 9%; and Mandingo, 6.5%. (Worthington and Johnson, 1980)

DIOLA DIET: The Diolas of the Casamance River Basin eat rice, beans, fish and oysters, with occasional supplements of millet, sorghum, and tubers. During the lean months, gathering and hunting are important. The Diolas keep cattle; they consume milk, but do not slaughter them for meat. (Menes, 1976)

RICE - DIOLA: The Diola people of the Casamance grow rice. Women share men's work. (Worthington and Johnson, 1980)

DIET OF DIERY FULANI: The Diery Fulani subsist mainly on a diet of grains, i.e., millet, maize, and some sorghum or rice. Cooked grains are eaten with milk, either fresh or fermented, as porridge, or couscous (steamed semolina). They do not bake bread and eat very few prepared foods but they do cook leaves, fruits, stems and roots of Sahelian plants to use as vegetable sauces to be eaten with the cereals. Luxuries include tea, salt, peanut oil, sugar, biscuits, and dried fish. Although they herd animals, they rarely consume them. (Teitelbaum, 1977)

DROUGHT EFFECTS - FULANI: The recent epidemic of PEM in the Diery resulted from the drought-induced loss of two important food sources: cow's milk and wild plants. Severe drought also resulted in decreased amounts of wild game. (Teitelbum, 1977)

HARVEST - FULANI: In October and November food is harvested and stored. The dietary intake of the Fulani is improved in this season by consumption of abundant milk and meat products as well as various leaves and bush fruits. (Teitelbaum, 1977)

MILK - FULANI: To survive as cattle keepers under marginal conditions, Diery Fulani must compromise between the needs of calves and the human use of cow's milk, especially for children. Customarily, the supply is divided with the calves allowed to suckle only at night after hand milking the cows each evening. (Teitelbaum, 1977)

WILD PLANTS - FULANI: Wild plants are an important nutritional supplement used by the Fulani, especially in the hungry season, June through September. Women specialize in gathering leaves, fruits, seeds, roots and stems of over two dozen species of plants. They are skilled in selection of non-toxic plants. Food gathering provides energy, some vegetable protein, and necessary vitamins and minerals at a time of year when domesticated foods are in short supply. (Teitelbaum, 1977)

MEAT AND EGGS - FULANI: Meat is eaten irregularly by the Fulani. Goat is the most common meat, slaughtered for guests or small festivals. Sheep may be slaughtered for important religious occasions. Poultry, usually chicken or guinea fowl, is eaten; due to low production there are few eggs. A steer or old cow is occasionally killed, but the Fulani prefer to accumulate animals. After slaughter, meat is consumed quickly to avoid spoilage; meat is distributed to neighbors and friends. (Teitelbaum, 1977)

HUNTING - FULANI: Some Fulani men hunt in the wet season (June to September) but are restricted by national poaching laws which preserve wildlife. The most ubiquitous source of meat, the wart hog, is taboo to the Islamic Fulani as it is a member of the pig family. Gazelle and other small mammals are hunted but they are becoming rare; large animals have moved south since the beginning of the drought. (Teitelbaum, 1977)

SHARING FOOD - FULANI: The compound shares food supplies. Wives and unmarried daughters pound grain, draw water and prepare meals together; the entire group shares food at meal times. The men dine at one end of the compound as a group and the women and small children dine at the other end. Adolescent boys and girls sometimes eat separately from the others. (Teitelbaum, 1977)

MILK PRODUCTS - PEUL: Among the Peul, semi-nomadic cattle herders in the east, women support their families by selling milk and milk products. (Worthington and Johnson, 1980)

GUM ARABIC: The Peul and Moor nomads harvest gum arabic beginning in November each year. They strip bark from the Acacia senegal trees and collect the sap, which is used in pharmaceuticals and in food. It is primarily a cash crop, bringing in about 150 to 200 francs CFA per kilo, and Senegal has traditionally been one of the world's major exporters of

gum arabic. Many of the trees were destroyed during the 1972 drought, and production is now about 500 to 1000 tons per year. (Fleury, 1982)

SERERE DIET: The Serere raise millet, but in quantities insufficient for year-long subsistence. They grow peanuts, which they sell as a cash crop, to make nonfood purchases. Sales of women's handicrafts provide money for the purchase of concessionary foods. The Sereres also raise sheep, for meat, and cattle and goats, for milk. (Menes, 1976)

SONINKE AGRICULTURE AND LABOR: The Soninke in the eastern part of the country depend almost entirely on women to maintain their farms because as many as 80% of the men migrate to France for most of their productive lives and send money home to their families. (Worthington and Johnson, 1980)

TOUCOULEUR DIET: The Toucouleurs of the Middle Senegal Valley consume a diet based on cereals (sorghum and millet), fish, milk, and green leaves--one of the best diets in the country. (Menes, 1976)

TOUCOULEUR AGRICULTURE: Toucouleur women, in the Senegal River Basin in the north, do much of the farming but are not allowed to own their own plot, only cattle and moveable goods. (Worthington and Johnson, 1980)

WOLOF AGRICULTURE: The Wolof, who make up 36% of the nation's population, inhabit the central, peanut-producing area. Traditionally, they worked as extended families on communally operated fields with individual plots for cash cropping. Recent trends towards cash cropping and westernization of values and customs have fragmented the extended family and reduced the numbers of communal food fields. (Worthington and Johnson, 1980)

PROTEIN AND CALORIE INTAKES: Balance sheets in 1974 showed average daily intakes of 2068 calories, including 1549 from cereals and 68 from animal sources; and 57.8 grams of protein, including 39.4 grams from cereals, 7.1 grams from legumes, and 10.1 grams from animal products. (Cantrelle and Ferry, 1978)

SEASONAL CALORIE DEFICIENCY: In three villages studied, the average intake was 2700 calories per day per person, but this could drop below 2000 during the soudure. (Cros and Baylet, 1967)

CARBOHYDRATE INTAKE: Carbohydrates dominate the rural diet, comprising 75% of the caloric intake. (West African Conference, 1968)

URBAN

URBAN POPULATION: 24% of Senegal's population is urban; of these, 64% live in Dakar. (World Bank, 1979)

3.1 DIETARY PRACTICES, GENERAL (Cont.)

INTAKE IN DAKAR: In normal times, 48% of the population consumes 2,000 to 3,000 calories per day. The diet is 11-12% protein and 34-36% fat. Food is uniformly available throughout the year. Foreign cereals such as rice and wheat often replace the traditional sorghum and millet. (Menes, 1976)

RICE FOR URBAN AREAS: At this time it is cheaper to import rice from Thailand than to ship it to Dakar and other centers from the southern Casamance and northern Fleuve regions. (Worthington and Johnson, 1980)

CEEB U JEN: Ceeb u jen, a rice dish, is more common in urban areas, and is a product of French influence, since rice is not native to Senegal. (N'Doye, 1980)

FOOD SOURCES: Urban dwellers often receive food from rural relatives. (Menes, 1976)

MEALS: Breakfast, eaten between dawn and 7:00 A.M., is porridge with milk, sugar and bread. Some people may eat a pancake bought from a street vendor and brew a cup of tea or coffee, which is heavily sweetened. Lunch and dinner are the same foods, prepared differently. Fish or meat is sometimes added, but the result is always a porridge or couscous. (Menes, 1976)

CALORIE AND PROTEIN INTAKES: Balance sheets in 1974 showed that intakes averaged 2495 calories per day, including 1363 from cereal sources and 367 from animal sources; and 87.3 grams protein, including 37.3 grams from cereals, 3.4 grams from legumes, and 45.9 grams from animal products. (Cantrelle and Ferry, 1978)

CALORIE AND PROTEIN INTAKE IN DAKAR: In Dakar, a budget sample survey in March 1974 yielded estimated intakes of 2594 calories and 71.9 grams of protein per person per day. (Cantrelle and Ferry, 1978)

FAT INTAKE: The diet in urban areas is characterized by a progressive increase in fat intake, to 35-40% of total calorie intake. (West African Conference, 1968)

3.2 DIETARY PRACTICES, WOMEN

3.2.1 DIETARY PRACTICES, WOMEN, DURING PREGNANCY

NATIONAL

GEOPHAGY: Geophagy (eating soil or clay) has been noted among pregnant women. (Menes, 1976)

3.2.2 DIETARY PRACTICES, WOMEN, DURING LACTATION

3.3 DIETARY PRACTICES, INFANTS 0-24 MONTHS

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

RURAL

PREVALENCE OF BREAST FEEDING: Among children in the Sine (Niakhar) Area who survived to the age of three years, 98% were breast fed for at least 12 months, 81% for at least 20 months, 58% for at least 23 months, and 29% for 27 months or more. (Cantrelle and Leridon, 1971)

DURATION OF BREAST FEEDING: Among the Wolof and Serere living in Thienaba area, mean duration of breast feeding was 23.2 months in 1968-69. (Cantrelle and Ferry, 1978)

DURATION OF BREAST FEEDING: In the Sine-Saloum areas, mean duration of breast feeding was 24.4 months during 1963-68. (Cantrelle and Ferry, 1968)

WEANING AGE: In the Sine (Niakhar) area, it was customary to wean children from the breast at about 24 months of age. (Cantrelle and Leridon, 1971)

MORTALITY AND WEANING: In the Sine (Niakhar) area, the average age at weaning from breast milk was greater for children who died between the ages of 2 and 4 years (25.6 months) than for those who survived (24.3 months), possibly because breast feeding was prolonged for children whose health was delicate. (Cantrelle and Leridon, 1971)

URBAN

DURATION OF BREAST FEEDING: In Dakar, the mean duration of breast feeding was 18.9 months in 1968 and in 1972. (Cantrelle and Ferry, 1978)

3.3.2 DIETARY PRACTICES, INFANTS 0-24 MONTHS, WEANING

NATIONAL

WEANING AND GASTROENTERITIS: One of the primary causes of gastroenteritis is the weaning of children with porridges made with polluted water or milk and unclean hands. (Menes, 1976)

COMMERCIAL WEANING FOOD: Local resources for weaning foods require detoxification (peanut flour contains aflatoxin and cottonseed flour contains gossypol) which makes them too expensive to be commercially feasible. A new gossypol-free variety of cottonseed, "niebe" bean four, and ground shrimp heads are being explored as solutions to this problem. (Menes, 1976)

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

COMMERCIAL WEANING FOOD: Many attempts have been made to produce a protein-rich, inexpensive commercial weaning food, but the results are discouraging. Most mixtures tested were unsafe or too expensive. (Menes, 1976)

RURAL

WEANING AND DISEASE: At weaning the substitution of polluted water and cereal roughages provokes diarrhea and dysentery among children. This leads to dehydration, increased susceptibility to internal parasites, and vulnerability to infectious disease. (Teitelbaum, 1977)

FULANI WEANING PRACTICES: Among the Fulani, the hungry season, June through September, is also the planting season, when women must go to work in the fields, leaving infants behind in the village to be weaned abruptly onto the adult diet of millet, corn gruels, steamed grains, and cows' milk. Polluted water and cereal roughage induce diarrhea and dysentery and increase susceptibility to measles and malaria. (Teitelbaum, 1977)

NEED FOR WEANING FOOD: To date, efforts to produce an acceptable, cheap, high-protein weaning food have been unsuccessful. Decreasing milk consumption among the Diery Fulani, even before the drought, had resulted in increasing rates of kwashiorkor and "prekwashiorkor." (Teitelbaum, 1977)

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

NATIONAL

GEOPHAGY: Geophagy has been noted among children. (Menes, 1976)

RURAL

ABRUPT WEANING TO ADULT DIET: Weaning is an abrupt transition to the adult diet of steamed grains and millet or corn gruels, to which fresh milk is added. (Teitelbaum, 1977)

3.4 DIETARY PRACTICES, HEALTH AND MEDICINE

RURAL

INDIGENOUS FULANI HEALTH CARE: The Diery Fulani do not have access to the one doctor in their district (Bakel), and rely on Islamic holy men and local fetish priests for herbal and mystical cures. (Teitelbaum, 1977)

4. NUTRITION STATUS CORRELATIONS

RURAL

BREAST FEEDING AND MORTALITY: Among children in the Sine (Niakhar) Area who survived to the age of three years, 98% had been breast fed for at least 12 months, 81% for at least 20 months, 58% for at least 23 months, and 29% for 27 months or more. (Cantrelle and Leridon, 1971)

MORTALITY AND WEANING: In the Sine (Niakhar) area, children who had died between the ages of 2 and 4 years had been breast fed longer (25.6 months) than those who survivied (24.3 months), possibly because breast feeding was prolonged for children whose health was delicate. (Cantrelle and Leridan, 1971)

5. NUTRITION AND HEALTH POLICIES AND PROGRAMS

5.1 NUTRITION AND HEALTH POLICIES

NATIONAL

PLANNING: The principal planning organization is the Ministry of Planning and Cooperation. Until 1973 this body was known as the Secretariat of State for Planning, attached to the Office of the Prime Minister. (Menes, 1976)

FOURTH PLAN HEALTH GOALS: The health goals of the Fourth Plan (1973-77) emphasized rural areas over urban; medicine for the masses rather than the individual; preventive medicine over curative; priority for health education; and development of integrated services to attack transmissible diseases and meet essential health care needs. (Menes, 1976)

FIFTH PLAN HEALTH GOALS: Both the Fourth and Fifth five-year plans pledge to place one health post in every rural community, but during the fourth plan period (1973-77), only 10-15% of the health plan was implemented, and almost nothing was accomplished in rural health. (APHA, 1981)

FOURTH PLAN HEALTH OBJECTIVES: The Fourth Plan for Economic and Social Development (1973-77) had two major health-related objectives: maintenance of the present coverage in rural areas by making every existing health post operational; and increasing coverage to 200,000 additional inhabitants per year. (Menes, 1976)

HEALTH MINISTRY ORGANIZATION: The Ministry of Public Health and Social Affairs played little role in health or development planning, primarily because of lack of capability. The Director of Health had technical responsibility for health programs without having administrative or budget authority; these powers were held by the Minister, through his Chief of Cabinet. To correct this, the government placed its highest priority on central reorganization of the Ministry of Health. (Menes, 1976)

HEALTH MINISTRY ACTIVITIES: Public health services are directed by the Ministry of Public Health and Social Affairs, which includes a Directorate of Public Health and a Directorate of Social Services. The former is responsible for surveillance of all health agencies and the operation of services providing free medical care; organization and control of public hygiene, including prophylaxis of communicable diseases; maternal and child health; health education; and generation of demographic studies, statistics, and epidemiological reports. (Menes, 1976)

MINISTRY OF HEALTH SUPPORT OF CRS AND PL-480: CRS reports that its program of PL-480 food distribution has become such a success in the eyes of the Ministry of Public Health that they now prefer that all food and nutrition activities by any agency conform to CRS methodology, including

5.1 NUTRITION AND HEALTH POLICIES (Cont.)

a requirement that all agencies working with the health clinics include food distribution as part of their activities. (Worthington and Johnson, 1980)

HEALTH BUDGET: Between 1965 and 1974, the health budget represented 7.5% to 9.2% of the whole national budget. (Menes, 1976)

HEALTH BUDGET: The percentage of the national budget spent on health has declined from 9.2% in 1969-70 to 6% in 1978-79. There are great disparities in the allocation of health resources: the Cap Vert region, which includes the capital, Dakar, but only 19% of the population, received 45% of the health budget, while the Sine Saloum Region, with 20% of the population, received only 9%. (APHA, 1981)

BUREAU OF FOOD AND APPLIED NUTRITION: The Ministry of Public Health had a Bureau of Food and Applied Nutrition (BANAS), the responsibilities and activities of which were "not immediately clear." (Menes, 1976)

HEALTH PERSONNEL POLICIES: To remedy health care staffing deficits, the government initiated mandatory rural service for all medical personnel receiving financial aid; a new category of village health worker, proposed under the USAID Rural Health Services Development Project; and the "recycling" of indigenous health workers into the health system. (Menes, 1976)

RURAL DEVELOPMENT - PROMOTION HUMAINE: Promotion Humaine, which cooperates with the Ministry of Health in the Sine Saloum health development project, is a cabinet-level organization concerned with rural development programs. (APHA, 1981)

AGRICULTURE POLICY: The Fourth Plan emphasized increasing groundnut and millet production, and the diversification of agricultural products such as rice, cotton and fruit. Areas suitable for this are Casamance and the southeast, and in northern areas with irrigation potential, along the Senegal River. (Menes, 1976)

AGRICULTURE BUDGET: Government investment in the agricultural sector increased 27% between the Fourth four-year plan (1973-77) and the Fifth (1977-81). (Worthington and Johnson, 1980)

AGRICULTURE POLICY: President Senghor has said that "we have replaced a feudal land tenure system by one based on the idea of community and democracy" and "we have made available to peasants and fishemen efficient implements, efficient because they are modern working devices." (Worthington and Johnson, 1980)

FOOD SELF-SUFFICIENCY: To achieve self-sufficiency in food, Senegal is putting emphasis on hydraulics, rice culture, and dams. (N'Doye, 1980)

FOOD STRATEGY: The Food Investment Strategy of 1976 noted the irony of Senegal importing much of its food supply while also exporting agricultural products. Efforts toward food self-reliance include:

substituting local products for rice and wheat in the urban diet; increasing production of dryland millet, the staple of rural areas; increasing production of irrigated rice; and increasing attention to fish resources. (Worthington and Johnson, 1980)

ORANA: ORANA (Organisme de recherche sur l'alimentation et la nutrition appliquee--Organism for Applied Research on Food and Nutrition) has operated since 1952, preparing tables on food composition, seeking the clinical causes of malnutrition, and proceeding with investigations for mass planning--primarily regarding food, families, zones and subregions, to obtain biological indices against which to measure progress. Current activities include educational television and gathering of traditional recipes through work with the midwives, who have close associations with mothers. (N'Doye, 1980)

ORANA POLICY: The spokesperson for ORANA states that they are not in favor of creating an elite, or of selective interventions; their goal is to ensure a lifetime's ration of food for the child who has been saved from malnutrition. (N'Doye, 1980)

AID FOR CHAD: In August 1973, Senegal sent 1,300 tons of grain, destined originally to relieve local shortages, to Chad, where slow delivery of relief supplies had produced a desperate situation. (DuBois, 1974)

RURAL

LOCAL HEALTH EXPENDITURES: Under administrative reforms initiated in 1972, rural communities will be given greater control over locally collected revenues. Rural councils currently allocate 8% of their budgets to health services and many have already financed construction of village maternities and first aid posts. (Menes, 1976)

MILK PRODUCTION: USAID and the Government of Senegal entered an agreement to conduct a $2.35 million project over 3 years for the improvement of animal production and environmental preservation. The project was oriented toward a national livestock plan, and included a proposal to use cows' milk exclusively for their calves, eliminating availability for human consumption. (Teitelbaum, 1977)

5.2 NUTRITION AND HEALTH PROGRAMS

NATIONAL

NUTRITION PROGRAM RESOURCES: Nutrition program resources included ORANA, the Institute of Social Pediatrics of the School of Medicine, the Institute of Food Technology, the School Food Service, the Office of Food and Applied Nutrition, and an infrastructure of seven primary and 80 secondary PMI centers supported by a growing network operated by the Rural and Urban Expansion Services. (West African Conference, 1968)

MINISTRY OF PUBLIC HEALTH NUTRITION PROGRAM: The Ministere de la Sante Publique (Ministry of Public Health) conducts a supplementary feeding

program, through its Dakar office, which has reached 175,000 children in both urban and rural areas. Local food is provided on-site, to take home; to pregnant and lactating women, and preschoolers age 5 months to 5 years selected by nutrition and risk status. Assistance is provided through the U.N., the national government, and the CRS mission. (Austin et al., 1978)

MINISTRY OF PUBLIC HEALTH NUTRITION PROGRAM: The Supplemental Feeding program of the Ministry of Public Health conducts monthly nutrition groups and demonstrations for mothers. Topics include weaning, illness, hygiene and sanitation, balanced diet, and weight charts. (Austin et al., 1978)

INSTITUTE FOR FOOD TECHNOLOGY (ITA): The Institute for Food Technology, with support from FAO, is the spearhead of industrial research, but is not aimed primarily at currency gains. One project is the production of commercial netetou, which is much more nutritious than rice. (N'Doye, 1980)

REFORESTATION PROJECT: At Mbiddi in the North, an agricultural research station has been established to help the area recover from the destruction of plants during the droughts of the 1970s. By studying plant species and cultivation techniques, they have been successful in reforesting many settlement areas with plants such as Acacia, which provides forage for herds, and a cash crop, gum arabic. (Fleury, 1982)

FOREIGN AID: Donor assistance to Senegal totals $100 million annually from France, the European Economic Community, the U.S., other countries, and U.N. agencies. U.S.A.I.D. support is about $19 million; Peace Corps, $1.6 million; U.S. private investments, $8 million; and PL-480 (Food for Peace) contributions are worth $6.1 milion. (Worthington and Johnson, 1980)

U.S. GOVERNMENT FOOD: Food donated by the U.S. government was distributed through schools, social welfare institutions, and leprosaria, and to mothers of preschool children, refugees from Guinea-Bissau, and drought victims. (Menes, 1976)

PL-480 ALLOTMENT: For fiscal year 1982, the approved quantity of food for Senegal was 18,707 metric tons of food, including cornmeal, CSM, and soy-fortified sorghum grits, worth $5,8 million, to be distributed by CRS through programs in maternal and child feeding, food-for-work and general relief, to reach about 231,500 recipients. (USDA, 1981)

PL-480 RECIPIENTS: In fiscal year 1977, 347,000 persons received PL-480 foods, through programs run by CRS and World Food Program in maternal and child feeding, school feeding, food-for-work, and disaster relief. (USDA, 1978)

PL-480 FOOD FOR DEVELOPMENT: A PL-480 "Food for Development" program is being developed by AID with the Government of Senegal to help the country meet its food import requirements and to encourage policy changes by

providing greater local currency for development programs. (Worthington and Johnson, 1980)

CRS AND PL-480 FOODS: CRS has distributed PL-480 foods for 20 years; they are now worth $6 million annually. CRS sees food distribution as preventive just as much as curative. (Worthington and Johnson, 1980)

CRS OUTREACH: The CRS Program reaches 75,000 mothers and 123,000 children (13% of all children under 5 years old) among the lower-income groups and is designed to meet 50% of the protein and calorie needs of the child. The program is conducted through 415 centers, about one-third of which are located in very low-income ares of the Casamance. Each PPNS clinic serves 5 to 12 villages. (Worthington and Johnson, 1980)

CRS/CARITAS ACTIVITIES: CRS and its Senegalese counterpart, Caritas, sponsored food-for-work programs in developing water works, wells, and latrines. (Menes, 1976)

CRS NUTRITION PROGRAMS: Catholic Relief Services conducts a health and nutrition program through the Senegalese office of Applied Nutrition (BANAS) of the Ministry of Health, which reaches 37,000 children under 5 years old. CRS also conducts school lunch programs and preschool health and nutrition education programs, and provides medical supplies and other material assistance. (TAICH, 1977)

CRS ADMINISTRATION: The CRS program is administered under the Sengalese Ministry of Public Health, which gives financial and administrative support to the personnel of the clinics and regional supervisors. They bear the port and warehouse costs of getting the PL-480 commodities. (Worthington and Johnson, 1980)

CRS CLINICS AND FOOD DISTRIBUTION: At a CRS clinic mothers brought their infants and children each month to be weighed. Weights were recorded on growth charts. At many sessions, groups of mothers participated in discussions about health and nutrition, or attended demonstrations on food preparation. Each child was given 3.5 kilos of sorghum grits and weaning food mix (corn-soy-milk) to take home. (Worthington and Johnson, 1980)

CARITAS: Caritas proposed to support nutrition rehabilitation at 71 private health posts through a contribution of U.S. $3,400 in 1974, and distributed milk worth U.S. $20,800. (Menes, 1976)

CRS ACTIVITIES: In addition to distributing food at maternal and child health centers, CRS has assisted in village water resources development projects; provided food to be used in food for work projects; expanded health and nutrition programs; and distributed U.S. PL-480 foods through school lunch programs. (Worthington and Johnson, 1980)

CRS ACTIVITIES: The Catholic Relief Services provided financial assistance toward development of a bee-keeping center, poultry cooperative, and a nationwide garden project. (Menes, 1976)

5.2 NUTRITION AND HEALTH PROGRAMS (Cont.)

WORLD FOOD PROGRAM: The World Food Program supported school feeding programs which reached 3,000 children in 280 schools. They found that a major obstacle was adapting donated foods to local tastes. W.F.P. also provided food for resettlement project participants. (Menes, 1976)

NUTRITION EDUCATION PROGRAMS FOR MOTHERS: Fifteen public and private nutrition education centers were supported by Catholic Relief Services, U.S.A.I.D., Peace Corps, and the Government of Senegal. The centers provided instruction in health and nutrition, demonstration meals, and discussions on basic hygiene, nutrition and child care to 3,500 mothers of children under five years old. High-protein foods were distributed. Significant changes in the habits and attitudes of the mothers were observed. Between July 1969 and June 1970, they contributed $2500 towards the operating costs of the centers. (Menes, 1976)

HEALTH EDUCATION: At demonstration PMIs (Maternal Child Health Centers) at Fatick, Pikine, and Khombole, a great effort was made to explain to mothers the significance of health cards and growth curves; this seemed to bring about real interest in the children's progress. (Menes, 1976)

PIKINE PROJECT: The Pikine Project, in the suburbs of Dakar, began in 1976 with Belgian assistance and has demonstrated that a self-financed health system can work in Senegal. (APHA, 1981)

WEANING FOODS: Local PMIs have conducted government-sponsored programs for mothers, teaching them to prepare porridges and other weaning foods based on locally-grown, protein-rich resources such as "niebe" beans and pulses. (Menes, 1976)

BREAD WITH MILLET: Senegal's Institut de Technologie Alimentaire (ITA) has developed methods of substituting millet flour for up to 1/3 of the wheat flour in bread, in order to decrease the amount of wheat which must be imported. Acceptability tests showed that the millet bread suits the taste of the Senegalese consumer, and has a longer shelf life than wheat bread. (Thiam, 1977)

NUTRITION EDUCATION FOR PROFESSIONALS: Since 1964 nutrition education has been provided to students at the School of Medicine, State Teachers College for Midwives, Institute of Pediatrics, School for Social Assistants, National School for Applied Economics, the Center for Teacher Training, School for Sanitary Workers, and the School for Rural Cadres. (Menes, 1976)

WHO TRAINING FOR PERSONNEL: Within the framework of a WHO project, nutrition education is provided for students of medicine, nursing, social work, midwifery, applied economics, teaching, sanitation, and rural cadres. (West African Conference, 1968)

SOURCES OF FOOD AID: During 1973, food aid was provided by the European Economic Community, the U.S.A., France, Canada, the World Food Programme, and others. (DuBois, 1974)

DROUGHT AID - U.S.: The U.S. donated soy-fortified grits directly, and donated instant corn-soy milk through UNICEF during the drought emergency. The U.S. provided 40% of all food donated by the international community, as well as airlifts. (Menes, 1976)

RESPONSE TO DROUGHT: Rainfall decreased progressively from 1968 to 1972. In December 1972, the FAO approved special aid for the affected Sahelian countries, Mali, Senegal, Mauritania, Upper Volta, Niger, and Chad. In March 1973, the governments of these countries declared them disaster areas. In April an FAO representative assessed the situation firsthand and determined that millions of people and tens of millions of animals faced starvation unless food and medical supplies reached them before the rains began in mid-June. Thus, almost eight months elapsed between the first signs of food shortages in September 1972 and the appearance of large-scale international aid in April 1973. (DuBois, 1974)

FOOD DEFICIT DURING DROUGHT: In April 1973, the FAO estimated the food deficit for the next six months to be 170,000 metric tons, but the French Foreign ministry's estimate was 60,000 tons. (DuBois, 1974)

FOOD RATIONING DURING DROUGHT: Food rationing, confined to rural areas, was based on the degree to which a region was regarded as "distressed." In districts 80-100% distressed, the allotment was 15 kg. of food per person for 3 months, June-September 1973. (DuBois, 1974)

U.S. AID: A team of physicians from the U.S. Public Health Service was sent to the Sahel in 1972 to assess the nutritional state of the population, but the results were not utilized or publicized. (DuBois, 1974)

DROUGHT AID FROM NIGERIA: Nigeria provided financial and logistical aid for drought relief in 1973. (DuBois, 1974)

HEALTH DELIVERY SYSTEMS: The health delivery system extends only to the secondary health post level, and has almost no contact with rural areas. Mobile health teams help to link the system with the rural population, but shortages of manpower, vehicles, fuel, and roads limit their effectiveness severely. (Menes, 1976)

MIDWIVES' TRAINING: The State School for Midwives at Dakar graduates 25 midwives each year. Its 3-year program includes local nutrition and health education in its core curriculum. Graduates are required to work in rural areas for five years. (Menes, 1976)

HEALTH CENTER SERVICES AND STAFF: The seven regions are divided into 27 departments, each with one or more primary health centers which ideally include a clinic or small hospital, a primary maternal and child health center, a maternity ward and a dispensary. Each center's professional staff usually includes one physician and an aide, and a few midwives and nurses or nurses' aides. (Menes, 1976)

MOBILE HEALTH TEAMS: Mobile health teams represent the only link between the health delivery system and rural areas, but vehicle maintenance problems and fuel shortages undermine their effectiveness. (Menes, 1976)

HEALTH CENTERS: In 1972 there were 17 primary PMI's (maternal and child health centers) and 23 secondary PMI's, none located in rural areas. (Menes, 1976)

DRUG SHORTAGES: The decline in resources for health, combined with rising costs, has impeded the system's ability to deliver health services. For example, the fifth plan indicates that there has been a general decline in resources for drugs, due to increased personnel costs. There have been chronic shortages of drugs, and many health facilities remain without adequate stocks for as much as nine months of the year. (APHA, 1981)

BIRTHS ATTENDED: 35% of births are attended. (Menes, 1976)

RURAL

DISTRIBUTION OF FOOD AID: Since the drought, the Government of Senegal has distributed whole grains during the hunger months. These are foods donated by European and American agencies. Each adult male Fulani receives 50 kilos of maize and sorghum. To some extent these foods help the Fulani survive through the worst part of the year. (Teitelbaum, 1977)

SUPPLEMENTS GIVEN TO FULANI MEN: The Government of Senegal distributed relief supplies of whole grains to the Fulani during the hunger months, donated by European and American agencies. Fifty kilos of maize and sorghum were given to each male adult. (Teitelbaum, 1977)

RURAL DISPENSARIES: The 27 departments are served by 428 health posts, each of which is designed to serve 10,000 people and ideally is staffed by a state nurse, a sanitarian, an orderly, and a midwife. The health workers weigh infants, provide advice on diet, hygiene and sanitation, distribute antimalarial drugs and provide simple first aid. This network reaches only 20% of the population. (Menes, 1976)

RURAL HEALTH SERVICES DEVELOPMENT PROJECT: The purpose of the USAID Rural Health Services Project is to create within the region of Sine-Saloum a network of staffed village health posts supported by local communities, and to strengthen a backstopping system for secondary health posts supported by the National Government. The project will promote preventive medicine by improving the staffing, support, quantity, and quality of rural health services. (Menes, 1976)

RURAL HEALTH SERVICES DEVELOPMENT: The Ministry of Health and "Promotion Humaine," with funding from U.S.A.I.D., Peace Corps, and the Government of Senegal, is conducting a project in the Sine Saloum Region, known as the Rural Health Services Development Project. The project has succeeded in opening several village health huts since August 1979, but has

experienced management problems necessitating redesign of the project. Its goal is to create a self-sustaining village-based health care system that can be replicated in other regions at a manageable cost. (APHA, 1981)

CATHOLIC RELIEF SERVICES IRRIGATION PROJECT: Catholic Relief Services funded small women's co-ops working with simple drip irrigation techniques to extend vegetable production further into the dry season. (Cloud, 1977)

UNICEF MILLING PROJECT: Cooperatively owned gasoline mills for grinding millet are being distributed by UNICEF. Without mills, women must spend 2 to 3 hours daily pounding grain, leaving less time for other food production and child care. (Cloud, 1977)

URBAN

ORANA SUCCESSES: ORANA projects have succeeded in reducing the rate of infant mortality in some areas of Dakar to 80 per thousand. (N'Doye, 1980)

6. COMMENTARIES

NATIONAL

HEIGHT GAIN A SIGN OF MALNUTRITION: Children born of undernourished mothers grow tall very quickly in their first few years. The growth in height is a sign of malnutrition, a sign of disequilibrium. The cartilage flakes, like some plants when they are fertilized with certain chemicals. The child will be more delicate. As far as Senegal is concerned, it is not a nutritional improvement. (N'Doye, 1980)

MALNUTRITION CAUSES AND REMEDIES: Malnutrition of vulnerable groups may be due either to absolute food shortages or to poor utilization of existing resources. The former is the most common cause in drought-prone areas and urban slums. In other areas, the second cause prevails, and could be corrected through nutrition education and diversified agricultural production. (Menes, 1976)

WEANING FOODS: A locally produced weaning food is needed, but if it were developed, CRS would be challenged to give up a program that has been their main raison d'etre in Senegal for twenty years (i.e., distribution of formulated foods based on U.S. PL-480 donated foods). (Worthington and Johnson, 1980)

DEVELOPMENT PLANS' SHORTCOMINGS: Development plans measure success in terms of production, consumption, processing, and distribution, but don't take into account the human level. Concern is for income rather than the inner man and his morality, his leisure occupations, his dietetics, his biological level, and his balances. It seems that men are treated as objects and that income is often opposed to true development. (N'Doye, 1980)

OBSTACLES TO HEALTH POLICY IMPLEMENTATION: Despite recognition of the need for rural health care and a preventive emphasis, health budgets and priorities are still oriented toward urban and curative care. Sources of resistance include political personnel, demand for curative care by urban populations, physicians' lack of leadership skills, and shortages of vehicles and gasoline for delivery of rural services. (Menes, 1976)

HEALTH CARE PRIORITIES: The Fourth Four-Year Plan made a commitment to improving and expanding rural health services, but its implementation was hindered by lack of funds and of a plan of action. In spite of the commitment to rural health, 47% of the budget was allocated to hospitals and hospital construction. (Menes, 1976)

NEED FOR ENVIRONMENTAL SANITATION: Environmental sanitation services are almost nonexistent outside the major cities because of severe shortages of personnel, health education, and financial support for environmental programs. Government investment and/or donor assistance in this area alone could have the single most positive effect on the health of the people. (Menes, 1976)

6. COMMENTARIES

SELF-SUFFICIENCY: If the urban Senegalese develops a taste for rice, grapes, and green peas, he will never manage to become self-sufficient in food. The Senegalese must become Senegalese again. (N'Doye, 1980)

AGRICULTURE POLICY PRIORITIES: One must choose between the big export enterprises and the medium concerns that include the family and respect ecology. Beware of currency gains if you want to respect the environment. Export must be borne in mind, but not exclusively. (N'Doye, 1980)

AGRICULTURE POLICY PROBLEMS: One of the most common complaints heard in Senegal is that ONCAD (the organization responsible for the supply of seed and fertilizer and marketing) is a state within a state, according to an Oxfam spokesman. (Worthington and Johnson, 1980)

AGRICULTURE POLICY PROBLEMS: ONCAD, the organization responsible for the supply of seed and fertilizer and marketing, also ensures that the loans made by the National Development Bank are repaid. After the 1978 drought, the government announced a one-year moratorium on the repayment of peasant debts to the bank. (Worthington and Johnson, 1980)

AGRICULTURE INTERFERENCE: In the north, along the Senegal River, there is documented evidence of the regional authority impeding peasant cooperatives from carrying out their successful form of cultivation and bringing them under its control. When government officials were sent in, most could not even speak the local language, according to an Oxfam spokesman. (Worthington and Johnson, 1980)

AGRICULTURE AND POLITICS: According to an Oxfam spokesman, groundnut production is concentrated in the center of the country, and most of the land on which they are cultivated is controlled by one of the leading Muslim brotherhoods of the country, the Mourides. They have been the most powerful influence in Senegalese politics since well before independence. The President's political success had depended on close cooperation with the leaders of the brotherhood. (Worthington and Johnson, 1980)

STORAGE FACILITIES NEEDED: Adequate food storage facilities might best guard against the vagaries of rainfall and crop production and maintain sufficient food supply during the "soudure." (Menes, 1976)

RURAL

THE RANGE/LIVESTOCK PLAN: The range/livestock plan does not concern itself with human nutritional needs. It is oriented toward providing gains in calf growth rates and improved cattle production. Under this plan, calves receive all cow milk supplies. The potential nutritional impact of this project is improvement of cattle at the expense of the nutritional health of their owners. (Teitelbaum, 1977)

RANGE LIVESTOCK PLAN: The range livestock plan has a number of drawbacks from the Fulani point of view. Cow manure used to fertilize the soil for grain cultivation would no longer be available. Cow's milk would be used only for calves and not be available for human use. Under the new plan, milk would be pooled, but traditionally each compound prefers milk from its own cows. The new system would require hired herders, which would disrupt the traditional division of labor: men herd, women milk. (Teitelbaum, 1977)

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Method: House-to-house survey, annually, 1962-1968; data gathered on pregnancies, outcomes, weaning, migration, and deaths.
Sample: 8,456 live births, registered mainly between 1962 and 1968. Population is mostly Serer peasants.
Geography: District of Niakhar, in the Fatek department, 150 kilometers from Dakar, with 33,000 inhabitants in 65 villages.

This longitudinal demographic survey was conducted in order to estimate fertility and mortality rates. Data is analyzed relating infant and child (age 1-3 years) mortality, duration of breast

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Sample: All 833 occupants of the villages
Location: Three villages, Sao, Diop-Sao, and Mekhe-Dakhar, in the region of Niayes.

During routine administration of antimalarial medicines, residents were examined by medical students under the supervision of a nutritionist. Results are presented by age groups, for the entire populations of the villages. The report also includes discussions of the geographic, economic, and environmental conditions of the villages. The sample included about 30 children age 18 months or less.

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USDA

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This annual report on agricultural export activities under PL-480 includes activities under all titles of the law, and focuses on disaster relief efforts and recipients of concessional food aid. Extensive tables show activities on a country basis, including foods involved and dollar values.

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This conference brought together planners, administrators, and technical personnel from 13 English- and French-speaking countries of West Africa to discuss problems of food supply and nutrition, to exchange information, and to review past developments and perspectives for the future. Each country presented a report on food production and nutrition activities according to a prearranged outline. Experts presented discussions of six major themes, including Nutrition and Child Feeding, and Nutrition and Education. Committee meetings and reports followed the six themes.

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This report, which includes an extensive statistical annex, is the second in a series of annual reports designed to provide a comprehensive, continuing assessment of global development issues. This report emphasizes issues of employment, industrialization and urbanization in developing countries and discusses the policies necessary to pursue the twin objectives of growth and alleviation of poverty.

Worthington, L., and Johnson, N.

1980 Senegal: Progress in Development. Hunger Notes (a newsletter of World Hunger Education Service, Washington, D.C.) 6(1):1-10, 1980.

This article presents an overview of the country, focused on factors related to hunger and the food supply. Sections are included on politics, women's roles, agriculture, employment and migration, development goals, foreign aid, activities of private voluntary organizations (especially the Catholic Relief Service), a bibliography of articles of general interest, and a list of organizations providing assistance to Senegal.

1. NUTRITION AND HEALTH STATUS

1.1 NUTRITION AND HEALTH STATUS, GENERAL

RURAL

SEASONAL WEIGHT LOSS: Non-pregnant, non-lactating women lost an average of 6 to 8 pounds in the period July through October, the rainy season, and regained this weight in the remaining months. This loss was probably due to food shortage and intense agricultural labor. (Thomson, 1966)

1.2 NUTRITION AND HEALTH STATUS, WOMEN, PREGNANT

RURAL

WEIGHT GAIN: When the last trimester of pregnancy fell between July and September, mean weight gain was 0.37 kg; during the remaining months, the mean gain was 2.95 kg. (Paul, 1979)

WEIGHT GAIN: The largest weight gains, 5.5 kilograms, occurred among women who delivered babies from mid-February to mid-August. Weight gain at other times of the year was roughly half as much. (Thomson, 1966)

WEIGHT GAIN AND BIRTH WEIGHT: A significant correlation ($r = 0.50$) was established for maternal energy intake in the last trimester and weight of the baby at birth. (Paul, 1979)

SEASONAL WEIGHT LOSS: Pregnant women remain in calorie balance from year to year, despite their raised physiological need and recurrent spells of negative energy balance in the rainy season. (Thomson, 1966)

WEIGHT LOSS: In the last trimester of pregnancy women lost an average of 1.4 kilograms per month in August, when food was scarce and agricultural demands very high. (Whitehead, 1978)

WEIGHT LOSS: 10 women measured for weight gain in pregnancy either failed to gain or lost weight during the rainy season regardless of stage of gestation. (Thomson, 1966)

TRICEPS SKINFOLD: When the last trimester of pregnancy fell between July and September, change in triceps skinfold was -3.20 mm; it was -0.77 mm in the other months. (Paul, 1979)

1.3 NUTRITION AND HEALTH STATUS, WOMEN, LACTATING

RURAL

HEIGHT, WEIGHT, AND SKINFOLD: Rural women in the second month of lactation acheived 97% of the Boston 50th centiles for height and 96% for weight. Triceps skinfold averaged only 62% of standard. (Paul, 1979)

WEIGHT CHANGES: Weight changes in lactating women are slight. Weight lost during the rains is mostly regained in the following months. (Thomson, 1966)

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

SEASONAL WEIGHT LOSS: Lactating women remain in calorie balance from year to year, despite their raised physiological need and recurrent spells of negative energy balance in the rainy season. (Thomson, 1966)

SEASONAL WEIGHT LOSS: Mean weight loss of women whose first three months of lactation fell between July and September was 2.10 kilograms. Women whose first three months of lactation fell in the remaining months gained 1.64 kilograms. Skinfold thickness had a similar pattern: .20 mm was the mean loss in the period July to September; 2.43 mm was the mean gain in the remainder of the year. (Paul, 1979)

DECREASED FAT STORES: During the farming season virtually all women were producing considerable amounts of milk at the expense of sub-cutaneous fat stores. (Paul, 1979)

CALORIE INTAKE AND ANTHROPOMETRY: A correlation of $r = 0.57$ between body weight during lactation and dietary energy intake was demonstrated among rural Gambian women. This indicates use of energy to replenish stores. A similar relationship was observed with triceps skinfold ($r = 0.49$). (Paul, 1979)

QUANTITY OF BREAST MILK AND SKINFOLD: In women who were actively replenishing subcutaneous fat stores, milk output was low. A significant negative correlation ($r = -0.69$) was observed between breast milk output at three months and skinfold thickness in the second six weeks of lactation. (Paul, 1979)

1.4 NUTRITION AND HEALTH STATUS, INFANTS, 0-6 MONTHS

NATIONAL

INFANT MORTALITY RATE: The infant mortality rate was 217 deaths per 1000 live births. (Tembo, 1979)

RURAL

BIRTH WEIGHT: Average birth weight in Keneba was 2800 grams. (Thomson, 1966)

BIRTH WEIGHT: Birth weights averaged 3.0 kilograms during the period December to June (the dry season) and 2.72 kilograms during the period from July to November (the rainy season). (Whitehead, 1978)

BIRTH WEIGHT AND MATERNAL WEIGHT GAIN: A significant correlation ($r = 0.50$) was established between maternal energy intake in the last trimester of pregnancy and weight of the baby at birth. (Paul, 1979)

WEIGHT FOR AGE: At three months of age, the mean weight for age of Keneba children was 96% of the WHO standard. (Rowland, 1979)

WEIGHT GAIN: Weight gain was rapid in the first 6 months, but then fell off. The average weight of girl babies was 6 lbs., 9 oz. at birth; 13 lbs. at 3 months; 16 lbs. at 6 months; 17 lbs., 1 oz. at 9 months; and 19 lbs. at one year. Average weights for boys were 7 lbs., 5 oz. at birth; 15 lbs., 1 oz. at 3 months; 17 lbs., 6 oz. at 6 months; 19 lbs. at 9 months; and 20 lbs., 3 oz. at one year. (Marsden, 1965)

HEALTH AND THE RAINY SEASON: Most disease in Keneba, especially insect-borne disease, is worse in the rainy season. Infants are protected by passive immunity for a few months; after that they suffer malaria in the rainy season to age 3 or 4 years. (Thompson, 1967)

1.5 NUTRITION AND HEALTH STATUS, INFANTS, 6-24 MONTHS

NATIONAL

CHILD MORTALITY: About 50% of children die before reaching the age of five years. This is primarily due to communicable disease, malaria, diarrhea, malnutrition, and respiratory disease. (Tembo, 1979)

SEVERE MALNUTRITION AND BREAST FEEDING: Among children admitted to the hospital with severe malnutrition, 87% were still being breast fed in the 0 to six month range, and 90% still were breast feeding in the 7 to 12 month range. Output of breast milk by four mothers was measured and found to be very low: 185 to 425 ml in 24 hours. (Spalding, 1977)

SEVERE MALNUTRITION AND ILLNESS: Among 168 children admitted to the hospital for severe malnutrition, 38 had a history of measles and 5 of whooping cough occurring during the three months before admission. (Spalding, 1977)

SEVERE MALNUTRITION AND SEASON: Among 168 children admitted to the hospital with severe malnutrition, fewer children were admitted between February and May than at other times of the year. (Spalding, 1977)

SEVERE MALNUTRITION: Among 168 severely malnourished children admitted to the hospital, the predominant form of malnutrition was marasmus. Only one third of the children admitted had edema. (Spalding, 1977)

EDEMA: Among children admitted to the acute malnutrition ward, between 20% and 37% had edema on admission. Findings varied by age group, with the youngest age groups having the lowest incidence of edema. (Spalding, 1977)

RURAL

MORTALITY: In a two-year longitudinal study of 215 children under five years of age, 35 children died. Nine died during the neonatal period, and three in the remainder of the first six months; 15 died between 6 and 23 months, and 8 between 2 and 4 years. 77% of the deaths occurred in the rainy period or the early weeks of the dry season. (McGregor, 1970)

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

MORTALITY: Only 16% of the 93 mothers in the study group were primigravidae; of the rest, only 28% had never lost a child, 26% had lost one child, and 30% had lost more than one. (Marsden, 1964)

WEIGHT GAIN: Average weight gain in Keneba over the age range 0.6 to 3 years was 98 grams per month; this is 45% of the expected growth rate for children of that age, which is about 220 grams per month. (Cole, 1977)

WEIGHT GAIN: Average weight gain was 9 pounds in the first six months, 2.5 pounds in the second six months, and 2 pounds in the third six months. (Marsden, 1965)

WEIGHT FOR AGE: The mean percentage of standard weight for age for Keneba children falls to 80% of the WHO standard at 10 months, and to 75% at two years. (Rowland, 1979)

WEIGHT FOR AGE: At three months of age, infants in Keneba averaged 97% of the standard weight for age; at 12 months the mean weight had fallen to 74% of standard. (Rowland, 1978)

WEIGHT FOR AGE: At one year of age, the average child in Keneba had achieved only 75% of the standard weight for age. (Rowland, 1977)

WEIGHT GAIN AND DISEASE: Weight gain had a negative correlation with gastroenteritis and malaria when investigated by multiple regression analysis. (Whitehead, 1977)

WEIGHT GAIN AND GASTROENTERITIS: If gastroenteritis could have been eliminated, weight gain would have increased by 101 grams per month, giving a corrected weight gain of 199 grams per month. (Cole, 1977)

GASTROENTERITIS, MALARIA, AND GROWTH: Both gastroenteritis and malaria had a highly significant effect on rate of growth ($P<0.001$ and $P<0.01$ respectively). The net effect of malaria on growth was only 1/13 that of gastroenteritis, due to its lower prevalence. The average child had gastroenteritis 13.1% of the time, and malaria only 1.0% of the time. This was due to the strongly seasonal nature of malaria prevalence and immediate and effective treatment with anti-malarials. (Cole, 1977)

GASTROENTERITIS, MALARIA, AND WEIGHT: Multiple regression analysis showed that gastroenteritis and malaria had the greatest impact on growth. Children suffering from either of these diseases for an entire month would grow nearly 800 grams less than healthy children. In practice, this would mean sick children losing about 600 grams during the month and healthy children gaining 200 grams. (Cole, 1977)

WEIGHT FALTERING AND ILLNESS: Weight faltering (failure to gain more than half a pound over a period of 3 months or more) was associated most frequently with diarrhea and malaria. (Marsden, 1964)

WEIGHT FALTERING AND ILLNESS: In 121 cases of weight faltering (failure to gain more than 1/2 pound during a three month period), 87 cases were

associated with the presence of clinical illness. Diarrhea was the most common illness associated with faltering. (Marsden, 1965)

DOUBLING BIRTH WEIGHT: Of 86 babies for whom birth weight was available, 29 doubled their birth weight by the third month, 33 by the fourth month, and 2 by the second month. It took one baby 11 months, and one baby had not doubled its birth weight by the end of the study (18 months). The remainder was not specified. (Marsden, 1965)

SEASON AND UNDERWEIGHT: During the rainy season, as many as 75% of children 13 to 18 months of age may be underweight (below 80% of the reference standard weight for age) and nearly 40% of children may be marasmic (below 60% of the reference standard weight for age). This means that the high prevalence of severe malnutrition is not restricted to disaster situations, but may be a "normal" recurring event. (Rowland, 1979)

WEIGHT GAIN AND SEASON: In general, weight gains were smaller in the rainy season among children under 5 years. In children 6 to 23 months old, average weight change was sometimes even negative. For example, in the period 15 August to 14 November, 1963, 0.05 kg was lost on the average among 54 children age 6 to 23 months. During the same period, children between 2 and 5 years gained 1.1 kg on the average. (McGregor, 1970)

CAUSES OF WEIGHT LOSS: Young children in Keneba tend to lose weight during the rainy season, because adults are so busy with arduous agricultural work that maternal care is least during this season; food provided is inadequate and unattractive; and the impact of disease is greatest during this season. (McGregor, 1970)

HEIGHT: Rate of height increase deteriorated progressively for two years and then showed little sign of improvement. At two years of age, average height for age was about 90% of standard. (Rowland, 1977)

HEIGHT AND GASTROENTERITIS: Height gain had a significant negative correlation with gastroenteritis when investigated by multiple regression analysis. (Whitehead, 1977)

GROWTH: Although overall growth in weight and height was considerably below the standard values, multiple regression analysis indicated that after the age of one year (except in July and August), normal and sometimes slow catchup growth was possible, in the absence of gastroenteritis. (Rowland, 1979)

GROWTH AND ENERGY INTAKE: By one year of age children had a mean total energy intake of 96 kcal/kg of <u>actual</u> body weight, which is almost adequate to support continued growth at the weight and height levels to which they have fallen but does not permit catchup to achieve expected standard body weight or height for age. (Rowland, 1979)

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

GROWTH AND DISEASE: There was a significant negative relationship between gastroenteritis and both weight gain ($p < 0.001$) and height gain ($p < .01$). Malaria correlated negatively only with weight gain ($p < 0.001$). (Rowland, 1977)

IMPACT OF DIARRHEA ON GROWTH: Of all categories of disease, diarrhea had the greatest negative impact on growth of children from .6 to 3 years of age. (Rowland, 1979)

ILLNESS AND GROWTH: Giardiasis and non-specific disorders had a significant effect on growth of children in Keneba ($p<0.05$). (Cole, 1977)

GROWTH, ILLNESS, AND FOOD AVAILABILITY: In Keneba, there was a marked seasonal difference in growth rate as measured by weight gain each month. Part of the seasonal difference in weight gain was caused by variation in food availability. When seasonal differences in food availability were allowed for, the influence of gastroenteritis on growth was reduced. (Cole, 1977)

DIARRHEA: Diarrhea was rare before 8 months of age. (Marsden, 1964)

DIARRHEA: The seasonal peak in diarrheal illness occurs at a time when nutritional status is highest, and prevalence rates are lowest when nutritional status is lowest. Weanling diarrhea is an infectious disease entity which may be expressed in its severest form in a malnourished subject but is, in itself, a major cause of growth impairment. (Rowland, 1979)

DIARRHEA AND AGE: At three months of age the average child was ill with diarrhea 7% of the time, at 12 months about 22% of the time, and at 18 months about 12% of the time. (Rowland, 1978)

DIARRHEA: Diarrheal disease reached its highest prevalence and has its greatest impact on the health and growth of Keneba children between the ages of six and eighteen months. (Rowland, 1979)

GASTROENTERITIS: During July and August the prevalence of gastroenteritis peaked at 20.4%. Average weight loss during this same period was 90 grams per month. (Rowland, 1977)

DIARRHEA AND SEASON: Peak of diarrheal disease prevalence coincides with periods of maximum rainfall. (Rowland, 1979)

SEASONAL PREVALENCE OF DISEASE: Prevalence of disease was greater in the rainy season. (McGregor, 1970)

MALARIA: A study of 215 children under five years of age found one third of all children clinically affected by malaria during the peak months of the rainy season (September through October). (McGregor, 1970)

MORBIDITY: 7 out of 95 babies enjoyed good health in that they had no serious illness; the majority of babies had one serious illness in the first 18 months of life, and were regarded as having fair health; 9 babies suffered poor health, having an average of four serious illnesses each. (Marsden, 1964)

MORBIDITY: Among 95 babies followed for the first 18 months of life, 73% had conjunctivitis, 76% had upper respiratory infections, 59% had lower respiratory infections, 55% had diarrhea, 51% had skin sores, 42% had cracks behind ears, 50% had bites, 46% had malaria requiring treatment, 34% had abcesses and boils, 26% had otitis media, 26% had prickly heat, 20% had thrush, 22% had measles, 14% had overt malnutrition, 16% had fungus infections of the skin, 10% had scabies, and 11% had whooping cough. (Marsden, 1964)

URBAN

MORTALITY: Gastroenteritis and malnutrition accounted for 21.3% of all deaths in children under five years of age in Banjul. (AED, 1982)

2. DIETARY BELIEFS

2.1 DIETARY BELIEFS, GENERAL

2.2 DIETARY BELIEFS ABOUT PREGNANCY

NATIONAL

FOOD TABOOS: Foods taboo during pregnancy include eggs, pigeon, milk, cream, raw and roasted groundnuts, oysters, peppers, bread, bananas, baobob, honey, bitter tomato, hen, and palm kernels. It is believed that eating these foods results in a deformed fetus, difficult delivery, or, in the case of bananas, the baby being lazy in later life. (Ministry of Health, n.d.)

RURAL

LACTATION DURING PREGNANCY: Lactation during pregnancy was considered harmful to the fetus. The breast milk was thought likely to be contaminated and to cause the suckling child to develop diarrhea or other debilitating disease. (Thompson, 1967)

FRUIT OF THE TALLOW TREE: The fruit of the tallow tree, Detarium senegalense, is said to be sucked by pregnant women. (Other people also eat them.) They are available from November to February. (McCrae, 1979)

2.3 DIETARY BELIEFS ABOUT LACTATION

NATIONAL

BITTER TOMATO: If a mother eats bitter tomato during lactation it is believed that the child will be stubborn or will have scaly or pimply skin. (Ministry of Health, Labour, and Social Welfare, n.d.)

PALM OIL: Eating palm oil in the first two weeks after delivery will cause red coloration of the breast milk. (Ministry of Health, Labour, and Social Welfare, n.d.)

RURAL

REST AFTER DELIVERY: After delivery, the mother has a short rest and remains in the hut until the naming ceremony of the eighth day. Often, however, she is busy with household tasks. (Marsden, 1964)

LACTATION DURING PREGNANCY: Lactation during pregnancy was considered harmful to the fetus. The breast milk was thought likely to be contaminated and to cause the suckling child to develop diarrhea or other debilitating disease. (Thompson, 1967)

DURATION OF LACTATION: Mothers should continue to breast feed for at least two years because the child 'needs the breast'. (Thompson, 1967)

INTERCOURSE FORBIDDEN: A mother should not have sexual intercourse while the child is on the breast because the child will develop diarrhea and

2.3 DIETARY BELIEFS ABOUT LACTATION (Cont.)

malnutrition if it sucks such a breast. In practice, this is not adhered to, for mothers do become pregnant while still nursing. Once they realize they are pregnant, they immediately fully wean the child, sometimes very abruptly. (Marsden, 1964)

COITUS: Coitus during lactation was taboo. (Thompson, 1967)

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

2.5 DIETARY BELIEFS ABOUT WEANING

2.6 DIETARY BELIEFS ABOUT ILLNESS AND CURE

NATIONAL

CAUSES OF DIARRHEA: When asked about the causes of diarrhea, mothers mentioned dirt, especially dirty food, water and dirt in the environment in which the baby lives; inadequate care of the child in general; careless preparation of the baby's food; and breast milk and flies carrying dirt. Spiritual and magical reasons were also given. Most women sought treatment at the government health centers or local healers.

RURAL

FEEDING DURING DIARRHEA: When asked about feeding a baby with diarrhea, all respondents felt the mother should continue to breast feed the child; most felt the mother should continue to feed other food as well. Most said the child should be forced to eat if he refused, but some thought he should be left alone. The types of food which the baby should be fed included paps, cow's milk or Cerelac, tea and bread. Less frequently mentioned were salt and sugar in water, potatoes and Ovaltine. Foods which should not be given to a baby with diarrhea included rice, bananas, oranges and sour milk. (AED, 1982)

POWDERED MILK: In one Gambian village dried milk powder provided by an international agency became known as "the stuff that causes diarrhea." (McGregor, 1970)

"DRYNESS": "Dryness" was a concept used by rural people to describe general wasting which resulted from malnutrition and which had symptoms similar to diarrheal dehydration.

3. DIETARY PRACTICES

3.1 DIETARY PRACTICES, GENERAL

NATIONAL

STAPLE FOOD: The staple food is rice. At present, large amounts have to be imported. The country has plans to make itself self-sufficient in rice. (Commonwealth Institute, 1977)

RICE: Rice is the most common cereal used in Gambia. (Roberts, 1971)

OIL: Palm oil is the most commonly used oil, even more than peanut oil. (Roberts, 1971)

FOOD SUPPLY LOSSES: The Gambia suffered losses of both livestock and crops during the Sahelian drought of the early 1970s, but losses were not as drastic as in other countries of the region. (Commonwealth Institute, 1977)

MEAT SUPPLY: In 1974, there were about 292,000 head of cattle. Cattle are traditionally regarded as a sign of wealth. As meat prices have risen, owners have been more willing to sell their animals. Also, in 1974, there were an estimated 92,000 goats, 90,000 sheep, 8,000 pigs, and 260,000 poultry. (Commonwealth Institute, 1977)

FOOD CASH CROPS: The major cash crop of Gambia is groundnuts. Estimated value for the 1970-71 season was £4,794,835; other cash commodities include palm kernels, smoked fish, and oysters. (Roberts, 1971)

FOOD PRODUCTION: The emphasis on groundnut cultivation by men has contributed to the decline in millet cultivation, as the two crops are competitive for land and labor. The decline in millet production has been accompanied by an increase in the cultivation of rice, primarily by women. The emphasis on groundnut cultivation has diverted production from other food crops so the area was not self sufficient in food. Food must be imported, especially rice. (AED, 1982)

CALORIES AND PROTEIN: In 1976, there was 2,281 calories and 57 grams of protein available per capita. The country ranked 80th in calorie supply and 90th in protein supply among the nations of the world. (Sivard, 1979)

RURAL

INSUFFICIENT FOOD: About 84% of the population lives in rural areas, where the main occupation is agriculture. However, unfavorable climate and insufficiently developed agricultural methods prevent the production of enough food. (Tembo, 1979)

HARVEST SEASON: In September, maize is harvested and used with leaf sauces. In October, the early millet and rice harvest occurs. In November, the main harvest takes place. (McCrae, 1979)

RAINY SEASON: Keneba has a well-defined, short rainy season (June to October). Agricultural activities are concentrated in the rainy season when, during the daytime, all the able-bodied men and women are scattered on their farms. During this season there is a relative food shortage and a concentration of disease, especially malaria and gastroenteritis. (Thompson, 1967)

SEASON AND FOOD SUPPLY: Food is plentiful in November and December. July and August are the hungry season. (McCrae, 1979)

FOOD SUPPLY AND SEASON: The staple diet is composed of cereals, millet, and rice, supplemented with sauces of groundnuts, dried fish, green leaves, or other bush products. As the year advances, grain stocks decrease and by August most families are dependent on imported supplies of rice, and green leaves have replaced groundnuts in sauces. (Thompson, 1967)

FOOD INTAKE AND FARMING SEASONS: Among rural women, intake was lowest when work demands were greatest. (Paul, 1979)

DIET AND SEASON: 90% of dietary energy is supplied by cereals and groundnuts. In August groundnuts supplied 13% of energy; in November, 35%. This increase in groundnut consumption accounted for most of the seasonal variation in energy intake. (Paul, 1979)

MEALS IN THE RAINY SEASON: In the rainy season, June to October, there is a shortage of both food and time to prepare food. Meals tend to be monotonous and unappetizing. (Thompson, 1967)

DIET IN THE RAINY SEASON: In the rainy season, diet varies. In June, shortages often begin, and sauces are made with leafy vegetables as supplies of groundnuts are used up. In July, millet is the staple; in August, cassava and millet are used; and in September, maize is harvested and eaten. (McCrae, 1979)

DIET IN THE DRY SEASON: From January to June, the staple food is rice, which is eaten with peanut sauce. During this season, money is available to buy oil, meat and fish. (McCrae, 1979)

MILLET: Millet was the grain of choice during the rainy season. It was considered the most filling and sustaining food when physical activity was at its maximum. Millet could be mixed with bran when cereals were short, and eaten with salt and water when there were few ingredients for sauces. (Thompson, 1967)

STAPLES: Dietary staples include rice, millet, sorghum, and maize. (Whitehead, 1979)

STAPLES: A type of millet called sanyo is eaten throughout the year. It is eaten by especially in July, August and September by the poor because they cannot afford to buy rice when home-grown stocks run out. Rice is the preferred staple. Sorghum and maize are also eaten. (McCrae, 1979)

PROTEIN SOURCE: The major source of protein is groundnuts, which is also the major cash crop. (Whitehead, 1979)

FISH: Fish is eaten more frequently than meat. It is used fresh on the coast. Supplies of fresh fish inland are limited; fish inland is usually dried, sundried, or smoked. Shellfish, collected seasonally, include oysters, crabs, and snails. (McCrae, 1979)

MEAT: Meat is in great demand, but it is usually scarce and expensive. Beef is most common, but sheep, goat, chicken, bushfowl, and antelope are also used. Pork is only eaten by non-Moslems, especially Manjagos. Children under two years rarely eat meat. (McCrae, 1979)

MEAT: In Keneba, there are five herds of cows (about 250 head), and all compounds possess chickens, goats or sheep. The goats and sheep are slaughtered at times of celebrations, such as weddings, and at major religious feasts. (Tully, 1978)

MILK: Milk is available in areas where cows are kept. It is usually in short supply. It is left to sour and added to sauces. (McCrae, 1979)

FRUIT: Many fruits (including mango, orange, tamarind, and soursop) are eaten in small amounts when available, generally at the end of the dry season or the start of the rains. (McCrae, 1979)

VEGETABLES: A wide variety of vegetables is eaten. Leaf vegetables are gathered in the bush in the rainy season. Some vegetables, such as tomato, onion, and okra, are planted in gardens near the house. Groundnuts are very important as a cash crop and as a sauce for staples. Mushrooms are used seasonally. (McCrae, 1979)

OIL: The most common oil is groundnut oil; also used are palm oil and ghee (confined to the cattle-owning areas, especially the Fula tribe). Coastal people (the Wolof and Aku) eat more oil than inland people. Oil is used for festive occasions. Oil is more frequently used in December and January when people have more money from the sale of cash crops. (McCrae, 1979)

SEASONINGS: Seasonings include chili pepper, salt, white pepper, bay leaf, locust bean seeds, baobob leaf, sour leaf, and tomato paste. (McCrae, 1979)

FOOD PREPARATION: Cooking was done in a small cooking house in the compound or in the open air. (Marsden, 1964)

KITCHEN FACILITIES: Rural Mangingo kitchens are generally situated separately from other buildings. Mud walls may partially or fully enclose the kitchen. Usually there is a simple wood fire set on stones and a water storage pot. Much food preparation takes place outdoors. (McCrae, 1979)

3.1 DIETARY PRACTICES, GENERAL (Cont.)

CONTAMINATION OF UTENSILS: Metal bowls scrubbed with soap were found to contain up to 10^5-10^6 viable bacteria per bowl. (Barrell, 1980)

FOOD PREPARATION (STAPLES): Dry grain is winnowed, then put in a mortar with a little water and pounded. The result is washed carefully. Wet grain is put aside for several hours to ferment. The grain is then pounded again to meal or flour. When compared to machine-milled grains, 100 grams of this flour contains more thiamine (.46 mg. in hand pounded and .27 mg. in machine-milled), more riboflavin (.13 mg. and .11 mg. respectively), and more nicotinic acid (3.7 and 3.1 mg. respectively). (McCrae, 1979)

STAPLE FOOD PREPARATION: Staples are steamed or boiled after pounding or dehusking and washing. Variations are available so that products can be thin or thick, of one grain or a mixture. (McCrae, 1979)

FOOD PREPARATION (STAPLES): Sato and mono both refer to preparation of porridge from various grains or cassava. Mono is thinner and may be served with milk, honey, sugar, sour milk, or groundnuts. Monos may be eaten at breakfast by adults, or as a light meal for pregnant women or children. (McCrae, 1979)

STAPLE FOOD PREPARATION: Fajiringo is the term for boiling rice. Grains are washed and steamed before boiling. The rice is served with oil poured over it, if available. Rice may also be served with various sauces or sour milk. (McCrae, 1979)

FOOD PREPARATION (STAPLES): To prepare "sanyo," grain is pounded and then steamed with water added during the steaming process. To prepare "futu," grain is pounded to a fine flour which is stirred with water to make little balls. The balls are steamed and pounded and steamed again. Flavorings may be added at the end. (McCrae, 1979)

FOOD PREPARATION (FISH): Fish is used fresh or dried. Dried fish is used as a flavoring for sauces. (McCrae, 1979)

FOOD PREPARATION (MEAT): Meat is often dried. Fresh meat is usually fried before boiling. Salt, chili pepper, and onions are usually added. Meat is generally served with boiled or steamed rice or millet. Liver is generally stewed with vegetables. (McCrae, 1979)

FOOD PREPARATION (LEAVES): To prepare "jambo," leaves are boiled, the water is discarded, and the leaves are boiled again to be served as a sauce with additions such as salt, peanuts, onion, tomato, okra, or bitter tomato. (McCrae, 1979)

FOOD PREPARATION (SAUCE): Durango is a sauce served over a cereal staple. Groundnuts are roasted, peeled and pounded, and boiling water is added. The sauce is seasoned with salt and chili pepper. If available, some meat, fish, vegetables, or extra oil are added. (McCrae, 1979)

FOOD PREPARATION (OIL): Palm oil is made at home from the orange fruit of the palm. Palm kernels are usually sold for commercial extraction. (McCrae, 1979)

FOOD PREPARATION (WATER): The water used in cooking may be highly contaminated. During the west season of September 1977, levels of 10^5 total organizsms/ml and 10^2 E Coli/ml were common. (Rowland, 1978)

LEFTOVERS: In times of plenty, leftovers were given to animals; in times of great scarcity, leftovers were dried and recooked. (Thompson, 1967)

WATER CONTAMINATION: Village well water in Keneba was heavily contaminated; counts of fecal coliforms often exceeded 10^4/100ml. (Barrell, 1980)

FOOD PRODUCTION AND TIME DEMANDS ON WOMEN: Women are the main work force in the village. As well as cooking, they are also responsible for growing and harvesting the staple food and cash crops. (Whitehead, 1979)

WOMEN AND FOOD PRODUCTION: Women in Keneba hoe their farms in May and June, plant in June or July, and harvest crops in October. From August to early October, women transplant rice to tidal swamps which are 6 to 8 miles distant on the River Gambia. Conditions are unpleasant, the work arduous. The mud is deep, and there is little elevated land where women can rest or leave their infants. It is too far for young children to walk, and tsetse flies and leeches are troublesome at certain times. (Thompson, 1967)

WORKLOADS: Both parents are active farmers. Women grow rice and help men cultivate upland cereals. Fields may be as far as 8 miles away. The mother may be exhausted when she returns home to prepare the evening meal. (McGregor, 1970)

GATHERING WILD FOOD: Women clean and gather edible bush products such as leaves and fruits and collect snails and tiny fish from creeks. (Thompson, 1967)

ENERGY CONTENT OF FOODS: Analysis of the energy content of common Gambian foods showed relatively low energy concentration due to low fat and high water content. The addition of groundnuts to staple cereals increases the protein content slightly, but usually not the energy content, since the sauce contains even more water than the staple. (McCrae, 1979)

3.2 DIETARY PRACTICES, WOMEN

3.2.1 DIETARY PRACTICES, WOMEN, DURING PREGNANCY

RURAL

INADEQUATE VITAMINS: The diets of pregnant women were deficient in riboflavin, vitamin A, vitamin C, and folate. (Israel, 1980)

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

CALORIE INTAKE: The diets of pregnant mothers provided only 1200 calories in August, at the height of the rainy season. In the dry season, intake was as high as 1600 calories per day. (Rowland, 1978)

CALORIE INTAKE: 1325 kcal/day was the average intake of rural pregnant women in the month of August. (Paul, 1979)

WORK DURING PREGNANCY: Women continue to farm throughout pregnancy, but not for the eight days following birth of a baby which survives. (Thompson, 1967)

3.2.2 DIETARY PRACTICES, WOMEN, DURING LACTATION

RURAL

STIMULATING LACTATION: To stimulate lactation, the leaves, Sora (Leptadenia Lancifolia), are eaten alone ot added to beans or groundnuts. (McCrae, 1979)

INADEQUATE VITAMINS: The diets of lactating women were found to be deficient in riboflavin, vitamin A, vitamin C, and folate. (Israel, 1980)

CALORIE INTAKE: Calorie intake for Gambian mothers averaged about 1800 calories, and was very low (about 1200 calories) in the rainy season, August and September. In fact, the weight of the food eaten by Gambian mothers was little different from that in a parallel study in the U.K. The real difference was in the nutrient concentration; Gambian foods contain more water. (Whitehead, 1979)

CALORIE INTAKE: Diets of lactating mothers fell to 1200 calories in August (the rainy season), but were as high as 2000 calories per day in dry months. (Rowland, 1978)

CALORIE INTAKE: 1184 kcal/day was the average intake of calories for lactating women. (Paul, 1979)

3.3 DIETARY PRACTICES, INFANTS, 0-24 MONTHS

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

NATIONAL

BREAST MILK AND SEVERE MALNUTRITION: Among children admitted to the hospital with severe malnutrition, 87% of those age 0 to 6 months were still being breast fed, as were 90% of those age 7 to 12 months. Output of breast milk by four mothers was measured and found to be very low: 185 to 425 ml per 24 hours. (Spalding, 1977)

RURAL

UNIVERSAL BREAST FEEDING: Breast feeding on demand is universal through 18 months of age. (Whitehead, 1978)

UNIVERSAL BREAST FEEDING: Breast feeding is universal to 18 months. (McCrae, 1970)

FIRST BREAST FEED: Infants are fed as soon as possible after birth, and on demand thereafter. (Thompson, 1967)

FIRST FEEDS: 63% of the Sukuta mothers bought a cheap brand of tinned evaporated milk to feed their babies during the first few days before milk came into the breast. This milk is called "white man's milk" as it is used by the majority of Europeans in the area. 14% used fresh cow's milk, and an equal number followed the midwife's suggestion and gave the baby only boiled water. In a few instances, goat's milk, honey, or sugar in water or palm wine were used. (Marsden, 1964)

BREAST MILK: 75% of mothers had breast milk by the third day after delivery, and were able to discontinue prelactal feeds of tinned or fresh milk, boiled water, or sugar water. (Marsden, 1964)

NUMBER OF FEEDS: Gambian mothers breast feed their children at least 14 times each day. (Whitehead, 1979)

NUMBER OF BREAST FEEDS: At 18 months the average child in Keneba was fed 5.5 times during daylight hours, with a similar frequency during the night. (Whitehead, 1978)

NUMBER OF BREAST FEEDS: The number of breast feeds varies from 4 to 10 times during the daylight hours and is continued with equal frequency throughout the night. (Rowland, 1981a)

AMOUNT AND FREQUFNCY OF BREAST FEEDING: The amount of breast milk delivered in 24 hours to an infant of given age was independent of frequency of feeding. (Rowland, 1981a)

WET NURSING: Infants were breast fed as soon as possible after birth and thereafter on demand for the first few months. Wet nursing by women not prohibited by kinship taboos was the rule for the first few days, and subsequently when necessary. (Thompson, 1967)

WET NURSING: It is customary for a fully breast fed baby to accompany the mother to the nearer rice farms, but only in exceptional circumstances is a child of any age taken to the tidal swamps. Whenver necessary, wet nursing is arranged. (Thompson, 1967)

QUANTITY OF BREAST MILK: Breast milk output averaged 790 grams per 24 hours for mothers of children three months old and 610 grams for mothers of children 18 months old. (Rowland, 1978)

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

QUANTITY OF BREAST MILK: It is customary to breast feed infants for the first 18 months but amounts of daytime breast milk (6:30 A.M. to 6:30 P.M.) fell from 350 ml at 3 months to about 280 ml at 18 months. (Rowland, 1978)

BREAST MILK QUANTITY AND CHILD'S AGE: 12-hour breast milk intakes rose during early infancy, but there was a steady downward trend from 3 months onward. (Rowland, 1979)

DAILY INTAKE: In the third month of lactation the average child, who weighed five kilograms, received a mean of 111 kcal/kg. of body weight daily (an intake somewhat lower than the WHO/FAO standard of 120 kcal/kg). (Rowland, 1979)

SEASONAL VARIATION: Breast milk output markedly decreased during the rains of June to November. In May and June the amount of milk per feeding was 66 grams for infants 6 to 12 months old, but in September and October it was 42 grams. (Whitehead, 1978)

SEASONAL CHANGES: Seasonal fall in maternal body weight is rectified very rapidly in association with improved energy intake, but the response in breast milk output is delayed by about 3 months. (Rowland, 1981a)

GROWTH AND QUANTITY OF BREAST MILK: In Keneba village, a three-month-old child received 111 kcal/kg of body weight from breast milk and growth rates were good. At six months, energy from breast milk had dropped to 79 kcal/kg and growth was falling steadily relative to international standards. (Whitehead, 1978)

BREAST MILK QUANTITY AND SEASON: 12-hour breast milk intake among infants from birth to nine months old fell during the rainy season. For example, among infants 6 to 9 months old, 12-hour intake at the end of the dry season averaged about 400 ml and fell to about 250 ml by the end of the rainy season. (Rowland, 1979)

BIRTH WEIGHT AND QUANTITY OF BREAST MILK: Breast milk intake at 2 months was positively correlated with birth weight ($r = 0.52$; $p < 0.01$). This relationship was maintained until at least 6 months of age. (Rowland, 1981a)

QUANTITY OF BREAST MILK: In Keneba village the amount of milk per feed was 54 ml between one and three months and 55 ml at 18 months. The usual pattern of infant feeding is gradual reduction of frequency of feeds and increase in quantity consumed per feed. (Whitehead, 1978)

QUANTITY OF BREAST MILK AND PARITY: Only with the first-born child did breast milk intake continue to rise after three months to meet the increasing needs of the growing child. (Whitehead, 1978)

QUANTITY OF MILK AND CHILD CARE: Mothers of children 3 to 13 months old were divided into two groups: those who took the infant to the field and those who left them with child-minders. No difference was found in the

ability of the two groups to maintain lactation over the farming season. In both groups post-rain volumes were about 80% of pre-rain volumes. (Rowland, 1979)

NUTRIENT CONTENT OF BREAST MILK: Fat, protein, and lactose content of breast milk all decreased during the rainy season. For example, for 3 to 4 month old children fat content fell from 3.5 grams per 100 ml in the dry season to 3.1 grams per 100 ml in the rainy season. (Rowland, 1981a)

ENERGY CONTENT OF BREAST MILK: The energy content of Keneba mothers' milk was 69 kcal per 100 ml. This figure did not differ substantially from that of mothers in the United Kingdon. (Rowland, 1979)

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

RURAL

WATER: Water is given to young children almost from birth. Counts of 1 of fecal coliforms per 100 ml. were common in the rainy season in the wells of Keneba. Within one to five days of the first rainfall, contamination had increased 10 to 100-fold with counts of 5×10^5 per 100 ml recorded. (Rowland, 1979)

PROPRIETARY MILKS: Occasionally, proprietary brands of dried or evaporated milk were used for infant feeding. One or two mothers used Cow and Gate and Farex because Europeans used them. (Marsden, 1964)

FRESH MILK: Some families gave babies fresh cow's milk. This milk was rarely boiled. (Marsden, 1964)

ARTIFICIAL FEEDS: Usually, if a mother's milk fails, she is expected to feed artificially. Wet nursing is seen occasionally. (Marsden, 1964)

BOTTLES: Western-type infant feeding bottles and commercial infant food products were virtually unknown in Keneba. (Rowland, 1979)

INTRODUCING SUPPLEMENTS AND BREAST FEEDING: Although there was no significant relationship between milk output at 3 months and the age at which weaning foods were introduced, mothers producing large volumes of breast milk tended to introduce supplements later. There was no evidence that local traditional weaning practices impaired mothers' breast feeding capacities. (Rowland, 1979)

INTRODUCTION OF SOLIDS: The traditional practice is to introduce local supplementary weaning foods, usually between the ages of 3 and 5 months. (Rowland, 1979)

FIRST FOODS: Almost without exception, mothers in Sukuta weaned their babies first on millet pap, then to cooked rice. Later they added a little peanut or fish sauce, with or without peppers. Oranges were often given to small babies, and later, meat, vegetables, and other fruits were added. (Marsden, 1964)

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

FIRST FOODS: The first foods to be introduced are watery cereal gruels, the most common being made from millet or rice. (Rowland, 1978)

FIRST FOODS: The earliest weaning foods are thin, watery cereal-based gruels or pap which compare unfavorably in energy content with breast milk, because of the high water content of these foods. (Rowland, 1979)

MONO: "Mono" is generally the first food offered to a child after breast milk. Mono is a thin gruel made of any grain which is first pounded to a powder. The powder is mixed with cold water, then added to hot water, stirring constantly. (McCrae, 1979)

MILLET: Sauce made millet porridge more palatable, and the lack of appetite sometimes observed in young children may have been aggravated by the dryness of steamed millet, as they more readily ate rice and swallowed paps. (Thompson, 1967)

CASSAVA: Children may be weaned onto cassava porridge or may eat dry cassava between meals, particularly just before or during the rainy season when cereals are in short supply. Cassava contains inadequate protein for the rapidly growing child. (McCrae, 1979)

SUPPLEMENTARY FOODS: Children were first weaned on pap or on water in which rice was cooked. Fruits, including mangoes or oranges, were given during the few weeks each year when they were available. At age 7 or 8 months children ate boiled rice, then steamed millet. By 11 months children received groundnuts and sauces. By the second year they ate a small share of any food except the most peppery relishes. (Thompson, 1967)

DRINKING: Infants usually sat on their mothers' laps while they were eating, and suckled as they wished. When mother was in the fields, the infant depended on someone giving him water to drink. Often a child who appeared to have had enough to eat began eating vigorously again after being given a drink. (Thompson, 1967)

SUPPLEMENTATION AT 5 MONTHS: By 5 months of age 80% of children are receiving other foods in addition to breast milk. (Whitehead, 1979)

BEGINNING WEANING: 70% of mothers started to wean their babies between 5 and 9 months, the mean time being 7 months. Weaning was rare before 5 months. (Marsden, 1964)

ABRUPT WEANING: If mothers realized they were pregnant, they immediately and fully weaned the child, often very abruptly. (Marsden, 1964)

ABRUPT WEANING: Young children were gradually trained to accept an adult diet, but final weaning from the breast was abrupt, often being enforced by handing the child over to a relative. (McGregor, 1970)

METHOD OF WEANING: 30 out of 44 children were sent away when their mothers stopped lactating. (Thompson, 1967)

CHILD SENT AWAY FOR WEANING: 30 out of 44 children were sent away when their mothers stopped lactating. Some returned when they had "forgotten the breast," while children kept at home sometimes went away later. Of 30 children separated from their mothers when breast feeding ceased, 6 went to another village, one stayed behind when her mother went elsewhere, and 23 went to live in other compounds in Keneba. (Thompson, 1967)

STAYING WITH MOTHER DURING WEANING: If a child stayed with the mother during weaning, this was usually done because the mother wished to conceal a new pregnancy, or because there was no suitable relative to send the child to. Other mothers said that if the child were older, it would simply lose interest in the breast, and therefore didn't need to be sent away. (Thompson, 1967)

WEANING METHODS: If a child stayed home while being weaned, breast feeding was discouraged by coating nipples with mud or pepper. Some children were treated with charms, rinses or medicines from soothsayers or witchdoctors. (Thompson, 1967)

DISCOURAGING BREAST FEEDING: If a child stayed with the mother during weaning, various methods were used to discourage breast feeding. Some mothers coated their nipples with mud or pepper. Some used charms from local witch doctors. The mothers' attitudes changed from extreme indulgence to ignoring or making fun of the children, or being angry and aggressive. (Thompson, 1967)

WEANING AND WEIGHT GAIN: Weaning did not consistently cause children to lose weight. For example, among 39 children weaned and then weighed every two weeks, 13 contiued to gain, 3 lost weight, and the remainder fluctuated. (Thompson, 1967)

WEANING AND SEASON: Women stopped lactating earlier during the farming or rainy season: they took 18 to 20 month old children off the breast, although the cultural ideal was to breast feed to 2 years of age. (Thompson, 1967)

SEASON OF WEANING AND WEIGHT: 48% of children taken off the breast during the dry season continued to gain weight, but only 17% of children weaned in the rainy season continued to gain. (Thompson, 1967)

CHILD FEEDING: When mothers went to the nearer swamps to farm, they usually took small babies with them. Mothers left a pap specially made for infants not yet on a "full diet" for older infants who stayed in the village. (Thompson, 1967)

CARE OF YOUNG CHILDREN: "Nurse maids," usually young girls, were appointed to take care of infants and young children when their mothers were working on their farms. People too old to work served as

supervisors of the nursemaids. Often the nursemaids were too young, 6 or 7 years, to care for the infants as well as their mothers did. (Thompson, 1967)

INADEQUATE QUANTITIES OF FOOD: Children around one year old were often getting the right foods, but in inadequate quantities, and they were not being supervised while they ate. (Tully, 1978)

AGE AND AMOUNTS OF WEANING FOOD CONSUMED: Consumption of traditional weaning foods rose from 50 grams a day at age 3 months to 550 grams a day at 18 months. (Rowland, 1978)

NUTRIENT CONTENT OF TRADITIONAL WEANING FOOD: The average energy content of millet gruel was 34 calories per 100 grams. Calcium content was 2 mg per 100 grams, vitamins A and C were virtually absent, and riboflavin and nicotinic acid concentrations were lower than levels found in breast milk. (Rowland, 1978)

NUTRIENT INTAKE DEFICIT: From three months to 3 years of age there is a marked deficit in nutrient and energy intake. Breast milk intakes compare favorably with most figures recorded elsewhere, but local weaning foods, particularly those used in early infancy, are severely deficient in nutrients and energy. (Rowland, 1979)

ENERGY INTAKE: The average daily intake of a Keneba baby at 6 months of age was 650 calories; the recommended intake is 800 calories. Breast milk supplied 300 calories per day, and the traditional weaning foods, cereal gruels, provided the rest. (Tully, 1978)

PREPARING WEANING FOODS: Preparation of weaning foods is time-consuming. The dampened grain is pounded, and the resulting flour is mixed with cold water. Boiling is perfunctory; if boiling is longer the result is a gelatinous mixture too thick for a young infant. (Rowland, 1978)

WEANING FOOD CONTAMINATION: In the simmering weaning food, counts of up to 10^4 total organisms/gm have been measured. (Rowland, 1978)

SHORTAGE OF WEANING FOODS: The common practice is to cook relatively large amounts of a weaning food. Leftover food may not be eaten until 8 hours after preparation; it is stored at temperatures of 30-40°C. (Rowland, 1978)

EFFECT OF STANDING ON CONTAMINATION: After standing 8 hours, levels of *E. coli* were the same in milks or traditional gruels. Levels of *B. Cerus* and *Staph. aureus* were lower in acidified milk. *Cl. welchii* was low in milks but present in traditional gruels. (Rowland, 1978)

BACTERIA AND STORAGE: Aerobic bacteria (total count per gram) rose from $10^{3.8}$ immediately after preparation to $10^{6.5}$ at 8 hours after preparation. (Rowland, 1978)

CONTAMINATION OF FOOD: The greater the interval between food preparation and its consumption, the greater the numbers of bacteria that were present. (Barrell, 1980)

BACTERIAL CONTAMINATION: Traditional weaning foods as well as imported milks are subject to marked bacterial contamination. Freshly prepared reconstituted milks were bacteriologically similar to freshly prepared local gruel with a total count of 10^2 to 10^3 organisms/ml or, if prepared with unboiled water, 10^4 - 10^7 organisms/ml. (Rowland, 1978)

CONTAMINATION OF WEANING FOODS: During the rainy season, 34.9% of freshly prepared infant food would be condemned as microbiologically unfit for human consumption by international standards. (Whitehead, 1979)

CONTAMINATION OF MILK AND WEANING FOODS: The bacterial contamination of commercially available milk products was no more severe than that occurring in the traditional cooked early weaning foods in Keneba. (Rowland, 1979)

CONTAMINATION OF WEANING FOODS AND ADULT FOODS: Boiled foods such as gruels used to initiate weaning were more frequently and more heavily contaminated with bacteria than the steamed foods more typical of the adult diet. (Rowland, 1979)

CONTAMINATION OF GRUEL AND FLOUR: Supplementary gruels were frequently heavily contaminated with potentially pathogenic micro-organisms. Millet flour itself was contaminated; for example, counts of up to 10^9 total organisms/g and 10^2 E. coli/g were obtained. (Rowland, 1978)

CONTAMINATION OF ACIDIFIED MILK: Housewives in Keneba were asked to prepare commercial milks or traditional millet gruel. Rate of multiplication of bacteria was lower in acidified milk than in millet gruel. (Barrell, 1980)

CONTAMINATION OF UTENSILS: Microbial contamination is not confined to commercial baby milk and feeding bottles but is also found in traditional weaning foods, bowls, and spoons. (Rowland, 1978)

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

RURAL

FEEDING AT 18 MONTHS: By 18 months of age, most babies shared their parents' main meals at midday and in the evening. For breakfast, some babies were given bread, tea, and sometimes milk or sugar, while others had millet or rice pap. (Marsden, 1964)

NUTRITIONAL STATUS AND INTAKE: From the second year of life onwards, the traditional local diet appeared adequate to maintain the level of nutritional status present at one year. (Rowland, 1979)

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

CONTAMINATION OF FEEDING UTENSILS: Children's feeding bowls are vigorously washed with fresh well water, scrubbed with palm leaves until they appear genuinely clean, then left to dry on stands in the sun. In spite of this total counts of 10^5 - 10^6 organisms from an empty bowl were usual. (Rowland, 1978)

MEAT: Children under two years old rarely eat meat. (McCrae, 1979)

3.4 DIETARY PRACTICES, HEALTH AND MEDICINE

RURAL

TREATMENT FOR DIARRHEA: Children between the ages of 4.5 and 24 months treated with glucose electrolyte mixture had a significant reduction is diarrheal prevalence (1.5 episodes) compared to children not receiving the mixture (2.5 episodes). Treatment also reduced the number of days of diarrhea reported (4.5 days among the treated group and 9.9 days among the untreated group), but this had no significant effect on growth in weight or height, as had been expected. (Rowland, 1979)

FOOD IN ILLNESS: Suitably prepared food was seldom provided for ill or anorexic children who often reverted to breast milk alone, at an age when the supply was inadequate to meet their needs. (McGregor, 1970)

STAYING WITH MOTHER: When a young infant was seriously ill, the mother usually took it to the swamp in order to breast feed it during the daytime. When older children became critically ill, the mother was more likely to stay home. But illness often developed with great rapidity, and children sometimes died in the village within a few hours of onset of symptoms and before the mother returned from the fields. (Thompson, 1967)

4. NUTRITION STATUS CORRELATIONS

NATIONAL

MALNUTRITION AND MOTHER'S EDUCATION: Among 168 mothers of severely malnourished children, only 8 mothers had received any schooling at all. (Spalding, 1977)

RURAL

BIRTH WEIGHT AND SEASON: Mean birth weight for the period December to June was 3.0 kg; mean birth weight for July to November was 2.7 kg. (Rowland, 1978)

BIRTH WEIGHT AND PRENATAL DIET: A significant correlation ($r=0.50$) was found between maternal energy intake during the last trimester of pregnancy and weight of the baby at birth. (Paul, 1979)

BREAST FEEDING AND DIARRHEA: The rarity of diarrhea before the age of 8 months was associated with the predominance of breast feeding at this time. (Marsden, 1964)

FAILURE TO THRIVE AND SUPPLEMENTATION: Seven children required supplementation because of failure to thrive associated with inadequate supply of breast milk. Cup and spoon were used, and the mother was taught how to make up feeds and administer them and keep the cup and spoon clean. In spite of this, marked weight loss occured after supplements were started in five of the seven babies. (Marsden, 1964)

GROWTH AND DISEASE: There was a significant negative relationship between gastroenteritis and both weight gain ($p<0.001$) and height gain ($p<0.01$). The only other disease category having a similar relationship was malaria, but in this instance, only with weight gain ($p<0.001$). (Rowland, 1977)

WEIGHT FALTERING, ANEMIA, MALARIA: Weight faltering, failure to gain more than 1/2 pound in a three month period, was associated in 17 cases with infection by Plasmodium falciparum, indicative of malaria, and in 14 cases with persistent anemia, also probably due to malaria and aggravated by iron intake. (Marsden, 1965)

QUANTITY OF BREAST MILK AND BIRTH WEIGHT: Breast milk intake measured at two months was positively correlated with birth weight ($r = 0.52$). The child disadvantaged by low birth weight thus is denied the opportunity to improve upon his position. (Rowland, 1979)

BIRTH WEIGHT AND MILK QUANTITY: Breast milk intake at 2 months was positively correlated with birth weight ($r=0.52$). The child disadvanted by low birth weight is thus denied the opportunity to improve upon his position. (Rowland, 1979)

QUANTITY OF BREAST MILK AND GROWTH: In rural Keneba, the three month old child received 111 kcal/kg of body weight from breast milk and growth rates were good. At six months energy from breast milk had dropped to 79

4. NUTRITION STATUS CORRELATIONS (Cont.)

kcal/kg of body weight and growth was falling steadily relative to international standards. (Whitehead, 1978)

QUANTITY OF BREAST MILK AND AGE OF CHILD: Breast milk intake decreased with age of children in Keneba. The estimated 24 hour milk intake was 790 grams at three months of age, and 610 grams at 18 months. (Whitehead, 1978)

QUANTITY OF MILK, SEASON, AND CHILD CARE: Mothers of children 3 to 13 months old were divided into two groups - those who took the infant to the field and those who left them with child-minders. No difference was found in the ability of the two groups to maintain lactation over the farming season. In both groups post-rain volumes were about 80% of pre-rain volumes. (Rowland, 1979)

NUTRIENT CONTENT OF BREAST MILK AND SEASON: Fat content of breast milk fell from 3.5 grams/100 ml at the start of the rains to 3.1 grams/100 ml at the end of the rains among mothers of infants 3 to 4 months of age. Similar changes in fat content were seen through one year of age. Seasonal variation was also seen for protein, lactose, and energy content. (Rowland, 1979)

LACTATION AND PARITY: Primiparae appeared to be better able than multiparae to maintain milk output up to nine months postpartum. (Rowland, 1978)

CALORIE INTAKE AND ANTHROPOMETRY: A correlation of $r = 0.57$ between body weight during lactation and dietary energy intake was demonstrated among rural Gambian women. This indicates use of energy to replenish stores. A similar relationship was observed with triceps skinfold ($r = 0.49$). (Paul, 1979)

QUANTITY OF BREAST MILK AND SKINFOLD: In women who were actively replenishing subcutaneous fat stores, milk output was low. A significant negative correlation ($r = -0.69$) was observed between breast milk output at three months and skinfold thickness in the second six weeks of lactation. (Paul, 1979)

MOTHERS' WORK AND CHILD FEEDING: 63% of mothers of the babies in the study farmed rice in the swamps. 74% of these mothers took their babies with them to the swamps. A few mothers took the babies during the first year when they were breast fed, but left them at home the next year. Twins in two families meant that the mothers could not farm rice. (Marsden, 1964)

MOTHERS' WORK LOAD AND BABY CARE: The mother in Sukuta farms, does housework, and cooks (for as many as 20 people twice a day). Some mothers allow an elder daughter to have almost sole charge of the baby or employ a nursemaid—a girl often only 9 or 10 years old—to look after the baby in return for her keep. (Marsden, 1964)

CHILD CARE AND MOTHERS' WORK LOAD: Young infants stay with their mothers, but when they are older, they are left with "nursemaids," those too old or too young to work. The care of these children left behind when mothers are farming is often perfunctory. (McGregor, 1970)

5. NUTRITION AND HEALTH POLICIES AND PROGRAMS

5.1 NUTRITION AND HEALTH POLICIES

NATIONAL

NUTRITION POLICY: In 1938, a Nutrition Committee was formed to provide nutrition education. In 1945, the Government appointed a Nutrition Officer. At present, the school feeding program is the major nutrition education effort in the country. (Roberts, 1971)

NUTRITION STRATEGIES: Strategies proposed to improve nutrition status include nutrition education, surveys to determine the magnitude of the nutrition problem, increased food production, iron supplements, supplementary foods for children, day nurseries for children of working mothers, and encouragement and promotion of the present 18 to 24 month duration of breast feeding. (Tembo, 1979)

PRIMARY HEALTH CARE PRIORITIES: His Excellency the President has expressed his Government's commitment to the development and implementation of primary health care. Money has been allocated specifically for the development of primary health care in the current national budget. A number of village health committees have already been established. The activities of these committees include increasing food production though village farms. (Tembo, 1979)

HEALTH PLAN OBJECTIVE: An objective of the primary health plan is to reduce the prevalence and incidence of all forms of malnutrition and promote better nutrition for all individuals, with emphasis on children, mothers, and women of childbearing age. (Tembo, 1979)

PRIMARY HEALTH CARE PLAN OBJECTIVES: The long term objective of the plan is to attain obtain optimum health for all Gambians by the year 2000. The objectives for the period 1980/81 through 1985/86 are to prevent and control endemic communicable diseases such as malaria, diarrhea, schistosomiasis, yellow fever, measles, and other childhood diseases through simple and effective technology. (Tembo, 1979)

HEALTH PLAN DIARRHEA TREATMENT: The primary health care plan proposes the introduction of oral rehydration salts at the village level, MCH clinics, health centers, etc. for early treatment of diarrheal cases among children from birth to five years old. Provision of safe water supply and improvement of environmental hygiene through intensive community health education are alsc proposed. (Tembo, 1979)

PRIMARY HEALTH CARE PLANS: Plans for improving primary health care include extending present health care services to those who have none, and helping communities, through technical support, to achieve a better standard of living. Communities will select suitable persons for training as village health workers. Traditional birth attendants will be encouraged to accept training. After training, these people will be able to promote proper nutrition; adequate, safe water supplies; basic sanitation; maternal and child health care; and child spacing. They will

5.1 NUTRITION AND HEALTH POLICIES (Cont.)

participate in immunization, health education, and curative health care. (Tembo, 1979)

POLICY ON TRAINING TRADITIONAL BIRTH ATTENDANTS: Under the primary health care plan, traditional birth attendants will be encouraged to accept training for 6 to 8 weeks to improve the health aspects of their traditional functions; to improve their knowledge of pregnancy; to refer complicated cases to other institutions; and to involve them in a wider range of MCH activities, including the reporting of births and deaths. (Tembo, 1979)

5.2 NUTRITION AND HEALTH PROGRAMS

NATIONAL

NUTRITION EDUCATION PROGRAMS: The School Feeding and Nutrition Education Programme was the biggest nutrition education project in Gambia in 1971. Nutrition was being taught to school teachers so it could be taught in primary schools. (Roberts, 1971)

NUTRITION EDUCATION: The School of Public Health includes nutrition in its curriculum. At child welfare centers throughout the country, pregnant and lactating women are advised on their diets and on weaning methods for their babies. Health visitors also give advice on weaning to parents. Nutrition education is also a part of the school feeding program. (Roberts, 1971)

MASS MEDIA CAMPAIGN: The Academy for Educational Development is completing a field investigation of feeding and child care during episodes of diarrhea. An implementation plan should be completed by January 31, 1982, and a mass media campaign is to begin on March 1, 1982. (Smith, 1981)

MASS MEDIA EDUCATION POTENTIAL: In 1975, there were an estimated 60,000 radio receivers in Gambia; there was no TV service. (Commonwealth Institute, 1977)

CRS NUTRITION PROGRAM: The Catholic Relief Services (CRS) Food and Nutrition Programme serves 22,000 children and mothers in 60 villages with a monthly or programme of health and nutrition education, growth surveillance and take-home food supplementation. (Tembo, 1979)

CRS NUTRITION PROGRAMS: Catholic Relief Services is expanding its pre-school nutrition program (which includes medicine and public health) to 60 centers serving 18,000 children and 12,000 mothers. CRS also does some food assistance and nutrition surveillance at 75 day care centers. These programs use PL-480 Title II food worth $469,000.00 in FY 1978. (TAICH, 1978)

CRS AND FOOD SUPPLY: Catholic Relief Services implements and evaluates demonstration gardens at pre-school nutrition centers and supports

projects to improve production, storage, and marketing of staple grains. (TAICH, 1978)

FOOD PRODUCTION PROGRAM: The government is promoting small horticultural and citrus projects in the western region, both to provide employment and to serve the demands of the tourist industry, which are met at present by large imports of food products. (Commonwealth Institute, 1977)

INADEQUATE HEALTH COVERAGE: About 84% of the populating living in rural areas is not adequately covered by the present health services. (Tembo, 1979)

HEALTH PERSONNEL: Generally, there is a maldistribution of health personnel, with the concentration in the Royal Victoria Hospital at the expense of the rural areas. (Tembo, 1979)

HEALTH FACILITIES: There is a hospital at Banjul which has a mental health unit and a tuberculosis sanatorium attached, and a small hospital at Bansang. There are health centers and dispensaries throughout the country, and over 20 maternity and child welfare clinics. (Commonwealth Insititute, 1977)

MEDICAL RESOURCES: In 1976, there were 13,122 persons per physician and 814 per hospital bed. The country ranked 106th in physicians available and 111th in hospital beds available per person among the nations of the world. (Sivard, 1979)

HEALTH CARE AID: Health assistance is provided by the World Wide Evangelization Crusade, the Pathfinder Fund, and the Planned Parenthood Federation of America. (TAICH, 1978)

TRADITIONAL BIRTH ATTENDANTS: Traditional birth attendants are present in every village to help with delivery, post-partum recovery of the mother, and neonatal child care. (Tembo, 1979)

RURAL

UNICEF MILK: Dried skimmed milk, provided by UNICEF, was available at the Government clinic; however, mothers did not use it. When questioned about the milk, the mothers reported that the UNICEF milk caused diarrhea. (Marsden, 1964)

MEDICAL RESEARCH COUNCIL KENEBA PROJECT: The goal of the Medical Research Council project in Keneba was to identify the dietary and associated disease factors which predispose young Gambian children to grow faltering, body wasting, and, in extreme cases, marasmus. The ultimate aim was to pinpoint those factors which, if subjected to controlled intervention, would bring about a significant improvement in growth and child health. (Tully, 1978)

KENEBA FOOD SUPPLEMENTATION: The Keneba Food Supplementation project, which began in 1976, provides health services, nutrition education, and

supplementary food to mothers and children within a 7 kilometer radius of Keneba. (Austin, 1978)

FOOD SUPPLEMENTATION FOR BABIES AT KENEBA: All babies in Keneba from 3 to 12 months of age are being offered a food supplement twice daily for five days a week. The aim of the supplement is not to introduce a new food, but to improve the quality of the traditional weaning food already given to babies when they reach three or four months of age. In this pilot program, the supplement is prepared from wheat soya blend, dried skimmed milk, and oil, all donated by the Catholic Relief Services. (Tully, 1978)

FOOD SUPPLEMENT FOR WOMEN AT KENEBA: A special biscuit has been designed, and is produced by the local village baker and made available to all lactating mothers in Keneba in a supplement center. It has been possible to increase maternal energy intake by 900 calories per day with this biscuit. These women are being followed closely to determine the effect of this increased nutrient intake on qualitative and quantitative lactation capacity. This program is planned to be extended to pregnant women. (Israel, 1980)

KENEBA FOOD SUPPLEMENT PROGRAM: A food supplement program for infants age 3 to 12 months was offered in Keneba. A special weaning food was offered two times each day at a supplement center. The results, as measured by weight increase, were disappointing. Mothers' work loads were very heavy, especially in the farming season, and may mothers were unable to attend the supplement center. After infants were over six months of age, attendance generally fell off. (Rowland, 1979)

MASS MEDIA CAMPAIGN: A mass media health education program was aimed at rural mothers, fathers, grandmothers and other caretakers of young children as well as health workers. The messages of the program provided instructions for measuring and mixing salt and sugar rehydration solutions. Caretakers were urged to seek medical care for severely dehydrated children. The target groups were also encouraged to clean human and animal feces from the family compound floor. The messages were conveyed by radio, print and face to face contract with trained health workers. (AED, 1982)

MASS MEDIA: The mass media and health practices project focused on oral rehydration therapy. Recommendations during the rainy season emphasized adequate food intake to prevent malnutrition in infants suffering from chronic diarrhea. This project was carried out jointly by the Academy for Educational Development, Stanford University, and A.I.D. (U.S.A.I.D, 1982)

RADIO: Despite poor signal quality and relatively rudimentary programming, the penetration of radio was a significant source of information in the villages. (AED, 1982)

CRS UNDER-5'S CLINICS. Catholic Relief Services provides PL-480 Title II food commodities to about 30,000 women and infants registered in monthly

under-5's clinics. These clinics included nutrition surveillance and education as well as provision of food. (U.S.A.I.D. 1982)

PROJECT CONCERN INTERNATIONAL: Project Concern trained trainers for village health workers and traditional birth attendants. Course work has included nutrition promotion and education at the community levels. (U.S.A.I.D., 1982)

AFRICARE: AFRICARE supports a vegetable and fruit production project in three villages (Busura, Penyema, and Marakissa). The objective of the program is increased production through new varieties. AFRICARE also provides some hand tools. (TAICH, 1978)

GOVERNMENT MIDWIVES: About half the deliveries in Sukuta were attended by the Government midwife, who practiced good sterile technique. Local midwives, with much experience but no training, attended the remainder of the deliveries. (Marsden, 1964)

URBAN

FAMILY PLANNING ASSOCIATION BREAST FEEDING PROMOTION: The Family Planning Association of the Gambia has received some money from a British women's group, "Corona," to produce posters promoting breast feeding. These posters have been mounted on public buses in Banjul. (Israel, 1980)

6. COMMENTARIES

NATIONAL

INTEGRATED NUTRITION EDUCATION: CRS (Catholic Relief Services) believes that health and nutrition education have the greatest potential to achieve behavioral change when they are integrated with economic assistance to the target population. Poverty, ignorance, poor environmental sanitation, and inadequate health practices undoubtedly contribute to malnutrition. (Tembo, 1979)

NUTRITION EDUCATION AND PRIMARY HEALTH CARE: Promotion of proper nutrition through nutrition education is one of the basic components of primary health care. The nutrition activities should contribute to optimum health of the communities, particularly vulnerable groups (infants, young children, and pregnant and lactating mothers). Nutrition education should emphasize the use of locally-available nutritious foods, early detection of protein calorie malnutrition, and improving year-round food supplies in the village. (Tembo, 1979)

WORKSHOP FOR PROFESSIONALS NEEDED: A national workshop for health professionals should be convened to identify priorities for nutrition policy and programs in the Gambia. (Israel, 1980)

ROLE OF HEALTH WORKERS: The training and activities of village health workers should include simple nutritional surveillance of growth of all children under five years, recognition of malnutrition, follow-up of malnourished children; nutrition education stressing good diet for pregnant and lactating women and breast feeding with proper supplementation for young children; use of locally-available foods; iron supplements for pregnant women; and encouraging families to include fruits and vegetables in the foods which they grow. (Tembo, 1979)

FOOD PRODUCTION AND INCOME: Falling levels of per capita national income from $240 in 1975/76 to $200 in 1976/77 resulted from recent years of drought and a steady increase in population. Public administration and tourism have been the only economic sectors to show any noticeable growth, but their impact on other economic sectors has been limited and insufficient to overcome the agricultural depression. (Tembo, 1979)

RURAL

PROBLEMS WITH WEANING FOODS: The most important factor limiting the energy value of food is the water content. The problem of how to prepare energy-dense and nutritionally adequate weaning foods suitable for consumption by the young infant using only traditional resources should not be underestimated. (Rowland, 1979)

ADVICE ON WEANING: The most important single piece of advice would probably be to give infants only freshly-prepared food. This could be difficult to implement because there is considerable demand on mothers' time. (Rowland, 1978)

6. COMMENTARIES (Cont.)

COPING WITH DIARRHEA: In rural Gambian villages, weanlings are at high risk of diarrhea. In this situation, no aspect of health strategy can be ignored, including promotion and active support of the breast feeding mother; the appropriately-timed introduction of hygienically-prepared, nutritious weaning foods; the general use of complete oral rehydration mixtures; and various aspects of environmental sanitation. In the course of treating children with diarrhea, breast feeding should be maintained, and other foods withheld ONLY if there appears to be clinically-important intolerance and not just malabsorption of these foods. (Rowland, 1981b)

GASTROENTERITIS: During July and August, the prevalence of gastroenteritis peaked at 20.4%, suggesting that the average child had gastroenteritis for 20.4% of this period. Weight loss during this same period was 90 grams per month. (Rowland, 1977)

CHILD CARE: Almost without exception, the children were fed and cared for to the best of the family's ability. Defects of mother care responsible for illness were largely due to ignorance rather than deliberate neglect. (Marsden, 1964)

BIBLIOGRAPHY

AED (Academy for Educational Development, Inc.)

1982 Mass Media and Health Practices Project Implementation: Implementation Plan, the Gambia. Washington, D.C.: Academy for Educational Development, Inc.

This monograph describes a mass media health education program in the Gambia. The targets of the program included rural mothers, fathers, grandmothers and other caretakers of young children as well as health workers. The messages of the program provide instructions for measuring and mixing salt and sugar rehydration solutions. Families are urged to seek medical care for severely dehydrated children. The target group is also encouraged to clean human and animal feces from the family compound floor. The messages are conveyed by radio, print and through face to face contract with trained health workers.

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

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

This directory is a compilation of the results of a mail survey of nutrition programs throughout the developing world. It lists 201 program responses from 66 countries and presents them by region and country. It is not comprehensive, listing only programs from which responses were received.

Barrell, R.A.E. and Rowland, M.G.M.

1980 "Commercial milk products and indigenous weaning foods in a rural West African environment: A bacteriological perspective." Journal of Hygiene, 84:191-202.

Original data.
Method: Local foods were prepared by village women in keeping with local practices. Women also reconstituted milk with boiled and unboiled water. Samples of foods were analyzed for bacterial contamination.
Sample: Millet gruel and milk products. Number not specified.
Location: Rural Keneba.

Commercial baby milk and traditional millet porridge were prepared by mothers in the village of Keneba. Bacteriological quality of the products was affected by contamination of the water, domestic utensils, personal hygiene of the food handler, and in the case of local foods, contamination of the cereal flour.

Cole, T.J. and Parkin, J.M.

1977 "Infection and Its Effect on the Growth of Young Children: A Comparison of the Gambia and Uganda," Trans. R. Soc. Trop. Med. Hyg. 71(3):196-198

Original data.
Method: Longitudinal study of children seen routinely once a month until age 3 years. At each visit, children were examined clinically and weighed. Mothers were encouraged to bring the children for examinations at other times when they thought they were ill.
Sample: 152 children below age three years.
Location: Rural village of Keneba.

Longitudinal studies of 152 children from Keneba, The Gambia, and 45 from Namulonge, Uganda. The relationships between growth and different types of infection in the two areas are reported, and their relevance to the patterns of malnutrition seen in Africa is discussed, stressing the relative ineffectiveness of curative medicine in addressing the real health problems of rural Africa and the need for prevention.

Commonwealth Institute

1977 Commonwealth Fact Sheet: The Gambia. London: Commonwealth Institute, 1977.

This booklet presents a proile of the Gambia's land and people, including its history, government, economy, and social development, and includes a bibliography of books and articles of general interest.

Israel, R.

1980 "Consultant Report for Gambia (September 4-5, 1980) (A description of a visit to assess the national nutrition and nutrition education needs)." Prepared for U.S. A.I.D. Newton, MA: Education Development Center.

This report describes a consultant trip undertaken to examine the national nutrition situation in the Gambia. The conclusion of the consultant was that a breast feeding poster campaign was not a high priority at this time, as most mothers already breast feed their infants. It would be useful to convene a national health professional workshop to identify priorities for nutrition policy and programs in the country.

Marsden, P.D.

1965 "Patterns of weight gain in Gambian babies during the first 18 months of life." Journal of Tropical Pediatrics 10(4):89-99.

Original data.
Method: Longitudinal study, weekly weighings.
Sample: 95 babies, birth to 18 months of age. Babies born in the village over a 3 month period were included in the sample.
Location: Sukata, a semi-rural village in the Kombo St. Mary District.

The author defined weight faltering as failure of a child to gain one half pound during a three month period. Weight faltering was found to be common. In 72% of cases of weight faltering, some associated illness was detected which appeared to contribute, at least in part, to the faltering.

Marsden, P.D.

1964 "The Sukuta Project: A Longitudinal Study of Health in Gambian Children from Birth to 18 Months of Age." Ordinary Meeting of the Royal Society of Tropical Medicine and Hygiene, October 15, 1964, pp. 455-489.

Original data.
Method: Longitudinal study of weekly observations of children from birth to 18 months of age. Babies were weighed, medical history and physical exam were obtained. Blood samples were taken once a month. Home observation.
Sample: Of 152 selected, 85 reached 18 months of age, 9 died, and the rest dropped out of the study.
Location: Semi-rural village of Sukuta in the Kombo St. Mary District.

A very high prevalence of disease was encountered in these unselected babies. Weight faltering occurs early in life and is often associated with clinical illness. Malnutrition, malaria and diarrhea were great problems. Life in the village, care of children, and work obligations of parents were also described.

McCrae, J.E. and A.A. Paul

1979 "Foods of rural Gambia." Cambridge, U.K. and Keneba, the Gambia: Medical Research Dunn Unit.

This monograph lists the foods used in Gambia. There is an introductory section on food preparation. A table shows protein and energy content of Gambian foods; vitamin contents of some plant foods are given.

McGregor, I.A.; Rahman, A.K.; Thomson, A.M.; Billewicz, W.Z.; and B. Thompson

1970 "The health of young children in a West African (Gambian) village." Trans. of Royal Society of Tropical Medicine and Hygiene, 64(1):48-77.

Original data.
Method: Longitudinal study. Weighing, clinical examination. Children received treatment during illness. Clinical records were examined.
Sample: 215 children under 5 years of age.
Location: Rural Keneba village.

All 215 children under 5 years of age in the village of Keneba were followed in 1962-1963; 35 died. High rates of the following diseases were found: malaria, respiratory tract infection, diarrhea and vomiting, skin sepsis, eye infections, worms, and wasting. There was a whooping cough epidemic during the study. Prevalence of disease was generally greater in the rainy season.

Ministry of Health, Labour and Social Welfare

n.d. "Nutrition and Health Education Talks."

This is a series of lesson plans which a nurse can use in giving a talk to parents. Topics include prenatal care; diet in pregnancy; feeding children, including the importance of breast feeding and weaning foods; and caring for children during common illnesses. It also includes information on food taboos, height and weight charts, and estimating a child's age from a local events calendar.

Paul, A.A.; Muller, E.M.; and R.G. Whitehead

1979 "The quantitative effects of maternal dietary energy intake on pregnancy and lactation in rural Gambian women." Trans. Royal Society of Tropical Medicine and Hygiene, 73(6):686-692.

Original data.
Method: Longitudinal. Food intake measured 4 to 6 days per month; breast milk output was measured by test weighing; anthropometry every 2 weeks; activity study; observation of the women for one or more 4-hour periods.
Sample: 29 women studied from the seventh month of pregnancy to third month of lactation.
Location: Keneba village, 100 miles inland, rural, isolated.

This study looks at energy intake, weight gain in pregnancy, birth weight, lactation performance in the first three months, and seasonal variability in farm work. Maternal weight gain was lower when the last trimester of pregnancy fell during the peak of agricultural labor, a time of very low energy intake. Birth weights also correlated with seasonal differences in energy intake. Breast milk yield early in lactation was related to subcutaneous fat stores. The authors suggest that in undernourished nursing women there could be competition for dietary energy between repleting maternal fat stores and milk production.

Roberts, G.J.

1971 "Nutrition Policies and Programme in the Gambia." In The 1981 Dag Hammarskjold Seminar on Nutrition as a Priority in African Development, pp. 1-7. Uppsala, Sweden: The Dag Hammarskjold Foundation.

This document reviews the Gambian nutrition situation and programs to improve nutritional status.

Rowland, M.G.M. and Paul, A.A.

1981a "Factors affecting lactation capacity: Implications for developing countries." In Bond, J.T. (ed.), Infant and Child Feeding, pp. 63-75. Academic Press, NY.

In the village of Keneba, an intensive longitudinal study of the epidemiology of early childhood malnutrition monitored diet of infants, growth, and disease. Energy deficits occur from three months of age onward; many bacteriological problems exist in the local weaning foods; childhood mortality is very high. Lactation was affected by birth weight, parity, season, and energy intake of mother.

Rowland, M.

1981b "The Diarrhoea-Malnutrition Complex." In Diarrhoea Dialogue. AHRTAG (Appropriate Health Resources and Technologies Action Group, Ltd.), a WHO collaborating centre, 6, August 1981.

This article describes studies of diarrhea in the Gambia, especially its effects on the weanling child and its relationship to malnutrition and faltering growth.

Rowland, M.G.M. and Whitehead, R.G.

1979 "The Epidemiology of Protein-Energy Malnutrition in Children in a West African Village Community." Cambridge, U.K. and Keneba, the Gambia: Medical Research Council, Dunn Nutrition Unit.

Original data.
Method: Longitudinal community study. Anthropometry, clinical exams, and chemical analysis of foods. Data collected from 1974 to 1978.
Sample: All preschool children in village.
Geography: Keneba, a relatively isolated village in the West Kiang area.

This monograph reports the results of work carried out by the Dunn Nutrition Unit. It provides an overview of the health problems, nutrition, and infections which contribute to failure to thrive among Gambian children.

Rowland, M.G.M., Barrell, R.A.E., and Whitehead, R.G.

1978 "Bacterial contamination in traditional Gambian weaning foods." The Lancet I(8056):136-38. January 21, 1978.

Original data.
Method: Traditional weaning foods were prepared by mothers of young children and then tested at regular intervals after cooking for E. coli, B. cerus, Staph. aureus, Cl. welchii, and Salmonella. The total viable count was made. The work was repeated in different seasons.
Sample: The number of women participating and the number of times weaning foods were prepared were not specified.
Location: Rural Keneba village.

Infants in the village of Keneba were fed commercial milks or traditional millet porridge prepared by their mothers. Both traditional foods and milks were bacteriologically hazardous, particularly when left standing at ambient temperatures for up to 8 hours.

Rowland, M.G.M., Cole, T.J., and Whitehead, R.G.

1977 "A quantititative study into the role of infection in determining nutritional status in Gambian village children." Brit. J. Nutr. 37:441-450.

Original data.
Method: Survey children came to the clinic routinely at one month intervals and at other times if mothers thought they were ill. Height, weight, clinical history, and microscopy were studied.
Sample: 152 Keneba children from 3 months to 3 years old (92% of total).
Location: Three villages were studied, but only information from Keneba village was reported.

This study attempts to quantify the contribution of different infections to the pattern of growth during the first three years of life. Thee was a highly significant negative relationship between gastroenteritis and both weight gain and height gain. The only other disease category having a similar relationship was malaria, but in this instance, only with weight gain.

Sivard, R.L.

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

This document summarizes the world situation in 1979 in statistics concerning military development and 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.

Smith, William M.

1981 Personal Communication (Nov. 25, 1981).

Spaulding, E., McCrea, J., Rutishauser, I.H.E., and Parkin, J.M.

1977 "A study of severely malnourished children in the Gambia," Journal of Tropical Pediatrics and Environmental Child Health, 23(5):215-219.

Original data.
Method: Severely malnourished children admitted to the Medical Research Council ward during a 15 month period were treated, their progress was monitored, and feeding and health histories were obtained from their mothers.
Sample: 168 children birth to 60 months of age. All subjects were severely malnourished and seeking treatment.
Geography: 106 children came from various rural areas, 46 from towns, and 16 from the immediate Fajara area.

This paper describes a study of severely malnourished children admitted to the Medical Research Council ward in Fajara over a fifteen month period. There was a mortality rate of 23%, most deaths occurring during the first three days after admission. A very satisfactory rate of weight gain occurred with the regime of treatment used. Analysis of possible etiological influences confirms the findings of a longitudinal village study that inadequate breast milk production and frequent attacks of diarrhea are probably of great importance.

TAICH (Technical Assistance Information Clearing House)

1978 "TAICH Country Report: Development Assistance Programs of U.S. Non-Profit Organizations, The Gambia, December 1978." American Council of Voluntary Agencies for Foreign Service, Inc.

This report describes the assistance programs for Gambia of U.S. organizations, including voluntary agencies, missions and other non-profit organizations which provide material aid and assistance to programs in medicine, public health, education, and food production.

Tembo, D., Arevshatian, L., Akim, N.B., Lucas, A.O., Kam, M.P., Samba, E.M., Oldfield, F.S.J., Cham, M.K., and Gowers, P.

1979 The Gambia primary health care action plan, 1980/81-1985/86. Banjul: Oct-Nov 1979.

The Primary Health Care Action Plan for the Gambia was developed by the World Health Organization Team in collaboration with authorities within the national health system. The plan is the result of discussions, visits to villages and government officials, and reviews

of previous reports and publications. The main goal is to extend the existing health care system down to the village level.

Thompson, B. and A.K. Rahman

1967 "Infant feeding and child care in a West African village." Journal of Tropical Pediatrics, 13(3):124-138.

In Keneba, an isolated rural village, seasons dominate life and affect child care, feeding, and survival. In the rainy season, adults are busy farming, food is short, humidity is high, and illness, especially malaria, increases. Women cultivate rice in swamps. Infants are breast fed and accompany their mothers. Supplementary foods are first offered at three to four months and then children are left in the village in the care of older children, the aged and infirm. Weaning is abrupt; the child is sent to stay with relatives.

Thomson, A.M.; Billewicz, W.C.; Thompson, B.; and I.A. McGregor

1966 "Body weight changes during pregnancy and lactation in rural African (Gambian) women." Journal of Obstetrics and Gynaecology of the British Commonwealth, 73:724-733.

Original data.
Method: Longitudinal. Weight of pregnant and lactating women recorded every 2 and 4 weeks respectively.
Sample: 73 pregnant women.
Location. Rural Keneba village.

All women in Keneba lost weight from July to October (probably due to food scarcity and increased agricultural labor) and regained the weight after October. At other times of the year weight was maintained and pregnant women gained weight. Weight gain with births during the period February through August averaged 12 pounds, but weight gain for birth at other times of the year was roughly one half as much.

Tully, M.

1978 "Nursing with a research unit in Africa," Nursing times, 401-405. March 9, 1978.

Original data.
Method: Anthropometric measurements were recorded once a month, urine and stool and blood samples were obtained, energy intake was measured by weighing, samples of food were subjected to chemical analysis, and amounts of breast milk were ascertained by test weighing.
Sample: All children 3 months to 3 years of age.
Location: The rural villages of Keneba, Manduar, and Kantonkunda.

This article describes the experience of a nurse midwife working in West Africa. The author describes her work with the Medical Research

Council, the ecology of Keneba village, the research on nutrition and health in Keneba, and the nursing services which she provides in the area.

U.S.A.I.D. (U.S. Agency for International Development)

1982 Telegram Re: Review of Breastfeeding, Weaning and Maternal Nutrition Program, American Embassy, Banjul.

This telegram was a response to an A.I.D. request for information on current breastfeeding, weaning and maternal nutrition programs.

Whitehead, R.G.

1979 "Infant feeding practices and the development of malnutrition in rural Gambia." Presented at the Symposium on Food and Nutrition Constraints in developing countries, Tokyo, Japan, January 27, 1979.

In the village of Keneba, women are extensively involved in production of both subsistence and cash crops. Growth of infants meets international standards to 3 months and then falls off. Mothers' energy intakes are low and amounts of breast milk are insufficient. Weaning foods are low in nutrients and high in bacterial contamination.

Whitehead, R.G., Hutton, M., Muller, E., Rowland, M.G.M., Prentice, A.M., and Paul, A.

1978 "Factors influencing lactation performance in rural Gambian mothers," The Lancet II (8082):178-181. July 22, 1978.

Original data:
Method: Breast milk was measured serially by test weighing. Every effort was made to avoid disruption of day-to-day activities. Mothers continued with their usual duties. Most children were observed from 7 A.M. to 7 P.M.; 26 children were test weighed over the complete 24 hour period. Mothers were observed from beginning of pregnancy. Food intake was measured 6 days each month by test weighing.
Sample: 81 children 1 to 18 months of age.
Location: Rural Keneba village.

Breast feeding on demand is universal through 18 months. The mother's long-term capacity for breast milk production is determined by the end of the second month of lactation. Yield is closely correlated with baby's birth weight and is also influenced by parity, month of lactation, baby's weight for age, season, and mother's diet.

Whitehead, R.G.

1977 Infection and the development of kwashiorkor and marasmus in Africa, American Journal of Clinical Nutrition. 30:1281-1284.

Original data.
Method: Longitudinal study of anthropometry, child feeding, and malnutrition.
Sample: Children, number not specified.
Location: Rural Keneba village.

Infections, particularly gastroenteritis and malaria, can have a profound effect on the faltering of growth among rural African children.