

PKAAS-215
152-38907

NUTRITION IN AFRICA

PERSPECTIVES

4567



NAOMI BAUMSLAG



PERSPECTIVES ON NUTRITION IN AFRICA

Prepared by Naomi Baumslag, M.D., MPH
with the assistance of Mellen Duffy and
Betsy Brown

For the Agency for International Development
AFR/TR/HN

July 1984

Table of Contents

	<u>Page</u>
SUMMARY.....	1
I. INTRODUCTION.....	8
Purpose of the Document.....	8
Scope of the Position Paper and Its Relationship to Agency Policy.....	8
AID Nutrition Policy Paper.....	8
McPherson Statement on Health.....	9
AFR/TR/HN Health Strategy.....	9
II. THE NUTRITION PROBLEM IN AFRICA.....	10
Magnitude of the Problem.....	10
Nutrition Problems.....	10
Protein Energy Malnutrition.....	10
Marasmus and Kwashiorkor.....	11
Maternal Nutrition.....	15
Anemia.....	18
Endemic Goitre.....	20
Vitamin A Deficiency.....	22
Indirect Nutrition Indicators.....	22
Constraints to Improved Nutrition at the Household Level.....	29
Household Food Availability.....	29
Seasonality.....	31
Home Gardens.....	32
Food Characteristics and Composition.....	33
Disposable Household Income.....	34
Sickness Calorie Loss from Infectious Diseases.....	35
Diarrhea.....	35
Measles.....	37
Malaria.....	38
Ascaris and Hookworm.....	38
Maternal Illness.....	38
Women's Work Load and Status.....	38
Social, Cultural, and Religious Factors.....	43
Feeding Practices.....	44
Infant Feeding.....	44
Weaning.....	46
Maternal Feeding Practices.....	43
III. RESOURCES FOR PROGRAM IMPLEMENTATION.....	50
On-Going Africa Bureau Supported Interventions and Staff.....	50
Africa Bureau's Bilateral Programs.....	50
P.L. 480 Title II MCH Programs.....	50
Central Bureau Resources.....	54
Bureau for Science and Technology/Office of Nutrition Projects.....	54

Bureau for Science and Technology/Office of Health Projects.....	57
Host Country Resources.....	57
Other Donor Projects and Programs.....	59
REFERENCES.....	61
ANNEXES.....	67
Annex A: List of Mission-Assisted Maternal and Infant Nutrition Projects.....	67
Annex B: Nutrition Training Courses in Africa.....	68
Annex C: Non-AID Nutrition Activities in the Africa Region.....	71
Annex D: Proposal for Nutrition Component of Acre Agricultural Project, Sierra Leone.....	74

11

W

LIST OF TABLES

<u>Number</u>	<u>Title</u>	<u>Page</u>
1	Hospital Admissions for Protein-Energy Malnutrition in 14 African Countries.....	17
2	Mean Weight of African Newborns and Low Birthweight Infants.....	19
3	Prevalence of Grade 2 and 3 Goitre in Five African Countries.....	21
4	Nutrition-Related Demographic Indicators by Sub-Saharan Country (c. 1980).....	23
5	Selected Nutrition-Related Health Indicators (late 1970's) by Country & Weighted Regional Means.....	24
6	Selected Nutrition-Related Development Indicators (c. 1980) by Country & Weighted Regional Means.....	25
7	Food Supply by Country & Weighted Regional Means.....	27
8	Measures at the Household Level to Improve Family Health and Nutrition.....	30
9	Itemized Energy Expenditure of Zambian Women during Planting Season.....	40
10	AID-Assisted Maternal and Young Child Nutrition Projects in Africa Projects by Activity Type, 1982....	51
11	Collaborators of AID-Assisted Maternal and Infant Projects in Africa by Types of Organizations.....	52
12	Multilateral, Non-U.S. Bilateral, and PVO-Assisted Projects (U.S. and Other) in the Africa Region by Number of Programs and Funding Level in 1978.....	60

LIST OF FIGURES

<u>Number</u>	<u>Title</u>	<u>Page</u>
1	Percent of Protein and Energy Malnutrition among Infants and Children in Selected African Countries....	12
2	Percent of Acutely Malnourished Children in Selected African Countries, by Age.....	13
3	Percent of Chronically Malnourished Children in 4 Countries, by Age.....	14
4	Percent of Maternal Arm Wasting in 4 African Countries..	18
5	Percent of Daily Caloric Intake of Cereals, Roots, Tubers, and Plantains.	28
6	Too Much Illness Early in Life.....	36
7	Women's Work in Africa.....	41
8	Education from Women.....	42
9	Resources for Mobilization - Bureau for Science and Technology: Office of Nutrition.....	55
10	Resources of Mobilization for Science and Technology: Office of Health.....	58

✓

SUMMARY

It is hoped that this document will provide some insight into current nutrition problems in Africa. Understanding malnutrition is, after all, the first step that must be taken in order to combat it. This paper does not pretend to be a complete analysis nor to cover all the required resources, but it does point to gaps in data, suggest quick and simple ecogeographical assessment methods, propose "women at risk" as the target group, and describe needed manpower development. It argues that for primary health care programs to succeed, a critical mass of well trained public health nutritionists is essential.

Stopgap measures such as food aid have not solved or abated malnutrition in Africa. While some may have ameliorated suffering for a few, they may have produced harmful effects for many. New initiatives that are self-sustaining must be sought. The challenge is ours.

The Magnitude of the Problem

In Africa malnutrition is a vast problem, multifactorial and widespread. The principal manifestations of this disease state are protein-energy malnutrition in mothers, as well as in infants and children; anemia; vitamin A deficiency; and goitre, all of which contribute to high morbidity and mortality in the region. Africa has a mortality rate twice as high as any other developing region.

- o Endemic diseases such as malaria, measles, hookworm, tuberculosis, and diarrhea drain nutrients and add significantly to the death toll.
- o Nutritional assessment, where available, reveals that chronic (invisible or hidden) malnutrition is prevalent in 20-30 percent of African children under five; in some areas as many as 40 percent of children are affected (Zaire). This is undernutrition of a long-term duration, as measured by, for example, height for age.
- o Acute malnutrition figures are not easy to find. However, available data suggest that they are high, ranging from 5 to 10 percent. This is undernutrition of short term, wasting as measured by low weight for height. This is the type of malnutrition found during the hungry season or famines.
- o Low birth weight, yet another manifestation of protein malnutrition in Africa, is in the range of 15 to 20 percent. In many African countries, famine or food shortages may raise this figure even higher.

- o Anemia is widespread in mothers and infants, affecting as many as 50 percent of them.
- o Maternal malnutrition, from limited data available, also appears to be a significant problem.
- o Indirect nutrition indicators such as the percentage of potable water and mortality rates bear testimony to the harsh environs in Africa, especially in rural and urban squatter areas. Explosive urban growth rates (8 percent in many African countries) is yet another signal that the problem is not static.
- o Africa's population growth rate of nearly 3 percent, expected to increase over the next decade, exceeds rates in other developing regions.
- o While food productivity per capita has decreased, imports of costly replacement staples are on the rise.
- o Famines and disasters are inevitable if the present course is not changed, food self-sufficiency developed, and reserves created. Valuable natural resources such as roots, tubers, and breastmilk, are being abandoned. Imported replacements are gobbling up scarce foreign exchange that could be used more profitably elsewhere.
- o Food availability is low. FAO estimates indicate that the Sahel is the worst subregion with a mean supply of 2049 calories per capita/per day, 87 percent of the minimum caloric requirements. Of all the countries, Chad is the most deficient, meeting only 75 percent of requirements. The FAO food supply figures, however, do not reflect the inequality in food availability among different regions in a country nor the food's nutrient content.
- o As costs escalate, this problem will only get worse. Food aid is contributing to altered food preferences in the region and accounts for 20 percent of total net cereal imports.

Constraints, AID Policy Concepts, and Achievable Goals

AID has recognized that malnutrition is multifactorial in nature and, in view of this, with the limited resources at its disposal, has stressed the development of:

- o Human resources
- o Health planning and management
- o Primary care delivery

AID has seen the need to move away from reliance solely on traditional health programs, as there is a cumulative effect of

interventions in other sectors. Intersectoral programs are to be promoted, with particular emphasis on integrating nutrition components in existing programs with agriculture, rural, and women's development -- a movement away from vertical nutrition programs.

Innerent Constraints Within the Agency

The constraints to AID's program are many and varied. A major one is that the structure and funding of the Agency creates barriers to cooperative management of projects. Intersectoral cooperation becomes possible only in the writing or formulating stages because of sector "turf guarding." There is also a dearth of Africa Bureau as well as host-country nutrition expertise. The Africa Bureau has many small projects which are more labor-intensive than a few large projects. Shortage of staff inhibits good supervision of these small projects. Money, too, is a limited factor. While AID's directive is for prevention, national health budgets in host countries are expended primarily for curative services. Patterns of curative, urban-based care begun during the colonial period have continued with trends in health-worker training that are inappropriate as well.

Concepts and Achievable Goals

The concept of health for all at low cost is commendable, but in practice difficult to achieve. Of initial importance is a more equitable redistribution of resources. Trying to provide the sickest and poorest with the worst health services that use the least trained and supported health professionals is part of the problem. Ill-trained workers and poorly equipped services are a waste of resources. Efforts at improving the skills and knowledge of traditional birth attendants are worthwhile if TBAs can be supported afterwards. Ultimately, self-sufficiency must be promoted and adequately trained public health experts provided to support services in poor, underserved areas.

Attainable goals must be planned, such as anemia reduction in one year by 10 percent or low birth weight by 5 percent. Obviously, the size of the problem and the resources available must be considered.

Constraints within Households

Some major constraints are:

- o Lack of household income for food.
- o Seasonal food shortages. Most severe in females. In times of food shortages, their low food intake can be reduced by 25 percent.
- o Decline in duration of breastfeeding and increase in bottle feeding in certain urban areas.

- o Cultural beliefs and practices restrict food use; e.g., during pregnancy, fear of "a big baby" limits food intake.
- o High prevalence of malaria, measles, and diarrhea and poor hygienic conditions.
- o Sale rather than consumption of food grown.
- o Poor food storage capabilities.
- o Growing alcoholism.
- o But the most serious drawback is the status and work load of women. More than 30 percent are illiterate. These women are subservient, in a continuous state of reproduction (with multiple, closely spaced pregnancies) and overloaded with manual tasks (7 to 15 hours a day) that leave little time for child-rearing. Breakup of the extended family has resulted in more women household heads and breadwinners.
- o Until the status of poverty-stricken women is altered and income-generating activities developed, they and their children will remain nonproductive, ill, and malnourished.

Strategy

A viable strategy should seek to:

- o Identify the nutritional problems at the local level through the use of simple assessment tools, using "high-risk women" as the target group.
- o Provide adequately trained public health workers with nutrition expertise for training community health workers and making primary care projects operational.
- o Develop Africa Bureau and in-region nutritional expertise.

It is suggested that these efforts be achieved by:

Strengthening Nutrition Components in Primary Health Care through:

1. Targeting to at-risk groups with the pregnant and lactating women as the primary focus.
2. Training community health workers to use a growth monitoring chart for preventive, individual care as well as for program planning and evaluation.
3. Training community health workers to develop oral rehydration programs and to deal with underlying malnutrition. Breastfeeding programs should also be stressed.

4. Tailoring interventions to local conditions and resources based on local assessment data. Local self-sufficiency should be stressed.
5. Title II MCH programs should be aimed at those most in need, and food selection and distribution should be improved. It is urged that better quality control be exercised and that the World Food Program (WFP)'s dried skimmed milk should be used only if it is fortified with vitamin A. Complementary health and education activities should be carried out. Home visiting is invaluable and should be encouraged whenever possible.

Institution-Building through:

1. Providing assistance at the national level to ministries for planning nutrition programs.
2. Training, supervising, and supporting community health workers.
3. Giving priority to regional training of public health specialists so that critical masses of expertise are available regionally as well as in each country. Though this may be expensive, the long-term effects will decrease dependency on donors and increase regional capabilities. Facilities and resources that are modern, current, and permanent will have to be developed and/or strengthened.
4. Integrating nutrition into the AID project development process.
 - o It is advocated that the Africa Bureau have at least one full-time nutrition advisor on staff, and that in the field, there be one for each of the five subregions.
 - o AID Africa Bureau and Mission staff should have training in nutritional assessment as well as be informed on the current nutrition situation in the region. This can be achieved through workshops and publications.
 - o AFR/TN/HN should provide all Missions with access to technical assistance as well as guidelines to be developed for addressing nutrition adequately in the development of CDSSs, PIDs, and PPs.
 - o A problem-oriented catalogue with regional nutrition resources should be developed for their use.
5. A concerted effort must be made for all AID staff responsible for health programs to receive basic nutrition training and regular updates of knowledge and skills.

Research

Research should mainly be operationally-oriented for establishing information-generating mechanisms within projects and advancing knowledge and biomedical research. For example:

1. Simple, quick assessment tools are needed at the primary care level. Suggestions include the invention of a simple instrument for screening low birth-weight infants; field tests for hemoglobin and folate levels; and a weight chart for mothers.
2. Controlled nutrition-intervention studies for determining malnutrition in mothers and factors affecting productivity.
3. Research on alcoholism and child-rearing practices.
4. Evaluation of nutrition rehabilitation units in the region and nutrition rehabilitation in the home setting.

Nutrition and the Private Sector

Private sector involvement is presently limited and needs to be explored more fully. All household technologies pertaining to family maintenance have an impact on nutrition. The private sector could help in developing and distributing appropriate household technology. Local weaning foods, oil extractors, storage bins, coolers, and fruit driers are a few examples.

Resources for Program Implementation

AID Resources:

Many resources that are currently available are underutilized. Most of the programs in Africa are P.L. 480 Title II MCH programs. These, with the new policy for targeting assistance, should lead to more efficient programming. A wide range of Central Bureau resources are also available for:

- o Making a diagnosis before beginning activities.
- o Determining famine and hunger periods.
- o Improving maternal and infant nutrition in primary health care, especially breastfeeding.
- o Educating individual mothers and communities on improved maternal and infant diets.
- o Delivering essential nutrients to pregnant and lactating mothers.

- o Improving weaning practices using local foods.
- o Providing nutrition interventions specifically for children with diarrhea.

In addition to these, the Bureau of Science and Technology offers institution-building and service-delivery opportunities.

Host-Country Resources:

Although specific data is hard to come by, there is enough evidence to indicate that few centers in Africa are devoted to developing nutrition manpower. Most training is for home economists. Directed institutional development could remedy this. Selection of overseas training programs is haphazard, but until complete information on courses and programs is disseminated, expensive overseas training will continue to be unsatisfactory.

Other Donor Programs:

Maximum coordination and cooperation could enhance the use of scarce resources, especially for the creation of food reserves, institution-building, and data gathering. Currently, four-fifths of the funding is for feeding programs. Through subregional cooperation, scarce resources such as stores, management personnel, and transport could be shared.

I.

INTRODUCTION

Purpose of the Document

A "blanket" approach to treating malnutrition in Africa has to date been ineffective. However, subregional preventive measures specifically tailored to the diagnosed causes could have an immeasurably beneficial effect on the reduction of infant and child mortality, as well as the prevalence and incidence of malnutrition in the region. Subregional* training and resource sharing centers could serve as focal points for coordinating funding efforts, thus maximizing limited resources and avoiding reduplication. They could also act as centers for data collection.

To respond to the problems and issues posed by the nutritional conditions in the Sub-Saharan Africa, AFR/TR/HN has convened an in-house working group to prepare a nutrition position paper for health and nutrition strategies. The purpose of the Nutrition Strategy** of AID's Africa Bureau is "to provide a clear statement of the framework within which the AID missions in Africa should prepare their country's specific assistance strategies for improving nutritional status."

This document, hopefully, will provide field officers with information on the magnitude of the regional and subregional nutritional problem of Africa and with information on the resources at the missions' disposal with which to implement preventive health care measures designed to meet nutritional goals.

Scope of the Position Paper and Its Relationship to Agency Policy

AID Nutrition Policy Paper

The AID Nutrition Sector Policy Paper*** has placed the highest priority on alleviating undernutrition through

* For classification of subregion, see Teller, C., INU Working Paper No. 3; p. 3-5, 1982.

** See USAID/AFR/DR/ARD "Africa Bureau Nutrition Strategy," draft copy, February 1982 and USAID/AFR/DR/HN "Africa Nutrition Strategy," draft outline, July 1982.

*** See USAID/PPC "Nutrition Sector Policy Paper," Washington, D.C., April 1982.

sectoral programs, primarily in agriculture, health, and rural development. The policy is to be implemented through:

- o Monitoring and evaluating the nutrition impacts of projects.
- o Targeting sectoral projects to nutritionally at-risk groups, including nutrition as a factor in program selection and project design.
- o Addressing nutrition through primary health care programs and focusing on the multiple factors that affect the health of nutritionally at-risk groups.

McPherson Statement on Health

On June 25, 1982, Peter McPherson, Administrator of AID, issued the following statement regarding health: "This statement reaffirms the commitment of the Agency to a strong health program with concentration on improvements in primary health care delivery and increased research support of such programs." Furthermore, Mr. McPherson stressed the importance of design and management of low-cost primary care programs, the development of self-sufficiency, and a strong role for the private sector, which he sees as likely to be self-sustaining. He also stressed biomedical research.

AFR/TR/HN Health Strategy

The main focus of the AFR/TR/HN Health Strategy is on subregional characteristics. The strategy states that in order to best respond to problems, given the limited resources available, the Bureau must concentrate on:

- o Human resource development
- o Health planning and management
- o Primary health care service delivery

This strategy is in line with AID's health policy which emphasizes the strengthening and development of primary health care. A selected nutrition package is advocated, to consist of nutrition education, monitoring growth and development, and supplementing diets of mothers and infants. In addition, the policy advocates the promotion of sustained breastfeeding. Epidemiological studies to find causal relationships are also stressed. These would help to determine specific causal factors and avoid the tendency to rush in and treat spurious or superficial problems.

II.

THE NUTRITION PROBLEM IN AFRICA

Magnitude of the Problem

Maternal, infant, and childhood mortality rates in Sub-Saharan Africa are among the highest in the world. In some rural areas, as many as half of the children die before the age of five. The primary health problem in Sub-Saharan Africa is malnutrition; this has continued unabated. The major nutritional problems include:

- o Protein-Energy Malnutrition (PEM), the most severe problem. It affects infants, older children, and, most importantly, mothers whose nutritional status is directly related to birthweight and subsequent feeding practices as well as to their own health and productivity.
- o Anemia, the most widespread condition; and
- o Vitamin A deficiency and endemic goitre in specific localities.

In analyzing the problems and proposing solutions, however, one finds that data are quite limited, often out-of-date, drawn from small samples (frequently from hospital records), and generally not representative of the population about whom generalizations are made. Furthermore, there are significant knowledge gaps about nutrition problems.

National nutrition surveys have been carried out in Sierra Leone, Togo, Lesotho, Liberia, and Cameroon under AID's auspices. These have been very expensive and slow in affecting any policy or programs. Better, cheaper methods for local use are needed. As there were so few surveys, no subregional comparisons could be made with regard to nutritional status.

Regional Nutrition Problems

Protein-Energy Malnutrition (PEM)

The most severe type of malnutrition in Africa is PEM. (1,2) General food scarcity, poverty, food taboos, infections, and poor food distribution in the community or family often result in deficient protein and energy intakes. Women and children have a greater need for nutrients per kilogram body weight than other groups and are often the first group in a community to show signs

of PEM. Until 6 months of age, African infants who are breastfed exclusively show weight and height gains equal to well-nourished reference populations. After this time, however, the majority of children in developing countries fall behind in height and weight. Waterlow, however, believes that growth failure may occur earlier. (3) Recent nutrition surveys in Togo, Liberia, and Lesotho show that four-year-olds average three inches shorter than four-year-olds in well-nourished reference populations.

PEM may be acute or chronic. In its chronic form, it is manifested as growth retardation. PEM has been described in infants and children, but it also affects mothers. There is, however, little information on the condition of mothers.

Figure 1 shows the percentage of children chronically and acutely malnourished for 11 African countries in which surveys have been conducted. (4) At the time of these surveys (1973-1974), over 10 percent of the children were acutely malnourished in the drought-stricken Sahelian countries of Mali, Mauritania, Niger, Upper Volta, and Chad. (Acute malnutrition is defined here as less than 80 percent weight for height compared with the median value in a reference population.) In a well-nourished population, no more than one to two percent of the children would be so thin.

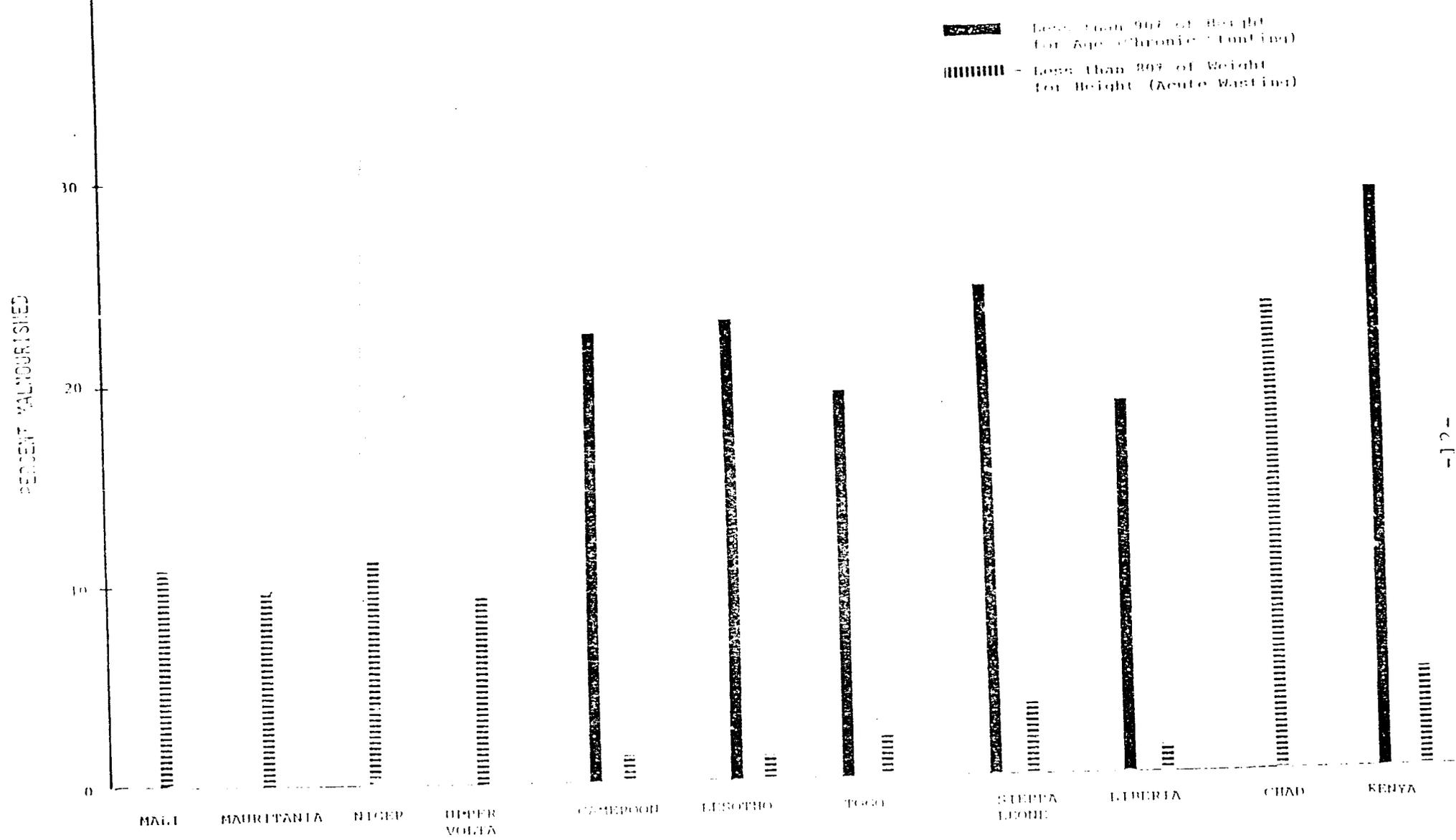
In the Cameroon, Lesotho, Togo, and Liberia, national nutrition surveys reveal a large proportion of chronically malnourished or stunted children. In Kenya, nearly 30 percent of survey children were stunted.

Acute malnutrition or wasting (weight for height) was found more frequently in younger children concentrated in the 6-23 month age group (see Figure 2). In Lesotho, it peaked in the 6-11 month age group, whereas in the other countries, the peak was in the 12-23 month olds. Seasonal effects on growth have also been noted. Bad weaning practices, coupled with infections at a vulnerable time, result in these peaks.

Chronic malnutrition is more concentrated in older age groups and may reflect the effects of a series of episodes of overall growth retardation and stunting from infection and poor weaning practices. The number of chronically malnourished children increases from 2-5 years (see Figure 3). These findings also have program implications and point out the need for analysis of the nutritional status of the community. Hidden hunger and infections are difficult for the untrained observer to detect. Growth monitoring is a great help in this.

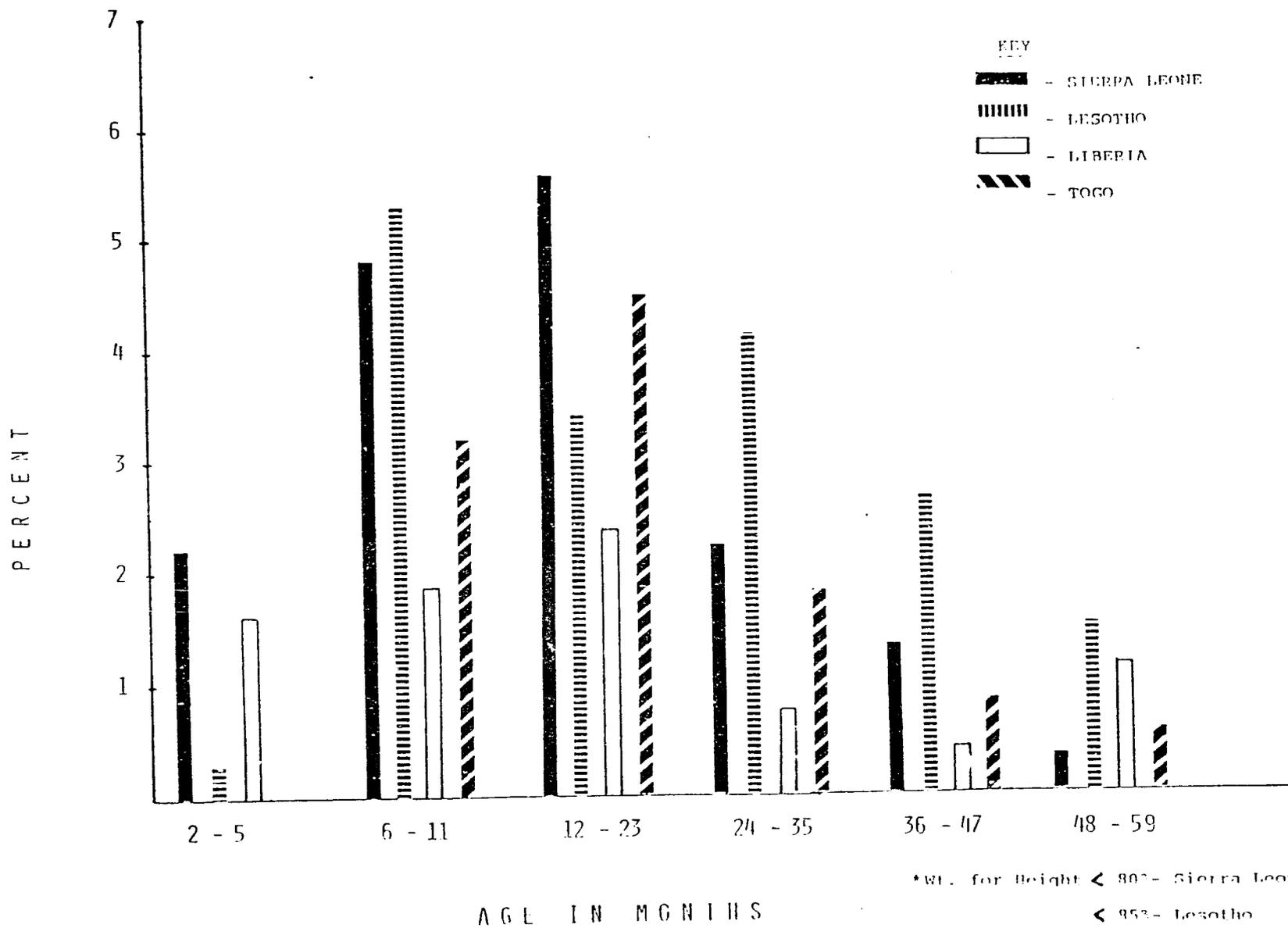
Marasmus and Kwashiorkor. The most severe forms of PEM are Marasmus and Kwashiorkor. Marasmus, which results from a severely inadequate intake of food, is characterized by a low body weight for height or age, loss of subcutaneous fat, and wasting of muscles. It is observed more frequently in infants. Early Marasmus in the 1-3 month old is often a consequence of bottle-

Figure 1: PERCENT OF PROTEIN AND ENERGY MALNUTRITION AMONG INFANTS AND CHILDREN IN SELECTED AFRICAN COUNTRIES



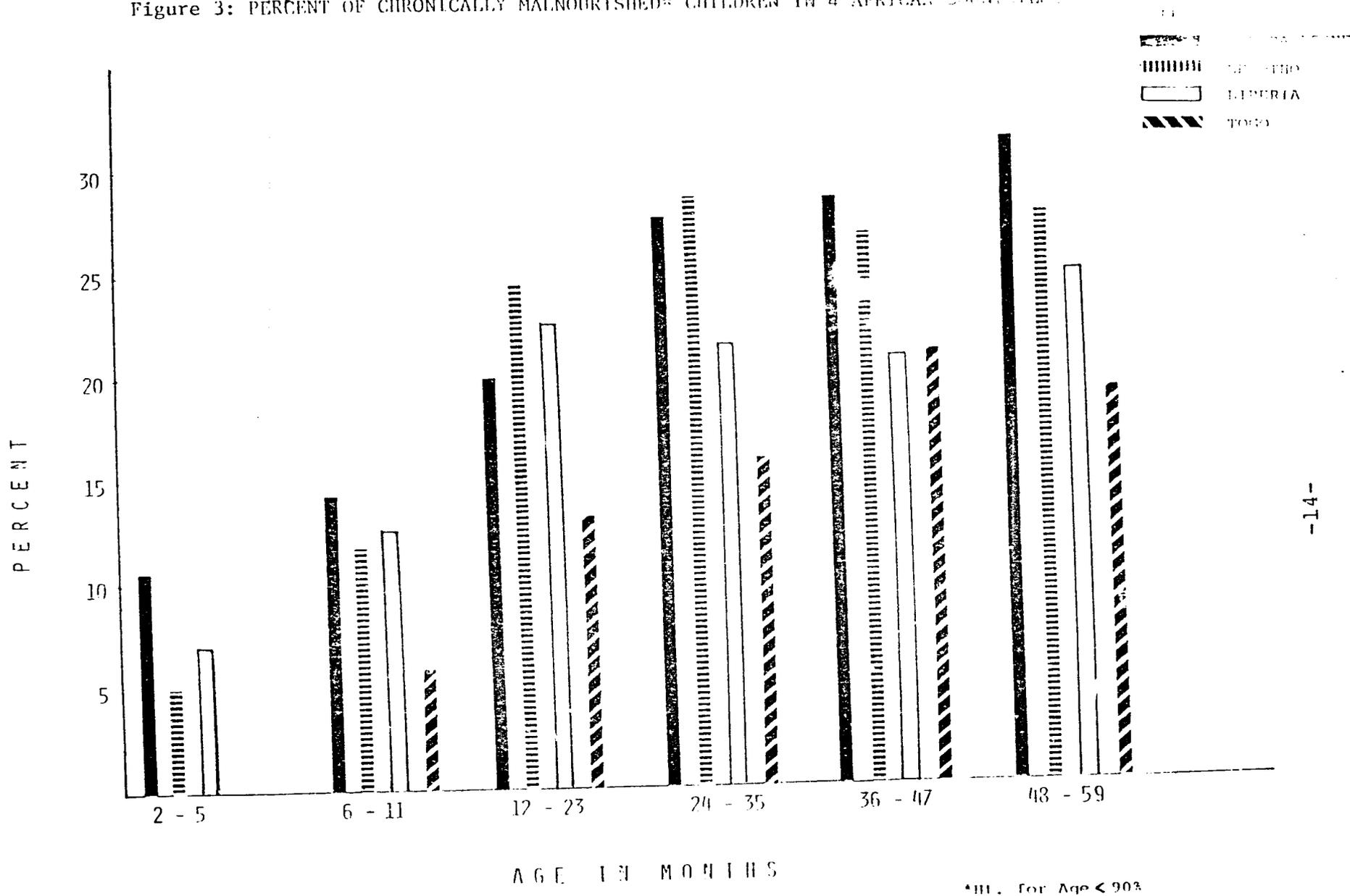
SOURCE: Nutrition surveys cited in footnotes 2, 9, 10, 11 and Sierra Leone National Nutrition Survey, UCLA School of Public Health and USAID, 1978; Cameroon Nutrition Survey, Preliminary Report, USAID, 1977; and the Rural Kenyan Nutrition Survey, Gov. of Kenya publication, 1977 reprinted in Hearings on the Market for Infant Formula in the Developing Nations, before the Senate Subcommittee on Health and Scientific Research, May 23, 1978, pp. 919-920.

Figure 2: PERCENT OF ACUTELY MALNOURISHED* CHILDREN IN 4 AFRICAN COUNTRIES, BY AGE



Source: Same as Figure 1

Figure 3: PERCENT OF CHRONICALLY MALNOURISHED* CHILDREN IN 4 AFRICAN COUNTRIES



Source: Same as Figure 2

feeding. Kwashiorkor, the result of inadequate protein consumption and most frequently observed in children aged one to three years, is often precipitated by an infection and is frequently associated with edema. The causes are varied and complex, and each situation requires an analysis of etiological factors. (5,6)

For example, bottle-feeding, with adulterated or overdiluted milk or formula, has led to early onset of Kwashiorkor, and this disease can now be found in infants aged 6-8 months of age. In Sierra Leone, bottle-fed infants were 6 times more likely to develop PEM than breastfed infants. (7) The weanling is the most at risk for this condition.

Data on the prevalence of Kwashiorkor and Marasmus are very limited (Table 1) for a variety of reasons; sample sizes are often small, national nutrition surveys do not include hospital data, and countries show that malnutrition, as the primary diagnosis, accounts for 7-50 percent of all child hospital admissions. (8) Preceding famine, the admission rate of these cases increases. Preventive measures at the community level could reduce the number of cases, which have fatality rates of 12-42 percent in hospitals. In poorly nourished children under 3 years old, the fatality is almost 100 percent. Infections, particularly measles, gastroenteritis, and malaria, in conjunction with malnutrition, contribute to the vicious cycle of malnutrition and high infant mortality.

The prevalence ratio of Kwashiorkor to Marasmus can vary as well as the age-specific rates and the incidence. Knowing the patterns of PEM may well lead to specific preventive measures. In Africa generally, moderate to severe protein malnutrition is present in over 20 percent of children under five. Levels as high as 42 percent were found in Kinshasa, Zaire and between 40-50 percent in rural Tanzania. These are among the highest recorded values. Causes will have to be determined locally so activities can be prioritized.

Maternal Nutrition. In developing countries, maternal PEM is also prevalent in pregnant and lactating women. Nutrition status of mothers is more difficult to define anthropometrically than of children. Surveys of feeding programs indicate that less than 20 percent of programs supplement the diet of pregnant and lactating women. Data from Malawi showed that as many as 23 percent of women were less than 150 cm. (4'11") in height -- an indicator of chronic malnutrition in childhood. (9) In Sierra Leone, 8 percent of mothers were found to be less than 150 cm., and 6 percent had arm wasting. In pregnant women, arm wasting was twice as frequent as in non-pregnant women. Fat wasting in the southern province affected 30 percent of rural women. Surveys in Liberia, Sierra Leone, and Cameroon showed mid-arm wasting (under 23 cm.) in over 5 percent and as many as 12 percent, indicating that the nutrition of rural women in these countries was poorer than that of urban women (see Figure 4). Malnourished women are at risk for child-bearing and their infants are very much at risk.

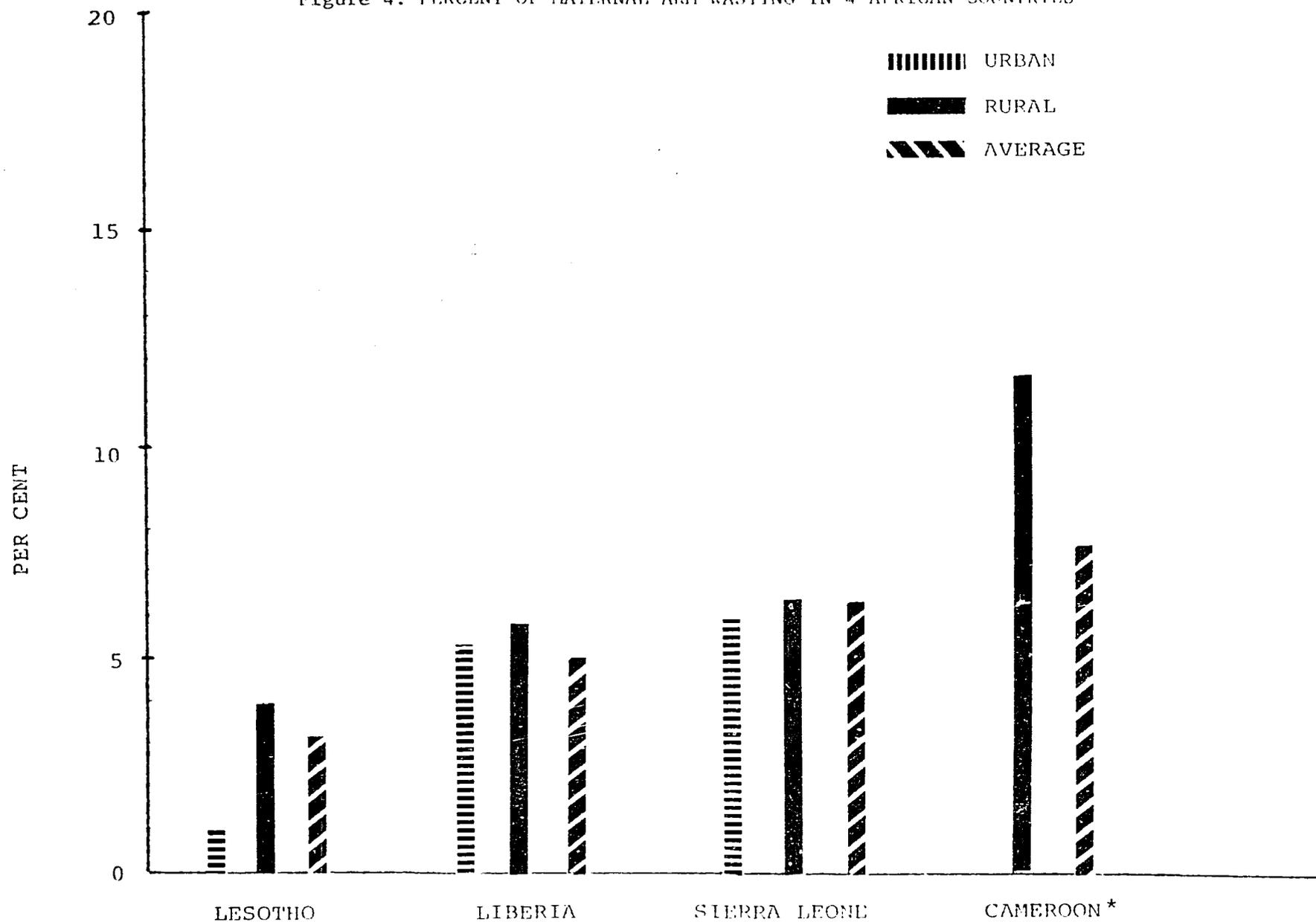
Table 1: HOSPITAL ADMISSIONS FOR PROTEIN-ENERGY MALNUTRITION IN 14 AFRICAN COUNTRIES

Country	Proportion of child admissions due to malnutrition (%)	Proportion of child deaths due to malnutrition (%)	Fatality rates for malnutrition
Central African Republic	7.1	11	26
Congo: Brazzaville (1969)	17 (frank PEM)	20	—
Dahomey	6.5	—	—
Ivory Coast: Treichville (1966)	marasmus: 6.6 kwashiorkor: 2.2	30	—
Abidjan (1962-66)	28.6	—	—
Madagascar: Tananarive	8.3	31.2	41.8
Malawi: Blantyre (1969)	40 (0.7 ^a)	—	—
Maunius	—	—	—
Niger: Niamey	marasmus: 7 kwashiorkor: 5	—	—
Senegal: Dakar (1953)	25+	50+	—
Sierra Leone: Freetown	—	6	—
Swaziland	(2.5 ^a)	10.6 (of all deaths)	12.4
Tanzania: Mevanza	25	50	—
Bukoba (West Lake)	11	—	28
Dar es Salaam	74	21	3
Upper Volta: Ouagadougou (Yalgoda-Ouédrago Hospital)	marasmus: 6.8 kwashiorkor: 2.7	—	39
Zambia	50+	17	21

^a Percentage of all admissions.

Source: Bailey, K.V. "Malnutrition in the African Region" in World Health Organization Chronicle, Vol. 29, 1975, p. 355.

Figure 4: PERCENT OF MATERNAL ARM WASTING IN 4 AFRICAN COUNTRIES**



* The rural figure is representative of the northern province only

** An upper arm circumference of less than 23 cm.

Source: Same as Figure 1.

Another indicator of maternal nutrition is the incidence of low birth-weight babies (see Table 2). In Guinea, Nigeria, and Kenya, for example, the percentage of low birth-weight infants has been reported as high as 18 percent.(10) Levels are generally under 4 percent in developed countries. In Khartoum Hospital, it was as high as 25 percent. Birth weight has been found to decrease during the pre-harvest or the rainy season. During famine or near famine times, birth weights are even lower.(11) A decrease in the infant's birth weight can be critical. As birth weight drops to 2000 gms. or less, infant mortality rises dramatically. The incidence of low birth weight has been reduced in some studies by increasing the caloric intake and by giving folic acid and/or iron supplements. (12,13,14) There is, however, a great need for simultaneously increasing prenatal care, in part to guard against cephalopelvic disproportion.

Currently in Africa, 20 percent or less of women are delivered in maternities. The true picture, therefore, of maternal malnutrition, is not available. It will be important to ascertain birth-weight levels for any interventions aimed at improving or assessing maternal nutrition. (15,16,17) Seasonal birth-weight changes, too, are important and may be prevented by short-term interventions. Weight gain during pregnancy is a valuable sign of maternal nutritional status. In the developed world, this is usually over 22 pounds but in developing countries it is often less than 12 pounds, which is considered critical.

In a group of mothers studied in Tanzania, the average weight gain was 9.1 kg., whereas in Uganda it was 8.3 kg. In socially deprived groups in times of food shortage, it is not unusual to find some mothers lose weight during pregnancy. Such mothers and those who weigh less than 40 kg. after the 20th week of pregnancy tend to have babies with low birth weights and high rates of perinatal mortality.

In many communities, the actual dietary intake falls short of the RDA (required daily allowance) for pregnancy (e.g., in Ghana caloric intake in pregnancy was 1,861 cal./day). Customarily, women eat less so "labor is easy." Taboos lead to reduction in animal protein and caloric intake in pregnancy. Surveys in Tanzania show that women may consume only half the dietary RDA, and studies in Malawi and Gambia reveal that during the rainy season, this is further reduced by as much as 25 percent. These women are the ones most at risk for low birth-weight infants. They are seen late in pregnancy, if at all. In most African countries, as few as 10 percent of rural women have access to organized health care.

Anemia

Limited data suggest that anemia in African mothers and infants is widespread. Surveys in Liberia and Togo reveal anemia present in 25-60 percent of children under 5 years old and in one-third of mothers. Below are the findings of survey data in five African countries.

Table 2: MEAN WEIGHT OF AFRICAN NEWBORNS AND LOW BIRTHWEIGHT INFANTS

	MEAN BIRTH WEIGHT	PERCENT UNDER 2000gms	PERCENT UNDER 2500gms
WEST AFRICA			
Gambia	2800	2	14
Guinea	2975		18
Guinea Bisau	3229		8
Ivory Coast	2950	3.6	14
Mali			13
Nigeria	2920	10	20
Senegal	3117		10
Upper Volta	3115	3	10
	2872		
EAST AFRICA			
Burundi	2730		14
Ethiopia	3132-3047	3-6	9-13
Kenya	3345-3145	9	14-19
Uganda	3150		
Tanzania	2950-3150		22-11
CENTRAL AFRICA			
Central African Republic	2893	4	23
Chad	3114		11
Congo			15
Gabon	2979		13
Cameroon	3119		
Zaire	3163	9	13
SOUTHERN AFRICA			
Lesotho	3012		14
Zambia	3180		12-17
Zimbabwe			

Data is fragmentary. Much of it represents estimates from small hospital records, not validated, or crosschecked for weight accuracy nor standardized for parity or mothers' weight.

Source: Birthweight Distribution - An indicator of Social Development. Proceedings from a workshop on Birthweight - a novel Yardstick of Development, organized by the Swedish Agency of Development for Research Cooperation with developing countries and WHO.

Anemia* in Children Under 5

Lesotho	25%
Liberia	62%
Sierra Leone	52%
Togo	59%
Cameroon	38%

In the Togo survey, 10 percent of the children were severely anemic. Additionally, 47 percent of pregnant Togolese mothers were anemic compared to 31 percent of non-pregnant women of child-bearing age. In 10 percent of children in Sierra Leone, folate deficiency was found.

Dietary deficiencies, primarily of iron but also of folate, are the leading causes of anemia. (18) In Malawi, Burgess found that anemia was associated with malarial parasites as well as PEM. (19) The decline in hemoglobin was associated with the proportion of children in each age group that were infested with malarial parasites. Hookworm is also a cause of iron deficiency anemia.

The solution to the problem depends on the diagnosis of the cause; e.g., in Chile recently, it was found that infants on milk had a high incidence of anemia. Fortification of milk with iron alone was not enough. It was necessary to add vitamin C which enhances iron absorption. On the other hand, foods such as legumes have been found to interfere with iron absorption. In other cases, eradication of hookworm and malaria is necessary to solve the problem. Just giving iron tablets blindly is thus not a sufficient solution.

It is important to note that hemoglobin is used to measure iron status but does not reflect iron stores and that hemoglobin is not easy to measure in the field.

Endemic Goitre

Goitre, usually caused by iodine deficiency, is widespread in Africa. Goitre occurs primarily in mountainous and inland areas where the soil is leached and where neither seafood nor iodized staples are available. Certain foods inhibit the absorption of an iodine that is consumed. Table 3 shows the prevalence of Grade 2 and Grade 3 goitre in males and females in five Sub-Saharan countries. Grade 2 goitre is defined as goitre visible when the neck is in a normal position. Grade 3 goitre is visible from a distance of 5 meters. Goitre is more frequent in women. In pregnant women it may cause cretinism, mental retardation, and deaf mutism in their infants.

*Cut-off less than 11 gms. percent.

Table 3: PREVALENCE OF GRADE 2 and 3 GOITRE IN 5 AFRICAN COUNTRIES

COUNTRY	VISIBLE GOITRES, GRADES 2-3
Cameroon:	
East Cameroon, adults 11-15 yrs.	(grade 3) 1- 12%
Kenya:	
Eburu Naivasha (Rift Valley)	M 18% F 39%
Reret (Kericho)	M 16% F 32%
Lesotho (1957-58)	
	(11-12 years)
	M 7% F 8%
	(13-18 years)
	M 14% F 22%
	(18 years)
	M 23% F 23%
	(all ages)
	M 12% F 15%
Senegal	
13-18 years	Casamance (F)
	10- 47%
	Eastern Senegal (F)
	22-51%
Zambia	M 7% F 18%
SOURCE: Bailey, K.V., "Malnutrition in the African Region," World Health Organization Chronicle, Vol. 29, 1975, p. 362.	

In 12 villages in the Ulangi-Mongola region of Zaire, an area known for a high prevalence of goitre, 12 percent of the male population and 23 percent of the female population showed Grade 2 or Grade 3 goitre. The prevalence of cretinism in these villages was high, ranging between 1 and 7 percent of each village's population. In this setting, iodized oil injections, at a cost of only 7 cents per year, have proven an effective goitre prevention measure. (20)

In Kenya and Liberia, pockets of goitre are not uncommon. Goitre is also endemic in Malawi. One-third of mothers in the Lower Shire Valley had palpable or visible goitres. The condition is also common in Dedza, perhaps due to high cabbage intake. Cabbage is a goitrogen, a food that inhibits iodine absorption. In Malawi, available salt is iodine-deficient rock salt obtained from Mozambique. In Lesotho, the use of iodized salt has resulted in a decrease of goitre from 15 percent to 4 percent. (21)

Iodized salt, a simple preventive measure for goitre, generally has not been effective in Africa due to geographic, economic, and administrative obstacles.

Vitamin A Deficiency

Vitamin A deficiency may be seasonal or associated with malnutrition and measles. Infants who are not fed their mother's colostrum miss an excellent source of vitamin A. Interest in this has developed recently. At the annual meeting of the International Vitamin A Consultative Group (IVAGG) held in Nairobi in late 1981, measles was recognized as an important cause of childhood blindness, especially in disadvantaged, malnourished communities in many areas of Africa. (22) That vitamin A deficiency may play an etiological role in blindness is recognized in some countries, including Kenya, Malawi, and Tanzania. Furthermore, there is apparently evidence of mild primary xerophthalmia in many Sahelian subdesert areas, as is seen in Mali, where night blindness is frequent due to seasonal shortages of vitamin A-rich foods. (23)

Diagnosis depends on awareness and the ability both to diagnose xerosis and keratomalacia and to take a dietary history. Whether this is indeed a public health problem is currently under investigation.

Indirect Nutrition Indicators

Indirect indicators of nutrition (Tables 4, 5 and 6) are more often available than nutritional assessment data and may be useful for identifying at-risk populations. (24,25) Infant and child mortality rates are higher in Africa than in any other developing region. Maternal mortality and total fertility rates are also excessive. In as many as 20 percent of maternal deaths, anemia is an associated cause. There is a high rural dependency ratio.

Table 4: NUTRITION-RELATED DEMOGRAPHIC INDICATORS BY SUB-SAHARAN COUNTRY* (c. 1980)

REGION & COUNTRY	Infant Mortality (Rate/1000)	Total Fertility (Rate/Woman)	Urban Growth, '70-'80 (Yr. Rate/1000)	Agri. Pop. Density (Agri. Land Per Agri. Worker) (ha.)
<u>SAHEL - SUDANIC</u>				
CHAD	149	5.9	6.7	-
GAMBIA	198	6.4	-	2.7
MALI	154	7.0	5.5	10.7
MAURITANIA	143	6.9	8.6	99.1
NIGER	146	7.1	6.8	8.9
SENEGAL	147	7.1	3.3	4.8
SOMALIA	147	6.1	5.1	27.3
SUDAN	124	6.6	6.8	7.5
UPPER VOLTA	211	6.5	4.1	6.7
<u>W. AFRICA - COASTAL</u>				
BENIN	154	6.7	3.9	-
CAMEROON	109	5.7	7.5	5.1
GHANA	103	6.7	5.2	6.3
GUINEA	165	6.2	6.1	4.1
GUINEA-B.	149	5.4	-	10.9
IVORY COAST	127	6.7	8.2	-
LIBERIA	154	6.9	5.6	1.3
NIGERIA	135	6.9	4.9	-
SIERRA LEONE	208	6.2	5.6	3.3
TOGO	109	6.5	5.6	2.2
<u>ZAIRE RIVER BASIN</u>				
C.A.R.	149	5.9	4.9	5.8
CONGO	129	6.0	3.2	82.7
ZAIRE	112	6.0	7.2	3.2
<u>EAST</u>				
BURUNDI	122	5.9	2.6	0.9
KENYA	87	8.1	6.8	1.3
RWANDA	107	7.0	5.9	0.7
TANZANIA	103	6.6	8.3	8.7
UGANDA	97	6.2	7.0	2.5
<u>SOUTH</u>				
BOTSWANA	83	6.5	-	151.2
LESOTHO	115	5.9	7.8	4.0
MALAWI	172	7.0	6.2	1.9
SWAZILAND	135	6.5	-	7.8
ZAMBIA	106	7.0	5.4	126.5
ZIMBABWE	74	6.7	6.4	5.3

*Only AID-assisted countries with over 500,000 population included.
 Sources: World Bank, World Development Report, 1980; Population Reference Bureau, World's Child Data Sheet, 1982; AID Indicators of Food and Agriculture in AID-Assisted Countries, 1981.

Table 5: SELECTED NUTRITION-RELATED HEALTH INDICATORS (LATE 1970'S)
BY COUNTRY & WEIGHTED REGIONAL MEANS

REGION & COUNTRY	Child Mortality Rate	Access to Safe Water (%)	Access to Excret. Disposal (%)
<u>CENTRAL & WEST</u>	<u>23</u>	<u>20</u>	<u>32</u>
BENIN	25	21	14
BURUNDI	33	2	-
CAMEROON	25	26	-
C.A.R.	30	16	72
CONGO	27	17	9
GHANA	22	35	56
LIBERIA	15	20	11
NIGERIA	22	20	-
RWANDA	25	35	57
SIERRA LEONE	25	12	-
TOGO	25	16	15
ZAIRE	25	16	22
<u>SAHEL</u>	<u>31</u>	<u>22</u>	<u>7</u>
CHAD	15	26	1
GAMBIA	-	12	-
GUINEA	28	10	13
GUINEA-B.	-	11	-
MALI	31	9	8
MAURITANIA	29	17	-
NIGER	31	27	7
SENEGAL	31	37	-
UPPER VOLTA	31	25	4
<u>EAST</u>	<u>21</u>	<u>34</u>	<u>40</u>
KENYA	15	17	55
SOMALIA	30	33	47
SUDAN	29	46	22
TANZANIA	18	39	17
UGANDA	16	35	94
<u>SOUTH</u>	<u>20</u>	<u>36</u>	<u>27</u>
BOTSWANA	-	45	-
LESOTHO	20	17	13
MALAWI	25	33	15
SWAZILAND	-	37	36
ZAMBIA	22	42	42
ZIMBABWE	15	-	-

*Only AID-assisted countries with over 500,000 population included.
Source: World Bank, World Development Report, 1981; and AID, ST/DIC, 1982.

Table 6: SELECTED NUTRITION-RELATED DEVELOPMENT INDICATORS (c. 1980)
BY COUNTRY* & WEIGHTED REGIONAL MEANS

REGION & COUNTRY	GNP Per Capita (US\$)	% Rural Pop. in Poverty	% Adult Illiteracy
<u>CENTRAL & WEST</u>	<u>633</u>	<u>65</u>	<u>78</u>
BENIN	300	65	89
BURUNDI	200	85	75
CAMEROON	670	40	88
C.A.R.	300	-	88
CONGO	730	-	86
GHANA	420	-	70
LIBERIA	520	-	70
NIGERIA	1010	-	75
RWANDA	200	90	77
SIERRA LEONE	270	65	85
TOGO	410	-	84
ZAIRE	220	-	85
<u>SAHEL</u>	<u>262</u>	<u>46</u>	<u>90</u>
CHAD	120	56	85
GAMBIA	250	40	90
GUINEA	290	-	90
GUINEA-B.	160	-	93
MALI	190	48	90
MAURITANIA	320	-	83
NIGER	330	35	92
SENEGAL	450	-	90
UPPER VOLTA	190	-	95
<u>EAST</u>	<u>371</u>	<u>64</u>	<u>60</u>
KENYA	420	55	60
SOMALIA	-	70	40
SUDAN	470	85	80
TANZANIA	260	60	34
UGANDA	280	-	60
<u>SOUTH</u>	<u>497</u>	<u>76</u>	<u>63</u>
BOTSWANA	910	55	65
LESOTHO	390	55	45
MALAWI	230	85	75
SWAZILAND	680	50	35
ZAMBIA	560	-	61
ZIMBABWE	630	-	61

*Only AID-assisted countries with over 500,000 population included.
Sources: World Bank, World Atlas, 1981; Social Industry Data Sheets, 1981;
World Development Report, 1981; UNESCO, Statistical Yearbook, 1981.

Illiteracy rates in most African countries, especially among women, are above 80 percent. For many of these indicators, there appear to be subregional trends. (25,26,27)

High population density occurs in many African countries, such as Rwanda, Burundi, Kenya, Malawi, and Liberia, where nutritional problems may be quite different from less densely-populated countries. In countries such as Mauritania, Ivory Coast, and Tanzania, the urban growth rate is an explosive 8 percent per year. In areas such as these, PEM may become highly prevalent and poor migrants are most at risk. The situation is not expected to improve, as Africa has the highest population growth rate (3 percent) and lowest productivity of all the developing countries. The population growth rate is expected to continue through the 1980s. (28) A decrease in the incidence of breastfeeding, an effective family-spacing measure, will further aggravate the situation.

To add to the problem, according to FAO's three-year food availability estimates, countries such as Zambia, Mauritania, Guinea, and even Ghana fall well below the percent of minimum FAO requirements. (29) Once again, the Sahel has the lowest calorie supply, with Chad registering 1,793 calories per capita per day (Table 7). These figures do not reflect the percent of population living on diets that provide less than this pitiful amount. More than 60 percent of Africa's total population is estimated to have the seriously inadequate intake of less than 2,200 calories per day. This measure of food availability used is very crude. It reflects neither the inequality of distribution, the quality of food, nor seasonal shortages.

Roots, tubers, and plantains (Figure 5) provide 30-50 percent of the calories in several countries. Roots and tubers are most common in humid regions. In such Central and West African countries as Zaire, the diet in certain areas is based heavily on cassava, with cereals primarily consumed in the cities. People in Rwanda obtain more than half of their calories from roots and tubers. (30) This again reflects the subregional differences in food usage. Within countries, too, there are different food zones. Cassava is very low in protein, and Kwashiorkor is more prevalent in areas where this staple is used almost exclusively.

Declining per capita food production, coupled with chronically inadequate calorie intake, means that there is little margin for human error or natural disaster. Concurrent with the decline in food production has been the rise in imports. Staple-replacement imports (rice and wheat) have soared. Cereal imports are heavily concentrated in ten countries, including some of the most populous (Ethiopia, Ghana, Nigeria, Sudan, Tanzania, and Zaire). The Ivory Coast, Senegal, Congo, and Zambia are also large importers of cereals. A World Bank report suggests that the low rate of food production may be an effect of rising cereal imports. Food aid is at least partially responsible for developing tastes for wheat, rice, and oil. (30,31)

Table 7: FOOD SUPPLY BY COUNTRY^a & WEIGHTED REGIONAL MEANS**

REGION & COUNTRY	Daily Calorie Supply, 1977-79 Per Capita	Percent of Requirements
<u>CENTRAL & WEST</u>	<u>2240(2266)*</u>	<u>96.6(97.9)*</u>
BENIN	2153*	93.6*
BURUNDI	2260*	97.0*
CAMEROON	2442	105.3
C.A.R.	2143	94.8
CONGO	2234*	100.6
GHANA	1996	86.8
LIBERIA	2396	103.7
NIGERIA	2295	97.2
RWANDA	2191	94.4
SIERRA LEONE	2082	90.5
TOGO	2035*	88.5*
ZAIRE	2156	97.1
<u>SAHEL</u>	<u>2049(2034)*</u>	<u>87.0(86.4)*</u>
CHAD	1793*	75.3*
GAMBIA	2281*	95.8*
GUINEA	1921*	83.2*
GUINEA-B.	2340	101.3
MALI	2114*	90.0*
MAURITANIA	1951	84.5
NIGER	2051*	87.3*
SENEGAL	2228*	93.6*
UPPER VOLTA	2024	85.4
<u>EAST</u>	<u>2195(2168)*</u>	<u>94.6(93.4)*</u>
KENYA	2085	89.9
SOMALIA	2173	94.1
SUDAN	2339	99.5
TANZANIA	2040	87.9
UGANDA	2070*	88.8*
<u>SOUTH</u>	<u>2118(2287)*</u>	<u>91.5(93.2)*</u>
BOTSWANA	2070*	89.2*
LESOTHO	2138*	93.8*
MALAWI	2238	96.5
SWAZILAND	2281*	98.3*
ZAMBIA	1986	86.0
ZIMBABWE	2545*	-

^a(Only AID-assisted countries with over 500,000 population included)

*Data for 1975-1977; includes fish;

**Includes data from the very small countries not shown in this table.

Sources: FAO Production Yearbook, 1979 and 1980; and AID ST.DIG. 1982.

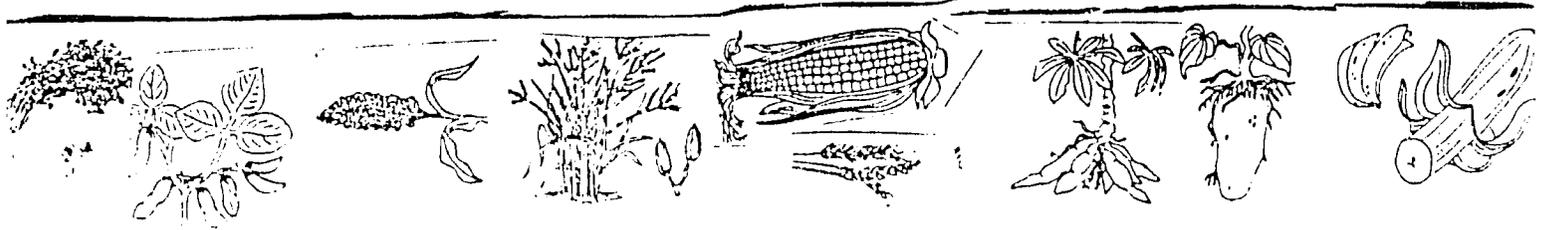
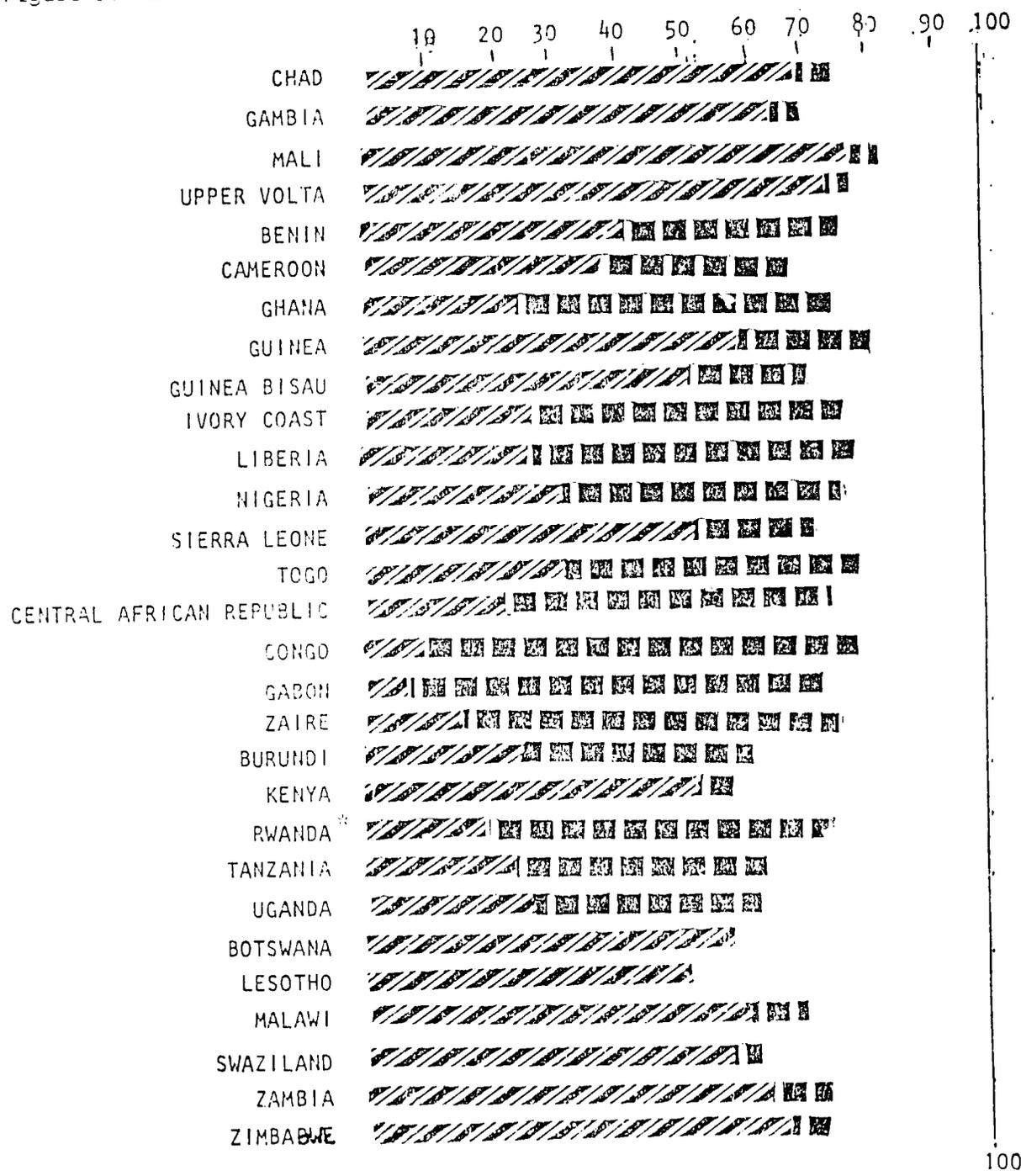


Figure 5: PERCENT OF DAILY CALORIC INTAKE OF CEREALS, ROOTS, TUBERS, AND PLANTAINS



 cereals
 roots , tubers and plantains

With the increase in population growth rate, the decrease in food production in the region, and increasing dependency on food imports, the food situation will not improve without drastic changes in landholding, food production, and distribution. Other measures, such as food aid, must be considered as short-term. This is, however, beyond the scope of this paper.

Constraints to Improved Nutrition at the Household Level

Knowing the size of the problem is not enough. At the individual household level, many factors that affect food availability have to be considered. Some of these factors are:

- o Total household food availability.
- o Family size.
- o Food storage capabilities.
- o Infectious disease attack rates.
- o Household disposable income.
- o Women's workload.
- o Socio-cultural factors.
- o Feeding practices.

The most important areas in which nutritional status can be improved by short-term interventions are infectious diseases and feeding practices. Decreasing women's workloads and fostering income-generating activities and seasonal preparedness require long-term interventions. Some constraints are described below.

Household Food Availability

Food-availability data are largely based on aggregate data and are only available on a per capita basis from local production and import estimates. If this data were disaggregated, they would be easier to use for targeting programs to those most in need. Available data, however, do show that a large number of people are affected. Production can be affected by a variety of factors such as prohibitive agricultural policies, unfair pricing, or a change in ease of transportation. Wars, too, affect food availability. Ultimately these food shortages can lead to social unrest. Many factors affect household food availability and must be diagnosed before they can be dealt with (see Table 8).

Importation of food, especially grains, rice, wheat, and oil, has been increasing both in amount and cost. The "Coke" or "Fanta and bun" syndrome is everywhere, and has replaced traditional eating habits at great expense. (32)

Table 8: MEASURES AT THE HOUSEHOLD LEVEL TO IMPROVE FAMILY HEALTH AND NUTRITION

FOOD PRODUCTION	breastmilk home gardens (composting, fencing to keep animals out) fish ponds, small domestic animals
FOOD STORAGE AND PRESERVATION	raised storage cribs, cement lined baskets etc, cupboards rat baffles, fly screens fermentation, solar drying, salting, iceless refrigeration stores for seasonal shortage especially dried greens
HOUSEHOLD PROCESSING	oil extractors, sun flower, palm oil dehuskers hand grinders
FOOD PREPARATION	fuel efficient stoves (mud ovens, hay boxes, solar cooker etc) hygienic preparation -hand washing facilities preparation of food just prior to eating
WEANING FOODS	breastmilk and supplementation during weaning multimix weaning foods (local) oral rehydration during diarrhoea and if breastfeeding continue caloric dense foods and watch the food vitamin sources
FOOD SANITATION	potable water adequate storage ; keep away from animals hygienic disposal of excreta wash hands before food preparation and usage prevent animal contamination
PREVENT INFECTIONS AVIOD SICKNESS CALORIE LOSS	Malaria, prevention, immunization and diarrhoeal disease control
EDUCATION budgeting	Provide education of mothers both functional literacy include budgetting and agricultural techniques. promote susistence-crops as well as cash crops reduce alcoholism

Food aid, too, has affected food preferences, and resulted in increasing trade deficits. The level of food importation may be unupportable in forthcoming years. It is becoming increasingly evident that local resources will have to be developed and existing resources expanded. Some countries have taken note of this by combining food preferences for wheat with blends of sorghum and maize to extend the wheat in bread. This has been tried in Senegal and Mozambique with some success. Import replacements of rice and/or wheat from staples such as cassava and maize have resulted in a decrease in caloric intake. Changing from cassava to wheat bread can represent a twelve-fold cost increase per calorie consumed. Changing from breastfeeding to formula can cost as much as half of the family income. (33)

In some areas, there is a growing shift from staples such as tubers and roots, which once formed 50-70 percent of caloric intake, to replacement imports and processed foods. There are an increasing number of disincentives for growing these quick-growing, cheap energy sources. In Sierra Leone, for example, when the train service from Freetown to the southern province was discontinued, cheap transportation to markets and a good supply of customers for perishable goods (fish and cassava) disappeared. The high cost of transportation to markets has had a disincentive effect on crop production. The incidence of malnutrition has increased in the area. Farmers now grow just enough for themselves. Their former customers now pay higher prices and even suffer food shortages. The transportation expense has resulted in a loss of income for those farmers, and where malnutrition was not a problem previously, it now is one. Any strategy will have to deal with the lack of economic motivation and incentives for small farmers, who produce most of the household food, to gain access to markets (credit extension, cooperatives, and guaranteed prices need to be provided).

Seasonality. Seasonality is an extremely important factor that affects food availability. In poor rural populations, the effects of the elements are not controllable. In Zimbabwe, waiting for rain before planting was found to result in a 60 percent maize crop loss. Technical assistance at times like this would be helpful. A study in Malawi found that during times of food shortage, food intake for men decreased by only 10 percent, whereas for females it decreased by 25 percent. In the rainy seasons, communities may be isolated and stores depleted. The cost of purchasing maize at these times often represents a three- to five-fold price increase, with disastrous effects; and it is at these times when stores are depleted that malnutrition rates increase. Infections such as malaria are also more prevalent and add to the nutrient drain. Subsidized food or ration stores for high-risk groups could be helpful. The seasonality also affects availability of green leafy vegetables and fruits, sources of vitamins (especially A, B, C) for high-risk groups. Supplements may be needed. Seasonal changes in birth weight and growth have been shown to coincide with a decrease in food availability in the rainy season. (34,35,36)

Severe drought in areas where there are marginally malnourished children can result in famine. Many countries walk the thin line between famine and chronic malnutrition, and few countries have effective emergency food stores available. A much more concerted effort is needed for planning the prevention of such disasters by developing regional self-sufficiency instead of the hysterical provision of disaster relief, of little help after the fact. Warning signs for early detection should be developed more carefully and heeded. FAO has been developing early detection indicators. But until self-sufficiency is attained and food reserves are made available, we will have to continue to rely on stopgap measures.

Conservation measures for in-house food storage and prevention of waste due to rot and infestation could prevent as much as 40 percent of household food losses. Low-cost, appropriate technology for improved household nutrition such as storage bins, food dryers, coolers, and clay ovens have been developed. The UNICEF Appropriate Technology Centre in Kenya is a well known demonstration site. Good storage facilities were seen in households served by a primary health care project in Western Province, Kenya, yet at the UNICEF Ahero Family Life Centre, the devices were on display but not in use. Homes visited in many developing countries did not incorporate the energy and food-saving devices present in centers for appropriate technology. If these devices are so cheap and easy to develop, why are they used so little in the community? Further research is needed to disseminate this technology and make it viable for rural homes.

Home Gardens. These have been advocated by many groups and can provide valuable sources of fruit and green leafy vegetables (sources of vitamins C and A) and even some additional calories. However, in times of shortages, they often are not available. They are found in areas where people have usable land and some water. In arid areas, they may not be worth the cost or effort. (38) School gardens in some parts of Botswana have been fairly successful and provide schools with an extra source of income. Gardens for the landless are not possible unless some community land is set aside. Arole, in the Jamked Project in India, used this approach quite successfully. (39)

The traditional home garden has been replaced in many areas with cash crops: Milk and eggs normally produced as food are sold for cash. In some areas, for example in the lower Shire Valley in Malawi, food is difficult to grow because rainfall is so variable and soil so poor. In addition, free grazing livestock wreck gardens, and the cost of fences to keep them out is prohibitive. Thus, local habits and terrain must be carefully considered.

Nutrition rehabilitation units often have gardens and even give seeds to mothers when they leave, but these families are rarely followed-up. In several nutrition rehabilitation centers, other

sources of food are advocated. Breeding of rabbits and chickens is taught in the nutrition rehabilitation centers in Zimbabwe. (32) Community health workers give people assistance in their home setting. In Malawi, the use of field mice as opposed to rats is advocated as a food source. Research is needed to develop ways to grow or augment food sources as well as ways to increase the effective use of food money spent.

At most, home gardens are an aid, not a solution, to household food shortages. Although gardens have been used for augmenting caloric intake and providing such vitamins as A and C, there are a number of constraints that do not make the development of home gardens universally applicable:

- o Lack of available land (village patterns).
- o Legal right to land.
- o Theft of crops.
- o Lack of government support in research and extension.
- o Lack of community motivation and action.
- o Lack and cost of water and lack and cost of seed.
- o Habit of free grazing. If crops are not to be trampled, costly fences may have to be erected.
- o Land unsuitable (flooded or rocky).
- o Pests and lack of fertilizer.

Before gardens are advocated, the following factors must be assessed or tested:

- o Food production practices (standard questionnaire).
- o Available technology.
- o Suitability and general guidelines for adaptation to local conditions.

Pilot gardens should be established before a large project is begun.

Little is known about existing traditional home gardening practices throughout Africa. Without solid data on the socioeconomic and climatic factors that influence home gardens, the chance for successful programming is limited. (38)

Food Characteristics and Composition. As migration increases to cities with health care, education facilities, social services, and a wide variety of amenities, the number of landless increase.

New life styles alter eating habits, preferences, time patterns, and cooking energy. Canned, refined foods and well-packaged convenience foods with long shelf life replace usual staples. Maize is milled and mass produced, e.g., as "Bakers Cones" (a Premier Mills product available in Southern Africa) -- a highly refined product which, although easy to cook and very white and fine, is nutritionally inferior to home milled maize and has been shown to be deficient in folate, zinc, riboflavin, and niacin. (40) Canned milk replaces fresh milk, and bottles replace breasts. Changing food processing can also cause public health problems, as was recently the case in the U.S., where the infant formula Nursoy's new processing caused B6 deficiency, and a large number of infants on this formula developed fits. Commercially processed food requires standards, inspections, and surveillance. Consumer nutrition education -- in particular how to budget and buy -- becomes increasingly important. Fortification, too, may have to be considered.

Disposable Household Income

Disposable household income is a useful measure for assessing the purchasing power of individuals or households. This purchasing power corresponds to that part of the income available for feeding household members and depends on absolute household income, food and non-food expenditures, the level of food and non-food processing, and the different elasticities of demand for different products. FAO recommendations set food expenditures at 45-50 percent of total household revenue as ideal.

- o There is evidence that 40-60 percent of African families have an inadequate income for basic food needs.
- o Cash croppers do not budget and often spend all their money at harvest time.
- o The lure of prestige goods competes with household food needs, and costly processed foods replace regular staples.
- o Money is used to buy consumer goods, not food.
- o Cash cropping provides a disincentive to home gardens. All food has to be bought.
- o Household disposable income is further reduced during times of food shortage. Lack of price controls hurts the subsistence or migrant farmer.
- o Men often control the family's money and make the purchases. In some countries, migrant workers send products back to their families but not cash.

Little is known of what modifications can be made to alter the situation. In many areas, little attention has been focused on how much food and money a family requires to meet their nutritional needs and how best to use them.

In Liberia, an interesting approach taken was to calculate the minimum-cost diet for 2 adults and 3 children aged 10, 3 and 1 years. A diet of 10,900 calories was calculated with 260 gms of protein in the pre-harvest season for urban dwellers. From this, using locally available in-season staples, the costs were calculated by a nutritionist and compared to monthly family income to assess if family income would support a basic minimum diet. (41) It was found that for 40 percent of families, the diet was inadequate. Such measures make it relatively easy to predict caloric deficiencies and malnutrition. Where the dependency ratio is high, this minimum diet is even lower.

For some people, increased income has replaced undernutrition with overnutrition. In urban areas, sugar, flour, and oil calories have increased the incidence of dental caries, obesity, and diabetes and its sequelae quite considerably. Rising incomes due to cash cropping do not necessarily lead to improved nutrition. There is some evidence that cash cropping has contributed to increased expenditure on consumer goods and alcohol.

Local analyses of problems and ways to remedy them by controlling advertisements, providing funds, and giving nutrition education in work places and large stores could be tried.

Infectious Diseases -- Sickness-Calorie Loss

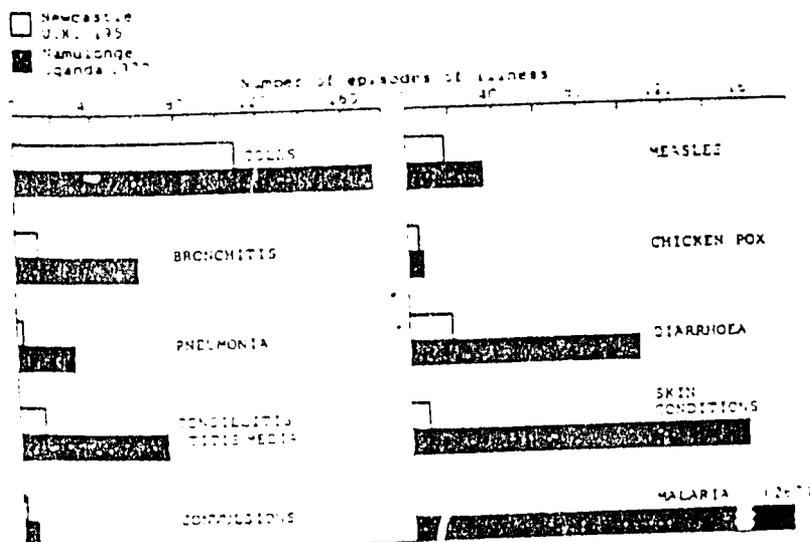
While food production is important, it does not guarantee food availability. Most calculations are for healthy populations who are moderately active and do not consider the inordinate workload of women nor their poor nutritional and health status. Furthermore, in areas where diseases such as measles, malaria, hookworm, diarrhea, and pneumonia are highly prevalent, sickness-preparedness calories (to replace calories lost to infection) must be provided. (42,43)

The causes of PEM are more complex than a simple lack of food. (44) In marginally malnourished infants and children, parasitic and infectious disease, particularly associated with diarrhea, make an already poor nutritional situation much worse. In addition, it is known that well-nourished children do not succumb to these diseases as readily or as severely.

Figure 6 illustrates the frequency of infectious illness among children in their second year of life in an African village in Uganda in 1970 compared to children in Newcastle, England in 1950. In the study, pneumonia was nine times more frequent in the Ugandan village, where malnutrition was very prevalent. (45)

Diarrhea. Diarrhea is responsible for 5-18 million deaths annually in children under five in developing countries. It is most common during the weaning period of infants 6-12 months old. The anti-infectious factors in human breast milk are especially

Figure 6: TOO MUCH ILLNESS EARLY IN LIFE



Source: Parkin, J.M. The Child in the African Env. 1975, p. 193.

protective against entero-bacteria such as E. coli and cholera vibrio, which cause significant mortality in developing countries. The consequence of the interaction of malnutrition and infection results in marked stunting of growth. (46)

Reduced caloric intake or availability occurs through a variety of mechanisms, such as loss through fever, damaged mucosa, malabsorption, and reduced appetite through fear of vomiting or frequent stools. Often breast milk is erroneously withheld. Ronde estimates that 35 percent of childhood diarrhea is associated with malnutrition. Other workers in the field, such as Palmer, have found that curing diarrhea was universally related to nutritional status. Children under 2 have been reported ill with diarrhea 10-14 percent of the time. Ronde suggests that for each day of illness it is necessary to double up on calories to 150 calories per kilo per day for catch up. (42) It is important to realize that each of these diseases produces different effects.

Measles. Measles in Africa is known to have a more serious effect on nutritional status than any other common childhood infection. In addition to its association with keratomalacia and severe desquamation, it has a high fatality rate. (43) Overall, measles produces a mortality rate among malnourished children in Sub-Saharan Africa that is four hundred times greater than in the West. In Mali the mortality rate from measles was 38 percent. In developed countries, measles is no longer a serious problem, probably because of better nutrition. Studies from East and West Africa confirm that a child with low weight and slow growth is more likely to die from measles. By comparing weight loss, recent studies have shown that Kwashiorkor frequently follows measles. In a Nigerian study at Imesi, nearly 25 percent of the children lost 10 percent or more weight after measles. Hendrikse showed that the severity of measles depends to a large extent on the nutritional state of the child at the time of the illness. Some children take up to 3 months to regain this weight loss. In Zimbabwe, it was found that 76 percent of children with measles were below the third percentile (Harvard scale) weight for age; their fatality rate was 7.4 percent. Those that died were not only under the third percentile, but also under 2 years of age, again pointing the need for early detection and intervention in the under-2 year olds. (47) The older children who survived, but who were under the third percentile, took twice as long to recover sufficiently to leave the hospital as those in the fiftieth percentile.

Measles also affects vitamin A needs and availability. In a Kenyan study, workers found that 50 percent of childhood blindness was caused by xerophthalmia that in most cases was precipitated by measles. During measles, the vitamin A levels fell, and a single dose or injection of vitamin A helped reverse the pathological changes. Such an intervention has the potential for significantly reducing xerophthalmia and subsequent blindness.

Malaria. There is some information on the relationship of malnutrition with gastrointestinal parasitic infestations such as ascaris and hookworm and blood infestations such as malaria. Malaria is a very major health problem in the area, affecting 60 percent of the population. It is associated with iron-deficiency anemia as well as folate-deficiency anemia. In addition to its nematological-nutritional effect, it has a sizeable impact on birth weight. In one study, infants of malaria-infected mothers were 89-312 grams lighter than infants whose mothers were not infected. As has been pointed out previously, weight differences of such magnitude can significantly affect the growth and mortality of these infants. Studies, although limited, show that infants are immune due to the first three months of maternal antibodies. Breastfed infants rarely get malaria. Children six months to five years old are the chief sufferers. A Nigerian study found that 80 percent of unprotected children had malaria by 2 years of age. An episode of "uncomplicated malaria" can result in a food loss equivalent to three days' intake.

Ascaris and Hookworm. Worms too can reduce caloric utilization by as much as 25 percent. (48) Deworming studies showed that the nutritional status of the study group improved after deworming, whereas in the control group nutrition deteriorated in spite of supplementary feeding. A worm population of 100 roundworms can result in a nutrient loss equivalent to four eggs per week! Hookworm studies show that heavily infested persons absorb 10 percent less than worm-free persons and nitrogen loss is roughly proportioned to the infestation load.

Maternal Illness. Although the mother is a vital member of the maternal-infant dyad, there is a lack of information on the effects of infection on the mother's health and her child-rearing practices, her productivity, and her nutritional status. Mothers in malnutrition rehabilitation centers often explain that their children's malnutrition followed an illness of the mothers that resulted in food shortages due to their inability to work in the fields. (32) This may be far more important than previously considered and should be studied.

In summary, the infection/nutrition cycle is one of continuous depletion, resulting in anemia, vitamin A deficiency, growth retardation, increased susceptibility, and higher mortality rates. Available calories in marginal diets can thus be stretched to deficiency.

Women's Workload and Status

The high illiteracy rate in women and their low social status mitigates against change. Reluctant childbearing and changes in traditional customs have made men less responsible

for their wives, and older women who once were esteemed are left to fend for themselves and their children. This has resulted in increasing numbers of women who are widowed, divorced, or unmarried with malnourished children. These women are unskilled, uneducated, and often landless. (49) Those who work in the fields when ill cannot feed their families. Often, they go to cities in search of work and leave their infants on farms or at home with children. Studies show that these girl-mothers are a fertile source of infant mortality. When these young girls are educated, however, infant mortality and birth rates decline.

In Botswana, about 50 percent of women are unmarried. (32) Young, unmarried women struggle to provide for themselves and their children. In studies of Kenya and Zaire, children of abandoned and single mothers have higher morbidity and mortality rates. Unless these mothers learn skills and receive health care, the problems will increase.

Even married women have an inordinate workload, and their duties and income-generating or food-producing activities may affect the amount of time they have for child care and nutrition. Wives of migrant farm and mine workers are especially at risk for malnourishment. Often receiving little money from their husbands for seeds, fertilizer, or agricultural tools, they are left to do the farming. Sick miners with tuberculosis return home and infect the family.

A major constraint to improved nutrition is the status of women and their workload. (50) Women in developing countries perform incredible amounts of work on grossly deficient diets in debilitating, disease-infested environs. (51) Women produce more than half of the continent's food, often with primitive tools. In many areas, women grow subsistence crops, e.g., millet, sorghum, and cassava. In Zambia, an analysis of women's workload during the planting season revealed a workload of 15 hours per day -- this is often hard physical labor -- with an energy expenditure of between 2400 and 2700 calories per day -- far in excess of the daily intake (see Table 9 and Figures 7 and 8). (52) It has been estimated that some women in Malawi hand-pound maize for the family for 7.5 hours per day. These women not only carry their infants for considerable distances but also carry crops to market, as well as food, fuel, and water for the family, often for long distances. In calculating the time given to food preparation, it can be seen from the Zambian study that as much as four-and-a-half hours a day are given to pounding grain, collecting firewood, fetching water, and cooking. This time and energy could be reduced considerably by simple technology at the household level. Mothers could have more time for education and child care.

Frequent pregnancies throughout the childbearing years and subsequent child-rearing activities also add to the health and

Table 9: ITEMIZED ENERGY EXPENDITURE OF ZAMBIAN WOMAN DURING PLANTING SEASON

Activity (or similar activity substituted)	Time Spent (hours)	KCal/Min.	Energy Expenditure (calories)
Walking and carrying baby (= 3 mi/hr w/ 10 Kg. load)	0.50	3.4	102
Ploughing and hoeing	9.50*	4.8-6.8*	1,758-2,328*
Collecting firewood and carry- ing it home (= walking 3 mi/hr w/ 10 Kg. load)	1.00	3.4	204
Pounding grain (= chopping firewood)	1.50	3.5	315
Fetching water (= walking 3 mi/hr to site & walking home 3mi/hr w/ 10 Kg. load)	.37 .37	3.0 3.4	66 75
Cooking	1.00	1.7	102
Eating (= sitting)	1.00	1.15	69
Washing clothes & children (= light cleaning)	0.75	2.5	112
Sleeping	8.00	0.9	432
TOTAL	24 hrs.		3,235-3,805

Reference: FAO/WHO, op.cit., Annex 5, Table 35, Energy Expenditure in Specified Activities: Women.

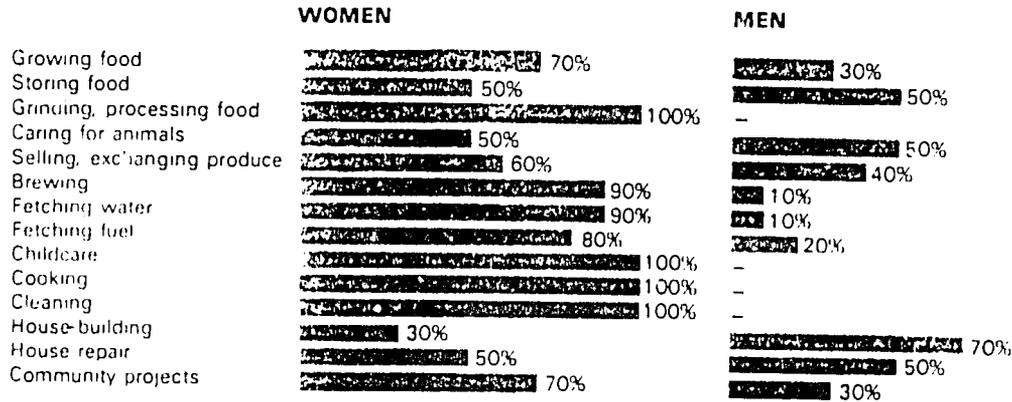
* Actual time hoeing would not be 9.5 hours; let us assume that the total time spent actually hoeing is half this amount, with periods of rest, standing, in between.

Figure 7: WOMEN'S WORK IN AFRICA

WOMEN IN AFRICA

In the fields

Between 60 and 80 per cent of agricultural work in Africa is done by women— on top of their household chores. In fact women in Africa do more agricultural work than in any other continent— and twice as much as African men.



Source: UN Economic Commission for Africa

In many traditional African societies it is normal for women to support themselves, their children *and* their husbands. A quarter of a million households in Egypt, half a million in Kenya and a third of a million in Botswana are dependent on the productivity of their women.



Photo: UNICEF



More work

Development tends to increase women's workload: new tractors lessen a man's work of ploughing; new seeds and fertilisers mean more weeding and hoeing for women. One study found that introduction of new technology in some African villages increased women's work by 25 per cent.

Courtesy Unitarian Universalist Service Committee Third World Calendar Boston Mass 1984.

Figure 8: EDUCATION FOR WOMEN

Education can be the key to women's liberation, offering greater equality with men, better understanding of family planning and a chance to work outside the home.

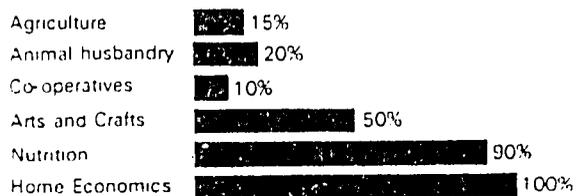


© Mark Edwards

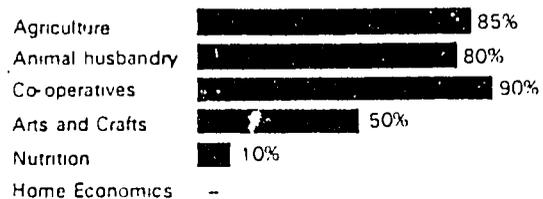
At school

Though African women do the majority of the work, the majority of the education about that work is provided for African men.

Nonformal education WOMEN



Nonformal education MEN



Source: UN Economic Commission for Africa

nutrition needs of these women. Improved health care and education should be made available. Often, women have no control over money, and in many areas, the husband purchases the food. In these situations, nutrition education must be delivered to men, as a Kenyan study has shown. (53)

Seasonal day care centers with communal feeding may be tried. Milling is becoming increasingly available; whether it has freed the mothers up for food preparation and child care has not been assessed. Hopefully, it has helped the mother conserve some of her energy for other activities. Where animal traction has been introduced, women's workload has tripled as more acreage has to be weeded and sown.

The Oodi weavers in Botswana have developed an income-generating cottage industry that has made them self-sufficient. (54) They see the operation through from start to finish. Sales and distribution are also part of this village cooperative venture. They are able to bypass the middlemen. The nutrition status of the village has improved with increased income.

Social, Cultural, and Religious Factors

Social patterns are changing, although polygamy still exists. Migration has contributed to a breakdown of family structure. The worker in the city often has two families and cannot support both. The dependents on the farm, including the aged, sick and young, increase in number while family support decreases and agricultural tasks fall increasingly on the women and children. Senior wives who were respected are now discarded. Divorce and unmarried mothers are on the increase, and the number of women household heads is increasing. In Botswana, as many as 25 percent of household heads are women, and 50 percent of mothers are unmarried. This "no-win" situation will not be solved by nutrition education but by economic measures that provide these women with income-generating possibilities. These at-risk groups could be assisted by developing stores, winter gardens, and where possible, shared child care.

Men regard the fact that their children did not get enough food as unacceptable and blame it on the women. In some cultures, if the child has Kwashiorkor, the woman is accused of having had relations with another man. In Malawi, where Muslims practice polygamy, if a child develops Kwashiorkor it is believed that the husband is going to marry another wife. It is for these special at-risk groups that multisectoral programs are much needed; where agricultural programs exist, nutrition components can be built in. In large plantations, workers may be domiciled with or without their families. Often, part of the workers' payment is in kind. In these areas, a large number of the children are malnourished.

Another costly problem that is on the increase is alcoholism. Previously, beer was home brewed and consumed with the evening meal; it provided calories and nutrients in a social setting. Now in many developing countries, home brewing is illegal and commercial liquor must be purchased. In several areas, this has resulted in increased malnutrition and even child neglect. In Southern Africa, fortification of the commercially produced beer has been considered because of its low riboflavin content. Alcoholism can result in an increased incidence of pellagra and, for the fetus, congenital defects and even mental retardation. Alcoholic beverages should at least be labeled, warning of the danger in pregnancy.

Feeding Practices

Infant Feeding. These must be considered with the practices of the mother as well, as she is involved in breastfeeding and her beliefs affect the infant's nutrient intake.

Breast milk is a natural resource of great biologic and economic value and, as such, has enormous public health implications. How infants are fed is often a matter of life or death. It has been estimated that the reinstatement of breastfeeding in developing countries could save 10 million children annually from diarrheal disease and death.

National and international pediatric and nutrition organizations and health experts have stated unequivocally that breastfeeding is the preferred method of infant feeding for the first 4-6 months. Breastfeeding is more than feeding. It is intimately related to child-rearing. For infants in illiterate populations, living in environs of poor sanitation and endemic disease, bottle feeding results in a high prevalence of early PEM and diarrhea, as well as increased morbidity and mortality rates.

There is no question that in most countries there is not only a decrease in the frequency of breastfeeding but also in the duration, thus creating a new problem. Formerly, prolonged, excessive breastfeeding was a major concern. (55,56) Fear of pregnancy resulted in infants being breastfed for a year or even 2-1/2 years exclusively and resulted in severe PEM for the infant.

Traditional practices are changing. Previously, sex was taboo during pregnancy. Now migrant mine workers in Lesotho bring cans of formula home so their wives can bottle feed their infants and resume sexual intercourse.

Bottle feeding of infants is replacing breastfeeding in urban areas. For example, in the urban areas of Sierra Leone,

43 percent of infants 3 to 50 months old were bottle fed whereas only 8 percent of infants in rural Sierra Leone were bottle fed. In the Ethiopian urban setting, 2 percent of the urban poor never breastfed.

Cultural beliefs also may be deterrents, e.g., to treat diarrhea and vomiting, mothers withhold food. In many countries colostrum (first breast milk, usually lasting 2-5 days) is considered to be harmful because it looks like pus. It is discarded and the infant is fed sugar water or maize gruel until the "true milk" comes. This practice may result in increased mortality and morbidity as colostrum has valuable anti-infective properties and high vitamin A concentrations.

Some socio-cultural factors affecting breastfeeding include:

- o hospital practices
- o advertising practices
- o national legislation
- o severe maternal malnutrition
- o ignorant health professionals
- o breast as a sex symbol

Although most deliveries take place at home or in the village, hospital deliveries are increasing, and their routines often create barriers to "demand" breastfeeding. In Harare Hospital, Zimbabwe, mothers live at a hostel down the road so they breastfeed during the day, and at night they go to the hostel and infants are bottle fed. (32) This artificial separation interferes with the frequency of feeding essential for the establishment of lactation. When a mother or infant is ill and hospitalized, the facilities do not allow for rooming in, and the one is admitted without the other. By contrast, in Mozambique, mothers, seen as agents of change, are encouraged to stay with their infants, and receive health education in the hospital setting. They still get paid if working. The hospital continues to provide the model for formula feeding and young mothers, especially in the cities, have no breastfeeding support system.

Advertising of formula continues in many countries and is widely practiced in spite of WHO code guidelines. (56) Many health professionals are ignorant of practical aspects of breastfeeding and formula feed their own infants while preaching breastfeeding.

Working mothers do not get breastfeeding breaks. There is no legislation to enforce the right to breastfeed in many

countries. In Mozambique, e.g., lactation breaks are mandatory if the mother wants to breastfeed, and nearby day-care facilities may even be provided.

Some mothers do not want to breastfeed. An increasing number of countries have formal dress codes, and the breast has changed from an organ of lactation to a sex symbol.

Severely malnourished women produce less milk than well nourished women. The decrease can be from 800-700 ccs. normally to 600-400 ccs. per day. In addition, there is some evidence that the fat and vitamin A content of milk of severely malnourished women decreases after 3 months. (57) However, it must be pointed out that it is 10 times cheaper to feed the mother the extra calories than to formula-feed the infant for 6 months.

In order to minimize these socio-cultural constraints (55,57,58) to improved nutrition, the following measures should be considered:

- o The frequency and duration of breastfeeding should be monitored locally.
- o Advertising of formula on health premises should be stopped.
- o Health service personnel should be assessed for their knowledge and skills on breastfeeding and their training upgraded as needed. They should also be provided with consultative resources.
- o Maternal nutrition in the last trimester and during lactation should be of prime concern.
- o Mothers diagnosed to be at risk for malnutrition (e.g., mid-arm circumference of less than 23 cms) should be provided with supplements. Ideally, some mixture dispensed as "maternal medicine" could be developed, for example, using P.L. 480 funds.

Weaning. This is a very critical period which usually begins when breastfeeding is no longer exclusive and ends when the child can feed himself on a full adult diet. Sudden weaning by sending the child to the grandparents or applying noxious stimuli to the breasts leads to periods of limited food intake. In addition to this, infections, especially diarrhea, add to the calorie drain. The unhygienic preparation of infrequent bulky food that is often contaminated with diarrheal organisms is part of the problem. Inadequate, unsanitary storage facilities allow easy spoilage of foods, especially in hot climates. In many households, animals and children stay

together, providing another ready contamination source. Other important considerations regarding weaning include:

- o After the infant is 4-6 months old, breast milk cannot supply enough calories for growth.
- o Sickness adds to the calorie drain.
- o The infant and child need calorie-dense foods (foods high in calories for volume). Bulky staples such as maize and cassava have low density calories that are not easily digested by the young child's small stomach. In order to satisfy the child's energy requirements, he needs to consume one kilogram of food each day, two or three times as much as a British child eats. Caloric density can be increased by adding oil to the diet or even sugar (30 ml. of cooking oil provides 25 percent of the infant's daily caloric needs).
- o Seasonal shortages affect availability of food and, therefore, growth. Also, during times of seasonal shortages, infections are most prevalent. At these times too, the family changes its diet, and this may also affect the infant's intake.
- o Cultural beliefs influence selection and use of food (59,60); e.g., in Western Kenya, as in many other areas, it is believed that eggs delay a child's ability to walk or talk. Fruits may be taboo; e.g., in Liberia bananas are thought to cause eye disease or enlargement of the fontanelle.

Much can be done during this period to improve the situation, including:

- o Local production of weaning foods made under sanitary conditions. Multimixes such as lukine pnale made in Malawi from groundnuts and maize should be encouraged.
 - o Hygienic preparation and storage of food. Foods should be freshly prepared and given separately from adult meals three or four times a day. More attention should be paid to the collection and storage of fresh milk. Hand washing for food preparation before meals should be encouraged. The use of food left to stand overnight and easily contaminated with diarrhea-causing organisms should be discouraged. This bacterial contamination constitutes an area of major importance, and where fuel shortages make boiling very difficult and costly, other types of sterilization might be sought. A water cooler that uses coke is one form of appropriate technology that can be used. Natural bacterial retardants should be sought. Solar heat may be another avenue to pursue.
- (38)

- o Careful and early monitoring of weanlings, including use of a growth chart. Infants under one are often seen too late. Home visiting of infants under one that are at risk for malnutrition should be implemented.
- o Promotion of breastfeeding during the first two years of life. Breast milk should continue to supplement weaning foods for the first year, as it adds 25 percent to the caloric intake.
- o Addition of sickness-preparedness calories to the daily requirements -- calories that make up for those lost due to infection.
- o Development of community projects to protect the water source and provide a potable water supply.
- o Education based on a study of mothers' knowledge, beliefs, and attitudes.
- o Providing dry mixes to which liquid can be added at the last minute.
- o Encouragement of home gardens with practical assistance where suitable.

Elaborate commercial weaning foods such as Pronutro often do not reach the poor. The soy weaning food in Tanzania was unsuccessful. HOVIPREP seems to be a more practical program that has added nutrition components and weaning food to projects such as the Sine Saloum Rural Health Project in Senegal. (61) Another such project was started in Gambia. These projects appear to be examples of practical, good approaches and should be assessed for wider application (see project description in section on Resources).

The community worker should know what practices are prevalent and, using simple tools, learn to make nutritional assessments and be responsible for helping to solve the nutrition problems. The health worker should be able to initiate all the activities mentioned above as well as suggest appropriate alternative local food sources in the local setting during the different seasons or in hard times.

Maternal Feeding Practices. Not only does the mother have food preferences for her child but there are also cultural food taboos for her during pregnancy and lactation. (62) The most common practice in pregnancy is a reduced caloric intake for an "easy labor." Protein intake is reduced and special foods are eaten during the pregnancy. Eggs generally are taboo as they allegedly cause such problems as abortions, pig heads, etc. However, the extent of these practices is not known. Fruits

are believed to cause diarrhea and are often avoided: There is some evidence that this is true. A study in Oman shows that women change their diets believing that the unborn infant is located in the stomach and that as the infant grows more space must be left and less food eaten. The Somalis have a good practice of encouraging mothers in pregnancy to eat liver. (59)

Many women, especially poor women, are pica eaters. Pica is the eating of non-food substances, such as starch or dirt, excessively and compulsively. In Sierra Leone, dirt eating is known as "dotti." Studies show that for women with pica, iron or calcium supplementation may stop the condition. The exact cause of pica remains unknown. In many cultures, lactating women eat special foods known to increase milk production, usually high calorie foods. In Ethiopia, for example, large amounts of butter are added to maize porridge in lactating women's diet. While there is anecdotal data, the extent and frequency of practices are not known.

III.

RESOURCES FOR PROGRAM IMPLEMENTATION

On-Going Africa Bureau-Supported Interventions and Staff

Africa Bureau's Bilateral Programs

Africa Bureau has 30 programs which contain maternal and young child components (See Table 10), lots of projects compared to other Bureaus, but with less funding. More than half of them are P.L. 480 MCH Title II projects, a quarter education and training projects. Analysis suggests that present priorities and resources are directed towards food security, personnel development, and the delivery of critical interventions.

Africa Bureau nutrition experience includes weaning foods production (e.g., Tanzania and Senegal); CHW and TBA training, and recent efforts with mass media nutrition education (e.g., AED/Stanford in Gambia). These activities are potential reservoirs of experience which could be useful to examine in future planning efforts. Table 11 indicates the collaborators of AID-assisted projects in Africa.

P.L. 480 Title II MCH Programs

P.L. 480 Title II MCH programs in Africa focus on two main areas: (1) food security versus disincentive issues, and (2) food targeting and nutrition education effectiveness. Currently, P.L. 480 MCH programs constitute nearly half of all of the nutrition activities and have a budget several times that of the rest of the AID-assisted programs in Africa. Short food supply in many African countries and in the region as a whole has made sector assessments essential. The P.L. 480 programming guidance is to continue to assess the food sectors, to enhance development and minimize disincentive effects, to integrate activities with other development assistance, and to program on a multi-year basis as much as possible. MCH Title II food aid should especially emphasize improved nutrition education, having found that just giving food is not the solution. Nutrition programming personnel are essential to this activity. P.L. 480 guidance emphasizes that the sector assessments should also be used in the development of Country Development Strategy Statements (CDSS's).

Table 10: AID-ASSISTED MATERNAL AND YOUNG CHILD NUTRITION
PROJECTS BY ACTIVITY TYPE, 1982¹

<u>Activity Type</u>	<u>Projects</u>
National Strategies	1
Nutrition Education	3
Formal Nutrition Education and Training	10
Weaning Foods	1
Primary Health Care	6
PL 480 MCH	18
Studies	--
Information Dissemination	--
Other	--
TOTAL	39
	—
	—

¹ Analysis of a S&T/N survey of missions' projects.

Table 11: COLLABORATORS OF AID-ASSISTED MATERNAL AND INFANT
PROJECTS IN AFRICA BY TYPES OR ORGANIZATION³

Government

MOH 18¹

Other Ministries 2

Institutes

PVOS² 24¹

¹ Does not count MOH and MOSS in 2 cases.

² Nearly three-fourths of the PVO projects are PL 480.

³ Analysis of 1982 S&T/N survey.

Assistance is available to improve P.L. 480 planning, targeting, activities, and educational components. Examples within recent P.L. 480 guidance included the following activity areas and resources:

- a. Develop Policies and Plans for Government Involvement
 - o Nutrition: Science, Technology, and Planning Support (931-0262) can help governments to assess their food sectors, develop policies using P.L. 480 as necessary for food security, and plan and develop budgets for activities.
 - o Nutrition: Improving Maternal and Infant Diets (931-1010) can assist sensitization workshops for leading policymakers and health professionals to both recognize maternal needs and weaning food problems in Africa and can also assist in planning.
 - o P.L. 480 sector assessments can assess the need and the effectiveness of use of P.L. 480 funds.
- b. Integrate Food with Health Services
 - o Nutrition: Health Systems RSSA (931-1198) can provide technical assistance for the integration of nutrition with health services.
- c. Adequately Train and Supervise Field Workers
 - o Nutrition: Health Systems RSSA (931-1198) is preparing and distributing training materials.
 - o Nutrition: Improving Maternal and Infant Diets (931-1010) can provide assistance for training physicians, nurses, midwives, and community health workers in the critical areas in African nutrition, increased food for the mother, and improved timing and amounts of weaning foods.
- d. Educate Participant Mothers
 - o Nutrition: Education Field Support (931-1065) especially targets the areas of nutrition education in Food for Peace programs and mass media nutrition education.

Central Bureau Resources

In the Science and Technology Bureaus, both the Office of Nutrition and the Office of Health have many projects which are of potential use in developing health and nutrition programs in the Africa region. These projects are potentially useful in the areas of policy development, problem definition, institution building, and program development, delivery, and evaluation. Forms of assistance available include technical assistance, information, and program monies. The problem is that too much work has to be done with little funding and insufficient support staff.

Bureau for Science and Technology/Office of Nutrition Projects

Thirteen S&T/N projects are accessible by the Africa missions in health and nutrition-related areas. These projects cover the full range of program development from policy analysis through program delivery (see Figure 9).

Several of the S&T/N projects are particularly relevant to the Africa nutrition in health strategy. These activities were referred to in part in the preceding P.L. 480 section. The full range is briefly considered below:

a. Make a Diagnosis Before Beginning Activities

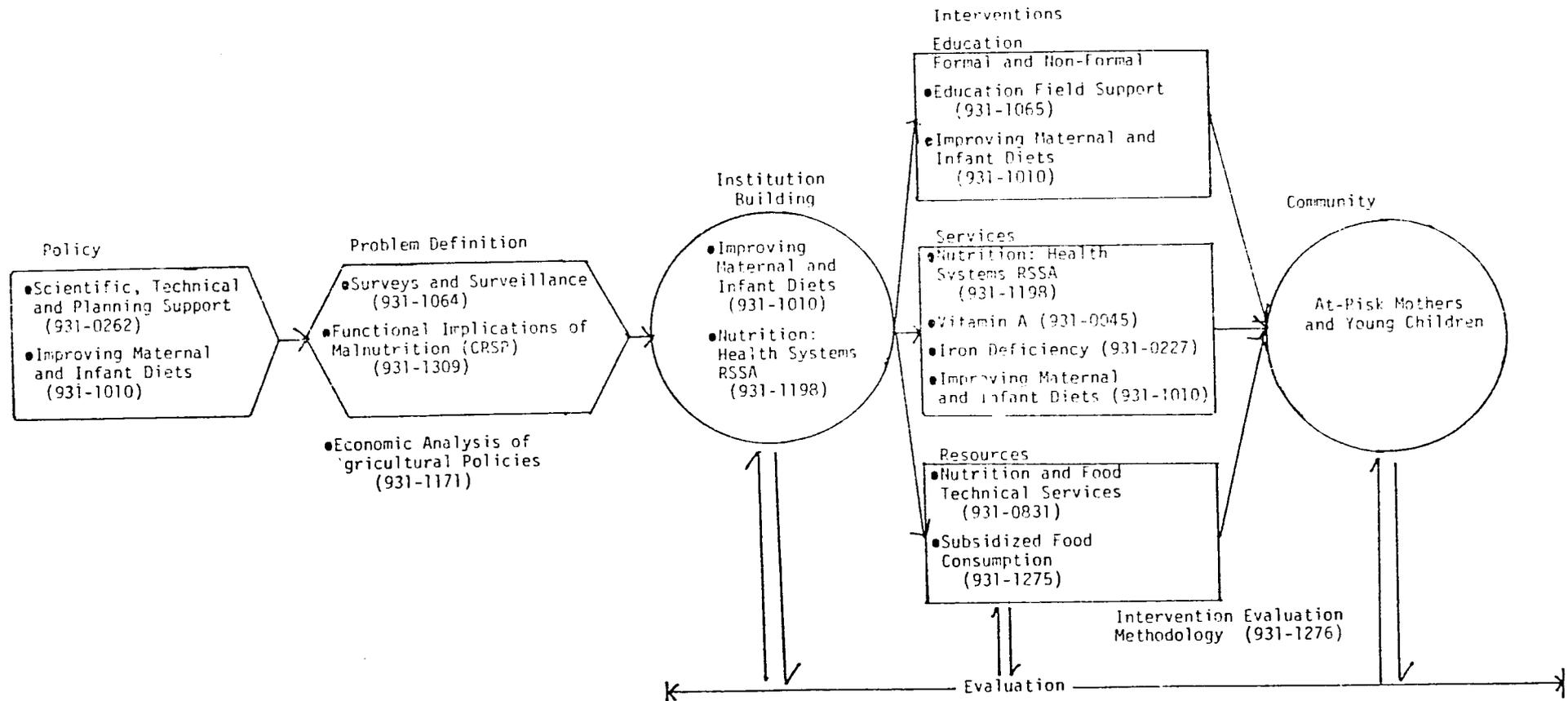
- o Nutrition: Surveys and Surveillance (931-1064) assists countries in developing methodologies and conducting surveys which focus largely on maternal and young child nutrition status.
- o Nutrition: Improving Maternal and Infant Diets (931-1010) provides country-specific literature reviews on maternal and infant status, diets, and beliefs.
- o Nutrition: Scientific, Technical, and Planning Support (931-0262) provides technical assistance to help governments analyze their problems, plan interventions, and integrate the plans into budget processes.

b. Determine the Famine and Hunger Periods

Projects 931-1064 and 931-0262 contribute to this objective.

- o Functional Implications of Malnutrition (931-1309) in Kenya is providing background research on the effects of various levels of food intake on basic human functions.
- o Nutrition: Economic Analysis of Agricultural Policies (931-1274) and Nutrition and Consumption Effects of Agricultural Policies both provide technical assistance, information, and methodologies to help planners realize

Figure 9: RESOURCES FOR MOBILIZATION, BUREAU FOR SCIENCE AND TECHNOLOGY: OFFICE OF NUTRITION



the correspondence between policies and food availability.

c. Improve Maternal and Infant Nutrition in Primary Health Care (Training of Personnel)

o Nutrition: Health Systems RSSA (931-1198) provides manuals and technical assistance for training primary service deliverers.

o Nutrition: Improving Maternal and Infant Diet (931-1010) provides information, funds, and technical assistance for medical and nursing schools and for auxiliary worker training programs.

d. Education of Mothers and Popular Sensitization for Improved Maternal and Infant Diets

o Nutrition: Education Field Support (931-1065) assists in the development of messages, activities, and mass media projects, especially in relation to PAC.

o Nutrition: Improving Maternal and Infant Diets (931-1010) assists in general mass media and other non-formal education specifically related to maternal and infant diets.

e. Deliver Essential Nutrients to Pregnant and Lactating Mothers

Besides the preceding educational and consciousness-raising projects, assistance is available specifically to improve maternal diets through the following activity.

o Nutrition: Iron Deficiency Program Support (931-0027) supports projects that develop and test appropriate strategies for use in preventing and curing iron deficiency anemia.

f. Improve Weaning Foods by Using Local Foods

o Nutrition and Food Technical Services (931-0831) assists in developing new, appropriate food-technology projects, including home and village-prepared supplementary foods for weaning age children and pregnant and nursing mothers, through a RSSA with U.S.D.A. The project is called HOVIPREP.

g. Provide Nutrition Interventions to Diarrheal Children and Promote Breastfeeding

The following four previously-mentioned projects provide assistance to alleviate diarrhea:

- o Nutrition: Improving Maternal and Infant Diets promotes better childhood feeding practices and foods.
- o Nutrition: Education and Field Support assists the education of the mother and general public to the need for appropriate practices to improve the young child's diet.
- o Nutrition: Health Systems RSSA trains workers and helps build systems that will safeguard against nutrition-related problems, including diarrhea.
- o Nutrition and Food Technical Services improves supplementary foods for young children, helping them to be better nourished and less susceptible to diarrhea.

Bureau for Science and Technology/Office of Health Projects

Seven Office of Health projects are immediately applicable to health services in Africa (see Figure 10). These projects focus primarily on the areas of institution-building and service delivery.

The following two S&T/Health projects are directly relevant to one of the proposed Africa nutrition strategy recommendations to provide nutrition alternatives to diarrheal children:

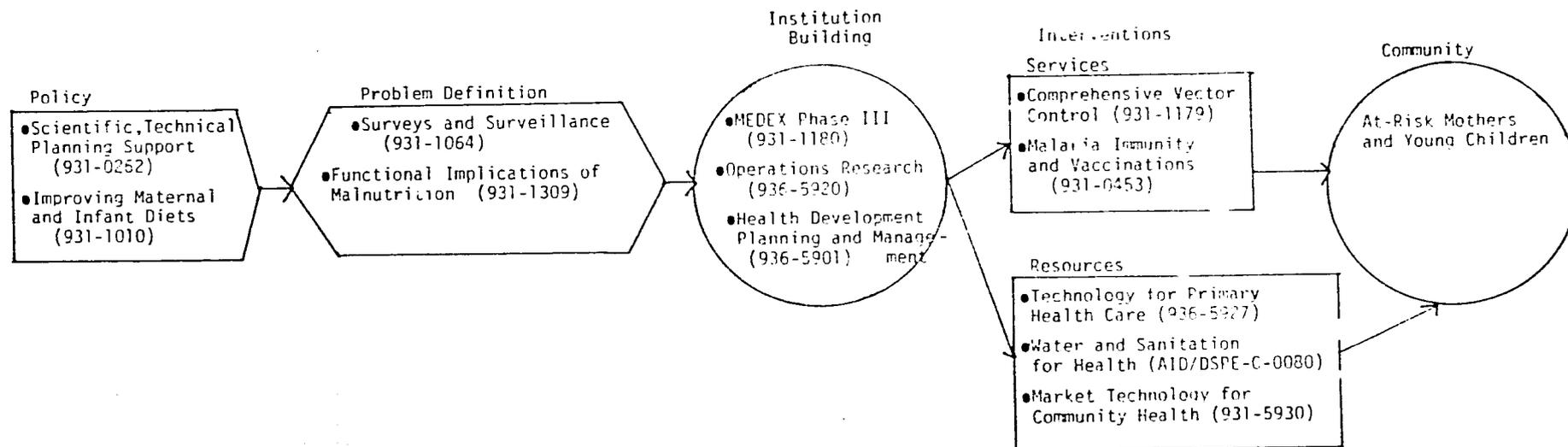
- o Technology for Primary Health Care (936-5927) principally addresses oral rehydration therapy, providing assistance for improved design, implementation, and evaluation as well as information support.
- o Water and Sanitation for Health (AID/DSPE-C-0080) provides assistance for preventive care: principally, increased water supply.

Host Country Resources

A recent FAO/WHO/OAU Africa region survey identified only 38 courses at all levels in the region, 24 in foods and nutrition related to health and 14 in food science and technology (see Annex B). Many of these programs were less than 4 months in length. The number of graduates per year was not usually available. In more detailed reports* for four countries in the region, a few

* Strengthening the Capacity of Institutions for Training, Applied Research and Advisory Services. Reports of the UNU/SCN Missions to Cameroon, Ivory Coast, Mozambique and Zaire. 7th Session of the ACC Subcommittee on Nutrition. Rome, Italy. March 2-6, 1981.

Figure 10: RESOURCES FOR MOBILIZATION, BUREAU FOR SCIENCE AND TECHNOLOGY: OFFICE OF HEALTH



additional programs were found, but the shortage of training programs and graduates in nutrition and health at all levels was confirmed.

The incompleteness of information on African training institutions and programs having nutrition components suggests a further need in the resource area: a cataloging of training institutions and of programs by country and sub-region as well as identification of institutions that could be strengthened for clinical nutrition training and of trainers who could serve as subregional resource persons. AID's International Manpower Training Office has no catalogue of nutrition training programs for the Africa region. A thorough document could be of use to both trainees and program managers.

Other Donor Projects and Programs

A 1980 survey of non-AID donor nutrition activities identified 105* nutrition projects in Africa. Projects existed in every category from policy development through service delivery. (See Annex C). Integrated MCH services, feeding programs, planning, education, training, and multifaceted programs were the most frequent ones by rank; however, the feeding programs received over four-fifths of the total funds (see Table 12). The remainder of the funds constitute slightly more than the corresponding AID funds. Maximum coordination and cooperation, as well as the introduction of relevant nutrition components, would greatly enhance these programs which generally leave a lot to be desired. The S&T projects, "Nutrition: Scientific, Technical and Planning Support" and "Health Development Planning and Management" could play significant roles in helping to plan more effective cooperation to meet critical African nutrition needs.

* Sabin, E. and C.J. Roesel. Survey of Externally Funded Nutrition Projects. A Report to AID. February 1980. 11 pp. and appendices.

Table 12: MULTILATERAL, NON-U.S. BILATERAL, AND PVO-ASSISTED
 PROJECTS (U.S. & OTHER) IN THE AFRICA REGION BY
 NUMBER OF PROGRAMS AND FUNDING LEVEL IN 1978

Planning	15	\$(1,595,000)
Training	13	(795,000)
Education	15	(904,000)
Multifaceted Programs	8	(1,608,000)
Integrated MCH Services	19	(1,925,000)
Nutrition Rehabilitation	5	(187,000)
Food Processing	1	(72,000)
Supplemental Feeding	9	(5,689,000)
Weaning Foods	3	(1,009,000)
School Feeding	7	(12,066,000)
Surveys	1	(59,000)
R & D	4	(565,000)
Nutrition, Unspecified	5	(215,000)
	<hr/>	<hr/>
TOTAL	105	<u><u>\$(21,685,000)</u></u>

REFERENCES

1. DeMaeyer, E.C. "Protein-Calorie Malnutrition" in Nutrition in Preventive Medicine, G.H. Beaton and J.M. Bengoa, eds. WHO, Geneva, 1973.
2. Alleyne, G.A.O., Hay, R.W., Picou, D.I., Stanfield, J.P., Whitehead, R.G. Protein Energy Malnutrition. Arnold, London, 1978.
3. Waterlow, J.C. and Payne, P.R. Nature 253, 1975: 113.
4. Baumslag, N., Sabin, E. and Roesel, C. In "Background Paper for Developing a U.S. Health Strategy for Sub-Saharan Africa." Vol. 1. OIH/DHEW, Rockville, Maryland, July 1979.
5. Bennett, F.J. Community Diagnosis and Health Action. MacMillan Press, 1979.
6. Williams, C.D., Baumslag, N., Jelliffe, D.B. Mother & Child Health: Delivering the Services. 2nd Edition (in press). Oxford University Press.
7. Baumslag, N. "Sierra Leone Trip Report." Office of Nutrition, USAID, Washington, D.C., 1981.
8. Bailey, K.V. "Malnutrition in the African Region." World Health Organization Chronicle, Vol. 29, 1975: 355.
9. Baumslag, N. "Malawi Trip Report." Office of Nutrition, USAID, Washington, D.C., 1979.
10. Tafari, N. "Prime Causes of Perinatal Mortality in Developing Society," in Birth Weight Distribution -- An Indicator of Social Development. G. Sterky and L. Mellander, eds. Sarec Report No. R:2. 1978: 20-28.
11. Famine in Africa: Report of the Second Session of the Joint FAO/WHO/OAU Regional Food and Nutrition Commission for Africa. Accra Ghana, December 1981: 39-61.
12. Baumslag, N., Edelstein, T., and Metz, J. "Reduction of Incidence of Prematurity by Folic Acid Supplementation in Pregnancy." British Medical Journal, (3 January) 1, 1970: 16.
13. Rosa, F. and Tursnew, M. "Fetal Nutrition." Bull. World Health Organization, 43, 1970: 785-795.

14. "Effect of Folic Acid Supplements during Pregnancy on Birth Weights of Infants," National Institute of Nutrition Annual Report. Hyderabad: Indian Council of Medical Research, 1974.
15. "Report on Effects of Maternal Nutrition on Infant Health Implications for Action." An International Workshop, Panajachel, Guatemala, March 12-16, 1979, Archivos Latinoamericanos de Nutricion, Vol. 29 (Supplement No. 1), 1979.
16. Rusn, D., Stein, Z., and Susser, M., Diet in Pregnancy: A Randomized Controlled Trial of Nutritional Supplements, Birth Defects: Original Article Series. Vol. XVI-No. 3, 1980. Alan R. Liss, Inc., New York.
17. Lechtig, A. "Effects of Food Supplementation During Pregnancy on Birth-Weight," Journal of Pediatrics, Vol. 56, No. 4, Oct. 1976: 503-520.
18. Guidelines for the Eradication of Iron Deficiency Anemia: A Report of the International Nutritional Anemia Consultative Group (INAVG). June 1977.
19. Burgess, H.J.L., Cole-King, S., and Burgess, A. "Nutritional Status of Children at Namitambo, Malawi." J. Trop. Med. Hyg., 73, 1972: 143.
20. Thilly, C.H. et al. "Strategy of Goitre and Cretinism Control in Central Africa," International Journal of Epidemiology, Vol. 6, No. 1, Oxford University Press, 1977: 51.
21. Maternal and Infant Nutrition Reviews, Lesotho; an INCS publication, Israel, R., ed. AID contract publication. AID/DSAW - C - 0209. Office of Nutrition, USAID, Washington, D.C. December 1981.
22. Report at Annual Meeting of the International Vitamin A Consultative Group (IVACG) Nairobi, 1981.
23. Somner, A., Munilal and Tarwojjo, I. "Protein Deficiency and Treatment of Xerophthalmia." Arch. Ophthalmol., 1982: 100.
24. Martorell, R. Nutrition & Health Status Indicators: Suggestions for Surveys of the Standard of Living in Developing Countries. World Bank. LSMS Working Paper No. 13, Feb. 1982.
25. Teller, C. Nutrition Problems in Aid-Assisted Sub-Saharan African Countries: Towards a Socio-ecological Classification of Target Groups. INU Working Paper No. 3, 1982.

26. Population Reference Bureau, World's Child Data Sheet, 1982.
27. World Bank, World Development Report, World Bank, Washington, D.C. 1981
28. USDA. Food Problems and Prospects in Sub-Saharan Africa: The Decade of the 1980's. Foreign Agricultural Economic Report No. 166. Washington, D.C., August 1981.
29. FAO Indicators of Food and Agriculture in AID Assisted Countries, 1981.
30. World Bank. Accelerated Development in Sub-Saharan Africa, An Agenda for Action, 1981.
31. Eicner, C.K. "Facing up to Africa's Food Crisis." Foreign Affairs, American Quarterly Review, Fall 1982: 151-174.
32. Baumslag, N. "Mothers and Children -- Nutrition and Health Care in Kenya, Zimbabwe, Mozambique and Botswana." Report to the Ford Foundation, 1980.
33. Baumslag, N. "Breast Feeding in the Developing World. Effects on the Health of Infants & Mothers." presented at the Maseru National Workshop on Breast Feeding, Lesotho, 1981.
34. Waldemann, E. "Seasonal Variations in Malnutrition in Africa," Trans. Royal Soc. Trop. Med. & Hygiene, 67, 3, 1973: 431.
35. Longhurst, R. and Payne, P. "Seasonal Aspects of Nutrition." Presented in a Conference on Seasonal Dimensions to Rural Poverty. Institute of Development Studies & the Ross Institute of Tropical Hygiene. IDS University of Sussex, 1978.
36. Eddy, T.P. "Food Shortage as Health Catastrophe." In Health in Tropical Africa during the Colonial Period. Sappen-Clare, E.E., Bradley, D.J., Kirkwood, K., eds. Clarendon Press, Oxford, 1980: 36-42.
37. Baumslag, N. "Food Distribution and Dependency in Famine in Africa," Famine, Pergamon Press, 1982.
38. Israeli, R. Proceedings. First Asian Household Nutrition Appropriate Technology Conference: Colombo, Sri Lanka, July 12-17, 1982. USAID Contract DSAW.

39. Arole, R.S. "The Comprehensive Rural Health Project Jamkned." In Community Action-Family Nutrition Programs. D.B. Jelliffe, ed. 1977: 97-114.
40. Coleman, N. et al. "Prevention of Folate Deficiency by Food Fortification, Vol. 1. The Antimegaloblastic Effect of Folic Acid Fortified Maize Meal." South African Med. Journal, 48, 42, 31 August 1974: 1795-1798.
41. Interministerial Technical Committee on Food and Nutrition Planning. Recommended National Food and Nutrition Plan for Liberia. August 1982.
42. Morley, D.C. and Woodland, M. See How They Grow. MacMillan Press, 1979.
43. Morley, D. paediatric Priorities in the Developing World, London: Butterworths, 1973.
44. Reutlinger, S. and Adderman, H. "The Prevalence of Calorie-deficient Diets in Developing Countries," World Development 8, 1980: 399-411.
45. Partkin, M., cited in The Child's Name is Today, a presentation prepared for a public lecture by David Morley on the occasion of the Celebration at the Institute of Child Health, First King Faisal International Health Award, 1982.
46. Taylor, C.E. et al. Malnutrition, Infection, Growth and Development. The Narangwal Experience. A Report to the World Bank. Johns Hopkins University, 1978.
47. Mossop, T.T. "Infant Malnutrition Centre." Af. J. Med. 10, 1964: 414.
48. Latnam, L., Latham, M., and Basta, S. The Nutritional and Economic Implications of Ascaris Infection in Kenya, World Bank Paper #271, Washington, D.C.
49. Ghai, D., Godfrey, M., and Lisk, F. "Planning for Basic Needs in Kenya," International Labor Office, Geneva, 1979.
50. Boserup, E. Women's Role in Economic Development. George Allen and Unwin, 1970.
51. Mitcnnik, D.A. The Role of Women in Rural Development in Zaire. Oxfam, 1972.
52. FAO/WHO op.cit., Annex 5, Table 35, "Energy Expenditure in Specific Activities Women."

53. "Fathers Help Fight Malnutrition." UNICEF News, 92, 2, 1977.
54. This is Our Life, Tapestries from Botswana. National Museum of Denmark. Danish Association for International Cooperation. Lentswe la Oodi Weavers and the Danish Association for International Cooperation, 1977.
55. Jelliffe, D.B. and Jelliffe, E.F.P. Human Milk in the Modern World. New York, Oxford University Press, 1978.
56. Contemporary Patterns of Breast Feeding, Report on the WHO Collaborative Study on Breast Feeding. WHO Geneva 1981.
57. Helsing, E. and King, F.S., Breast Feeding in Practice, A Manual for Health Workers, Oxford University Press, New York, Toronto, 1982.
58. Eporanim, G.J., Breast Feeding: The Biological Option. MacMillan Press Ltd., 1978.
59. Vemury, M. and Leveine, H. Project on Beliefs and Practices that Effect Food Habits in Developing Countries, New York: CARE, 1978.
60. Scott, S. Food Beliefs Affecting the Nutritional Status of People in Sierra Leone. National School of Nursing, Freetown, 1978.
61. Roesel, C. AID-Assisted Maternal and Young Child Nutrition Projects in Africa. S&T/N, Devres, Washington 1982.
62. Cameron, M. and Hofvander, Y. Manual on Feeding Infants and Young Children, 3rd. Edition, Clarendon Press, Oxford 1983.
63. Baumslag, N., Roesel, C., and Sabin, E. AID Integrated Low Cost Health Projects. Analysis. Vol. II, November 1978.
64. Wilcox, J.R., Corson, C. and Teller, C.H. Nutrition Components of AID-Supported Primary Health Care Projects in Sub-Saharan Africa: A Review. INU Working Paper No. 4, Sept. 1982. Rockville, Maryland.
65. Task Force on the Nutritional Components of a Primary Health Care Delivery System, Committee on International Nutrition Programs Food and Nutrition Board, NRC. Nutritional Components of a Primary Health Care Delivery System. National Academy Press, Washington, D.C., 1982.

66. Gwatkin, D.R., Wilcox, J.R., and Wray, J. Can Health and Nutrition Interventions Make a Difference? Monograph No. 13. Overseas Development Council. Washington, D.C., February 1980.
67. Kielman, A. Evaluation of Nutrition Intervention Projects. Office of Nutrition, USAID, Washington, D.C., June 1980.
68. Parker, R.F. "Narangwal Nutrition Project: Measurement of Service Inputs and Activities." (Draft) Johns Hopkins University, 1976.
69. Newell, K.W., ed. Health by the People. World Health Organization, Geneva, 1975.
70. Mangay-Maglacas, A. and Pizurki, H., eds. The Traditional Birth Attendant in Seven Countries: Case Studies in Utilization and Training. Public Health Papers 75, World Health Organization, Geneva. (1981).
71. World Health Organization. "Nutrition Review of the World Health Program I." World Health Chronicle, 26, 4, 1972: 171.
72. Beaton, G.H. and Ghassemi, H. "Supplementary Feeding Programmes for Young Children in Developing Countries." Amer. J. Clin. Nutr. (Suppl.) 35, 1978: 864-916.
73. REDSO/WA Response to Draft Africa Bureau Nutrition Strategy. Aoidjan 9957. 8/9/82.
74. Baumslag, N. and Boston, E. "Public Health Training. Review and Guidelines." Mimeographed Report. Tulane School of Public Health. 1983.
75. Evans, J.R. Measurement & Management in Medicine and Health Services. Training Needs and Opportunities. Rockefeller Foundation, Oct. 1981.
76. Health Progress and Manpower Development. Afro Techn. Paper No. 14, 1978.
77. Mata, L.J. The Children of Santa Maria Cauque. A prospective field study of health and growth. MIT Press, Cambridge, Massachusetts, 1978.

ANNEX A

LISTING OF MISSION-ASSISTED MATERNAL AND INFANT NUTRITION
PROJECTS

Country	Activity	Project Number	Collaborator		Funding in 1982 ¹
			Government	Other	
AFRICA					
Benin	PL 480 MCH	PL 480		CRS	\$ --
Botswana	Training MOH Staff (2)	633-0032	MOH		5,000
Burundi	PL 480 MCH	PL 480		CRS	--
Cameroon	In-service Training (Health)	932-0604	MOH		5,000
Congo	National Nutrition Education	679-0055	MOH	CARE	91,000
"	Primary Health Care		MOH	CARE	25,000
Djibouti	PL 480 MCH	PL 480		CRS	--
"	Refugee Health Services	AID-AFR-C/163Q	MOH	CRS	170,000
Ethiopia	PL 480 MCH	PL 480		CRS	--
Gambia	Mass Media and Health Practices	AID-DSPE-C-0028	MOH	AED/Stanford	72,000
"	PHC Training of VNB and TBAs		MOH	Project Concern	25,000
"	PL 480 MCH	PL 480		CRS	--
Uganda	"	"		"	--
Guinea	Mother-Child Health Care	698-041A.3	MOH, MSoc. Sec.		8,000
Kenya	Kidwazi Primary Health Care	615-0179	MOH	AMREF	12,000
"	Kitui Primary Health Care	615-0185		Kitui Diocese, CODEL	7,000
"	PL 480 MCH	PL 480		CRS	--
Lesotho	PL 480 MCH	"		CRS	--
"	Rural Health Development	632-0058	MOH		80,000
Madagascar	PL 480 MCH	PL 480		CRS	\$ --
Mauritania	"	PL 480		CRS	--
"	Rural Medical Assistance	682-0202	MOH		6,000
Kwanda	MCH Family Planning	696-0013	MOH	Population Office, M.Soc. Serv., MOH	5,000
"	PL 480 MCH	PL 480		CRS	--
Senegal	Millet Transformation Project		ITA		12,500
"	PL 480 MCH	PL 480		CRS	--
"	Senegal Rural Health		MOH		50,000
Seychelles	PL 480 MCH	PL 480		CRS	--
Sierra Leone	PL 480 MCH	PL 480		CRS	--
Sudan	Community-Based Family Health	932-0632	Univ. of Sudan		10,000
"	PL 480 MCH	PL 480		CRS	--
"	Rural Health Project	650-0030	MOH		93,600
Tanzania	MCH Aides Training Project		MOH		20,000
"	PL 480 MCH	PL 480		CRS	--
Togo	"	"		"	--
Upper Volta	"	"		"	--
Zaire	Area Nutrition Improvement	660-0079	MOH		200,000
"	Health Systems Development	660-0057	MOH		20,000
"	Basic Rural Health	660-0079	MOH		20,000

¹ Estimated funding level to be spent on Maternal and Infant Nutrition in 1982.

ANNEX B

Nutrition Training Courses in Africa

COUNTRY	Type of Course	Institution	Subject	Duration	No. of students 1st year	REMARKS
SENIGAL	- Agronomy and agrotechniques	National University of Senegal	Food technology	30 hrs.		
CAMEROON	- Science	University of Cameroon	Food technology			Conducted at Institut de Recherches Industrielles et Technologiques
	Polytechnic	National Higher Polytechnic	Food technology			
GHANA	Chemical engineering department Nutrition and Food Science	University of Science and Technology, Kumasi University of Ghana, Legon	Food technology Food Science			
IVORY COAST	Agricultural engineers and technicians	Richer National School of Agronomy, SIDAJan	Food technology	5-6 yr. course		
GULINA	Polytechnic	Polytechnic Institute O.A. Kassor	(Food Science) (Food Technology)			
KENYA	Food Science and Technology	University of Nairobi	Food Science and tech.			
NIGERIA	Food Technology Department Food Science and Technology Food and Home Sciences	Institute of Applied Science and Technology Faculty of Technology, University of Ife	Food technology Food Science and tech. Food Science			
SENEGAL	Technology	University Institute of Technology	Food technology			Technicians trained since 1967
TANZANIA	Science	Faculty of Science, Morogoro	Food science and tech.			
TUNISIA	Agronomy	National Agronomic Institute	Food technology			70 hrs. teaching in food technology especially conservation, refrigeration
ZAMBIA	Agronomy	UNISA, Kitsham	Food technology			

Source: FAO/WHO/OAU Regional Food and Nutrition Commission, Accra, Ghana, Dec. 1981.

ANNEX B (Cont'd)

Training in Food Science and Technology in Africa

Country	Type of Course	Year started	Diploma	Duration	Usual Dates	Conditions of adm.	Defined objectives	Defined programme	Notes	Field exercises	No. of students per year	No. of foreigners	1st year	2nd year	3rd year	Remarks	
ETHIOPIA (Ibadan)	Certificate Course Diploma B.Sc.		Dip. Diet. B.Sc. (Nut)	4 months 2 months 2 yrs.	Oct./June Oct./June	Nutritionist B.Sc. or Dip. Diet.	+	+		+							
GHANA	Nutrition educators (Bukungeri)	1974	Certificate	4 months	variable	3 yrs. secondary + 6 months in nutrition centre Age 18-35 yrs	+	+	2	(2/3)	20	-					
SENEGAL	Modules/Pro. of Medicine, CEISS, and various Schools of Health Sciences																
SWITZERLAND	Nutrition in Home Economics	1974	Dipl.			O level											
TANZANIA	Food and Nutrition in integrated planning	1975	-	2 wks.		Planning Officers											
TUNISIA	Higher technicians (Nutrition)	1970	Lycée diplôme	3 years	Oct./June	Baccalauréat				+	20					Ecole Supérieure de Sciences de la Nut et de l'alimentat	
UPPER VOLTA	Modules/Sub. of Health Sciences	1977	Dipl. Inf.	3 years		MEPC	-	-									
ZAMBIA	Nutritionist/ Dieticians	1976	Graduate Diet/Diet.	3 years	Oct./July	Baccalauréat or Burs. Dipl. 12	+	+	+	+	30-60	25	36	21	14	Institut Supérieur de Techniques nutritionnelles	
ZAMBIA	Nutrition in Home Economics Course																Natural Resources Development Coll.

10-

ANNEX C

NON-AID DONOR NUTRITION ACTIVITIES
IN THE AFRICA REGION
(1978)

<u>Type of Project</u>	<u>Donor</u>	<u>1978 Amount in U.S. \$</u>
<u>Regional</u>		
- Required workshop on food economics	FAO	87,000*
- African Rural Storage Center	FAO	(1,648,400)
<u>Benin</u>		
- Home Economics Rural insti. officer	FAO	(25,000)
- Food and Nutrition project for rural dev. centres	FAO	5,700
- Introduction of improved village nutrition	FAO	310,000
- Construction of 3 nut. ed. cents. (low countries)	Pays Bas	83,700
<u>Botswana</u>		
- One nutrition expert	WHO	50,000
<u>Burundi</u>		
- Nutrition of the child	UNICEF	93,000
- Central African Empire, World Food Program Office, 3 staff	WFP	50,400
- Food for hospital in-patients and health centers	WFP	13,284
- Food for advanced education	WFP	35,970
- Food self-sufficiency	USAID	800,000
<u>Cape Verde Island</u>		
- MCH including child weighing, nutrition education	SWEDISH SAVE THE CHILDREN	N.A.**
<u>Central African Empire</u>		
- None		
<u>Chad</u>		
- Food aid to vulnerable groups	WFP	2,479,000
- Aid distribution of milk, beans and rice to dispensaries and orphanages	UNITED EVANGELICAL MISSION	27,907
- Modernization of techniques of fishing	UNDP	79,140
<u>The Gambia</u>		
- Rural health and nutrition educators.	PEACE CORPS	210,000
- Supplemental feeding/PLW 40-5's.	CRS PL480	273,000
- Emergency storage of grain and food aid commodities.	FAO	15,250

Ghana

- Food and Nutrition Commission for Africa.	WHO	51,000
- Health Services, Nutrition education, supplementary food.	PVO	N.A.
- Health service, Nutrition education, supplementary food.	UN	N.A.
- Nutrition health education.	NETHERLANDS	24,730
- Supplies and equipment	UNICEF	6,800
- Supplemental feeding/PLW's 0-5's.	CRS PL480	2,304,000
- Health centers.	PVO	N.A.
- Health services, nutrition education and supplementary food.	PVO	N.A.

Guinea-Bissau

- Assistance to the Bureau of Planning in Food Security.	FAO & NORWAY	276,000
- Health laboratory and food laboratory.	SWEDEN/SIDA	141,000
- Research into the nutrition situation.	SWEDEN	50,000
- Food aid for institutions.	WFP	482,000

Kenya

- Nutrition in rural development planning.	FAO	(95,000)
- Nutrition education	UNICEF	153,000
- Train community workers.	PEACE CORPS	140,235
- In-service training of health personnel.	UNICEF	111,300
- Fish culture extension.	PEACE CORPS	46,054
- Mbitini Women's Poultry Project	U.S. CRS	N.A.
- Deworming research action project.	PVO	5,131
- Family Life Training centers.	UNICEF	452,300

Lesotho

- Applied nutrition & nutrition education.	UNICEF	100,400
- Nutrition education; equipment, garden tools, seeds, fertilizers.	UNICEF	36,400
- Primary school feeding program	UNITARIAN SERVICE COMMITTEE OF CANADA	354,000
- Food for education.	WFP	5,298,000
- MCH & basic health education.	UNICEF	138,400

Liberia

- Services for children. Training of Home Economics workers.	UNICEF	(145,000)
- Reduction of post-harvest rice losses on farm in primary market.	FAO	(283,650)
- Support to small farmers.	EAO	282,743
- Services for children.	UNICEF	121,000

Madagascar

- Scholarship for 3 months in nutrition education to Cameroons.	UNICEF	10,000
---	--------	--------

ANNEX C (Cont'd)

<u>PROJECT</u>	<u>DONOR</u>	
<u>Zambia (cont.)</u>		
- Home visiting nutrition education.	SWEDISH VOL AG.	N.A.
- Nutrition group, TA,	DENMARK	14,640
- Train community workers.	UNICEF	600,000
- Production of supplements "under fives clinics"	WFP	275,000
- Rural Grain Storage.	FAO	10,370
- Food storage and conservation.	U.K.	27,160
- Provision of assistance for rural development programme, dairies.	NETHERLANDS	25,000
- Development of basic health service MCH	WHO	52,070
- Health services including weight charts, deworming, and immunizations.	PVO	N.A.
- Strengthening of health service.	DENMARK (DUS)	55,000
<u>East Africa Region</u>		
- Control of environmental contaminants in foods.	FAO/UNDP	(75,000)
<u>Cameroon</u>		
- Supplemental feeding/PLW & 0-5s.	CRS & PL480	402,000
<u>PROJECT</u>		
<u>Togo</u>		
- Infant nutrition program	CATHWELL	27,339
- Assistance to food and nutrition program.	UNDP & FAO	23,820
- Supplemental feeding/PLW & 0-5's.	WFP	425,000
<u>Tanzania</u>		
- Supplemental feeding/PLW & 0-5's.	CRS & PL480	1,750,000
- Food self-sufficiency	MORAVIAN CHURCH	75,000
- Health Services.	MEDICAL MISSIONARIES	N.A.
<u>Tonga</u>		
- Develop & teach mini-course in nutrition education to rural women, high schools, and teacher training.	PEACE CORPS	60,000

ANNEX D
 Proposal for Nutrition Component of Acre Agricultural Project,
 Sierra Leone

- | | | |
|--|---|--|
| ACRE Project Nutrition Subgoal : | To improve nutrition status of families in target areas, especially children and mothers. | 7) To develop and test new recipes for preparation of ACPE crops and carry out acceptability tests among consumers. |
| Nutrition Survey: | The use of the very recent National Nutrition Survey Report conducted in 1978 will be used as a base line guide for nutrition status. Small scale base-line survey will, however, be conducted to collect necessary information, that is lacking in the National Nutrition Survey Report. | 8) To conduct workshop/seminar for field workers and group leaders of farm families on nutrition activities of ACRE. |
| General Objectives: | <ol style="list-style-type: none"> 1) To develop the Nutrition Component of A Food Crop Adaptive Research and Extension System responsive to the needs of rural small holders. 2) To strengthen the capacity of the Nutrition Unit of N.U.C. to carry out detailed nutritional studies of varieties of food crops grown in ACRE project, including nutritional analysis and consumer acceptability studies. 3) To encourage growth, preservation, and optimum utilization of a variety of nutritious foods. | <ol style="list-style-type: none"> 9) To advise research division on crop combinations, crop acceptability and nutrient composition of different varieties. (Advice to be focussed on protein content and biological value but other nutrients and total energy value be considered as well). 10) To develop teaching aids and visual aids for nutrition education and implement a nutrition education program in ACRE zones emphasizing special food needs of various family members. 11) To demonstrate special techniques of food preparation preservation and storage to ensure a year round supply of ACRE food crops. 12) To develop low cost methods of food preservation. 13) To provide in service training for extension nutrition workers of ACRE. |
| Activities (specific objectives): | <ol style="list-style-type: none"> 1) To investigate nutritional values of local as well as introduced foods. 2) To collect data on local methods of preservation and utilization of food crops, including technologies. 3) TO study current practices and use of crops by different ethnic groups in ACRE target areas, especially in relation to diets during weaning period. 4) To collect information on food beliefs related to particular ACRE crops. 5) To conduct research in preparation of ACRE Food Crops for improved nutrition, especially for weaning foods. 6) To prepare recipes and methods for processing ACRE crops and test locally available and more sophisticated equipment. | |

ANNEX D (Cont'd)

Preliminary Activities for ACRE

Nutrition Component

1. Baseline survey

- a. Target: 60 "pilot" families in each of 5 ACRE areas.
- b. Interviewers: Home Economics Students (others if necessary).
- c. Supervisors: Mrs. Dahniya and staff
- d. Information needed:
 - 1) specific foods currently consumed by families in ACRE areas
 - 2) specific foods used for diet of weaning children
 - 3) methods of preparation of particular foods (legumes, cereals and vegetables) and recipes
 - 4) methods of preservation/storage of particular foods
 - 5) technologies currently used for food processing, preparation, preservation
 - 6) Food beliefs related to ACRE crops
- e. Time Frame: March-April 1981
- f. Methods:
 - questionnaires
 - observations

2. Hold meeting to discuss nutrition component of ACRE

- a. role of nutrition unit in research activities
- b. role of nutrition unit in extension activities
- c. joint ACRE seminar on nutrition considerations in ACRE project with key project staff.

3. Ordering/purchasing nutrition books, films, slide sets, etc. for nutrition unit

- a. prepare list and quantities and prices
- b. order and receive
- c. organize nutrition resource center for nutrition unit and other ACRE departments

4. Nutrient analysis capability developed

- a. Information gathered on equipment/reagent needs and methods
- b. Laboratory equipped to analyze:
 - caloric value
 - total protein
 - certain amino acids
 - iron content (?)
 - Vit. A content (?)
 - calcium content (?)
- c. Analysis of:
 - 1) nutrient values of varieties of ACRE crops
 - 2) effect on nutrient composition of ACRE crops and combination of foods of various methods of food food preservation/processing/preparation.
- d. Responsibility for laboratory - ACRE Research Unit/ Nutrition Unit/Chemistry Laboratory
- e. Trained personnel (perhaps through United Nations University)

5. Purchase necessary local and imported equipment for recipe testing

- a. Local cooking/preparation/processing equipment
- b. Imported equipment for processing/preparation/cooking.