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# NUTRITION BRIEFS Linking Multiple Sectors for Effective Planning and Programming



West African Health Organization



United States Agency for International Development,  
Bureau for Africa, Office of Sustainable Development

## FOREWORD

Nutrition is both a cause and an effect of many of the key developmental challenges facing the countries of West Africa. These challenges range from ensuring child survival to improving maternal health; from broadening education to increasing labor productivity; from re-orienting agricultural policies to modernizing food processing and distribution; and from reducing HIV/AIDS rates to increasing economic growth rates. Increasing evidence suggests that integrating nutrition into policies and interventions targeted at these areas is one key for success. In fact, with 30 percent or more of the region's population suffering from one or more types of chronic and severe malnutrition, the long-term effectiveness of public policy in any area may depend on whether the problem of nutrition is adequately addressed.

These Nutrition Briefs provide background information for policy makers on why and how to integrate nutrition into policies, regulations, and programs in key sectors. The goal is not to provide exhaustive technical detail, but rather to begin a dialogue on nutrition, thus providing information that can be adapted to suit the diverse needs and situations of those who make and implement public policy. The briefs will be updated and expanded over time to reflect the changing priorities and realities of the pressing nutrition problems in the region.

## ACKNOWLEDGEMENTS

Prepared by Dorcas Lwanga, Nutritionist, Sustainable Approaches to Nutrition in Africa (SANA) project, and Dr. Ellen Piwoz, Project Director, Sustainable Approaches to Nutrition in Africa (SANA) project.

The Nutrition Briefs were adapted for West Africa based on Nutrition Briefs that were developed for countries in the East, Central and Southern African (ECSA) region.

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# The Heavy Burden of Malnutrition

*Malnutrition imposes a substantial burden on the people of West Africa. Most households have insufficient food in terms of quantity, quality, and utilization. This compromises their nutritional status, diminishes their potential for growth and good health, increases their burden of disease, reduces their educational and economic prospects, and shortens their lives. Yet, nutrition programs lack the financial and political support they deserve, especially given their effectiveness and relative low cost.*

The burden of malnutrition is high for the individuals, communities, and economies of West Africa. For millions, inadequate nutrition means, increased vulnerability to serious and chronic illness, mental retardation, physical disability, diminished educational and economic prospects, and early death. Despite the fact that in many regions of the developing world a decline in malnutrition rates has been observed over the past two decades, in sub-Saharan Africa the absolute number of malnourished children has increased.

Because many of the effects of malnutrition are cumulative over a lifetime, children who are malnourished often enter adulthood with diminished mental and physical capacities. The long-term effect is an increased burden of disease and decreased labor productivity, which hamper countries' overall growth and development.

Malnutrition is therefore part of a self-reinforcing cycle that also includes poverty, high fertility, and poor health.

In fact, breaking this cycle is essential to sustaining the significant achievements made in recent decades in child survival and health.

## Who Is Affected?

Many Africans are placed at risk of severe malnutrition and starvation by war, famine, and other emergencies that disrupt food supplies. Yet chronic malnutrition is pervasive even where food supplies are adequate. A third to half of the population of West Africa suffers nutritional deprivation, including protein-energy malnutrition and deficiencies of vital micronutrients such as iodine, vitamin A, and iron (see figures on pages 2 and 3).

Mild to moderate malnutrition reduces people's capacity for normal growth, development, and function. Malnutrition is not whether or not a woman or child can eat to satisfy immediate hunger. A woman or child who can eat to satisfy his or her appetite can still be malnourished. Hence, the effects of malnutrition are

The malnutrition crisis...is, first and foremost, about death and disability of children on a vast scale, about women who become maternal mortality statistics partly because of nutritional deficiencies and about social and economic costs that strangle development and snuff out hope.

—UNICEF 1998

subtle and, many times, invisible, but the impact is often irreversible. That is why malnutrition is called the "silent emergency."

In West Africa, as elsewhere, women of reproductive age and children are particularly vulnerable to the destructive effects of malnutrition. Malnourished children are less resistant to infection, and because their immune response is hampered by a lack of body stores of essential nutrients, their illnesses are longer and more severe. In fact, malnutrition plays a role in half of the 12 million child deaths that occur each year in the developing world.

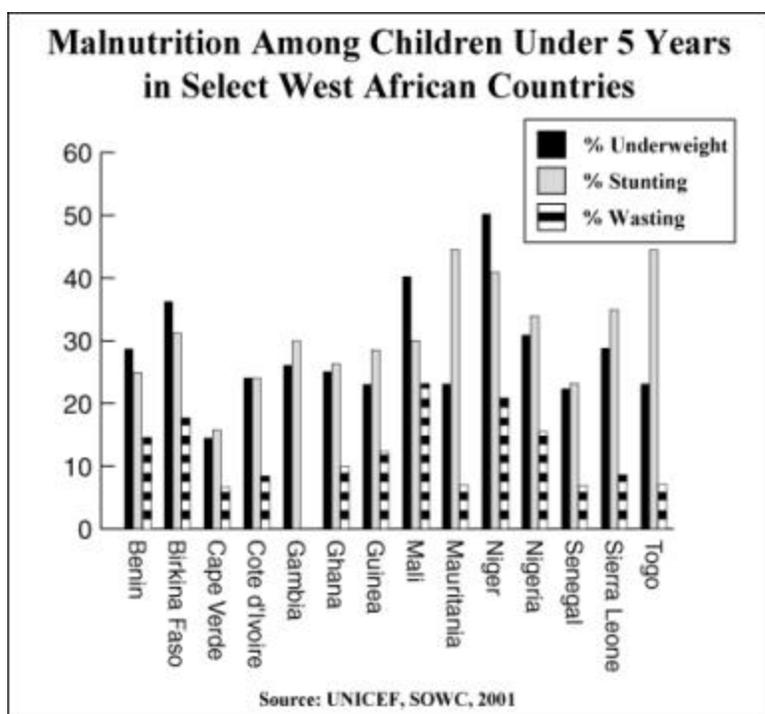
Malnutrition also increases maternal mortality rates. In a number of West African countries, almost half of all pregnant women suffer from iron-deficiency anemia (hemoglobin < 11g/dl), and the figure may be much higher. Moreover, reports show that in sub-Saharan Africa during the 1990s little change was achieved in decreasing the prevalence of anemia among pregnant women. In some countries as many as 80 percent of pregnant women are anemic. Furthermore, malnutrition during pregnancy causes stillbirths, birth defects, and mental retardation.

A clear relationship also exists between nutrition and HIV/AIDS, which now infects about 4 million adults between the age of 15 and 49 years in the West

African region. Indeed, over 50 percent of the adults infected in the region are women aged 15-49. These are women in their most reproductive and productive years. Mother-to-child transmission of HIV during pregnancy, labor, and breastfeeding, causes almost all the new HIV infections among children. Poor nutrition increases the heightened susceptibility of HIV-infected persons to illness and secondary infection. Studies have shown that clinical outcome is

poorer in individuals with compromised nutrition. Improved nutrition helps to slow the progression of HIV to AIDS.

Improved nutrition for women and children must be a priority for all countries, not only to lessen the burden malnutrition exacts today, but also to secure the promise of improved health and economic well-being for tomorrow.



#### Vitamin A Deficiency, Select Countries

Country	Subclinical Vitamin A Deficiency* among Children (% of children under age 5)
Burkina Faso (1986)	70.5
Côte d'Ivoire (1994)	46.6
Ghana (1990)	54.9
Mali (1986)	73.0
Mauritania (1983)	41.6

Though the vitamin A coverage rate for 6-59 month-olds has increased in many countries in the region with 100 percent coverage in some countries like Benin, vitamin A deficiency among children under 5 years old is still high.

\*Serum Retinol < 0.7µmol/L. Prevalence rates > 20% indicate a serious problem.

Source: Third Report on the World Nutrition Situation, Geneva, ACC/SCN, 1997.

### Types of Malnutrition

Malnutrition takes many forms, which often appear in combination and contribute to each other. Some types result from a lack of adequate food intake, but the more prevalent forms are caused by a lack of essential vitamins and minerals.

**Protein-energy malnutrition**, the inadequate consumption of protein and energy, inhibits proper growth and is most often poverty-related. One symptom is low height for age, or stunting.

**Iron deficiency anemia** is the most common nutritional deficiency worldwide, affecting 2 billion people in 1998, including about half of all children under age 5 and about 56 percent of pregnant women in West Africa. Even mild anemia can cause low birth weight, impaired immunity, and reduced physical and mental capacity. Promising solutions include controlling parasitic infections and providing iron supplements.

**Vitamin A deficiency** increases children's vulnerability to infection and increases the severity of illness, contributing to 23 percent of childhood deaths. It affects about one-third of all children in the region and is the leading cause of blindness among children. The condition, which also affects many women of reproductive age, has been linked to higher rates of maternal mortality. Vitamin A supplementation can effectively reverse the most immediate effects, for example, reducing deaths among children with measles by two-thirds.

**Iodine deficiency** is the most important cause of preventable brain damage and mental retardation, with most damage occurring before birth. Goiter the most visible sign of iodine deficiency affects as many as 6-55 percent of 6 to 11 year-olds in West Africa. However, joint efforts by international health agencies and food manufacturers to increase consumption of iodized salt have significantly decreased the risk of iodine deficiency in recent years and demonstrated the power of concerted action to improve nutrition.

**Zinc deficiency** in children impairs growth and increases susceptibility to infection, particularly diarrhea, acute respiratory infections, and pneumonia. In women, zinc deficiency has been associated with complications in childbirth. Zinc also appears to play a role in the body's ability to use vitamin A and is effective in reducing the severity of diarrhea. The prevalence of zinc deficiency is unknown, but it is assumed to be a problem where other types of malnutrition are prevalent.

## An Overview of Malnutrition

### The Causes

Malnutrition is caused by a number of factors. The International Conference on Nutrition classifies them as them as the following:

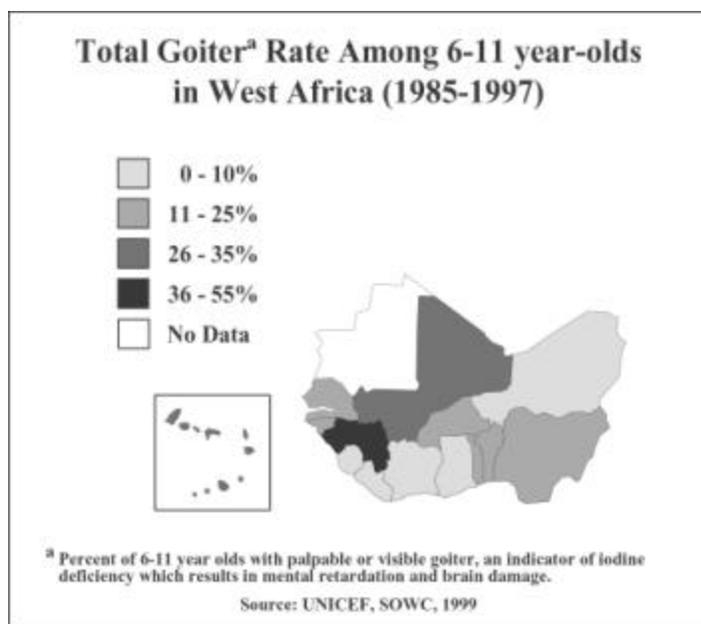
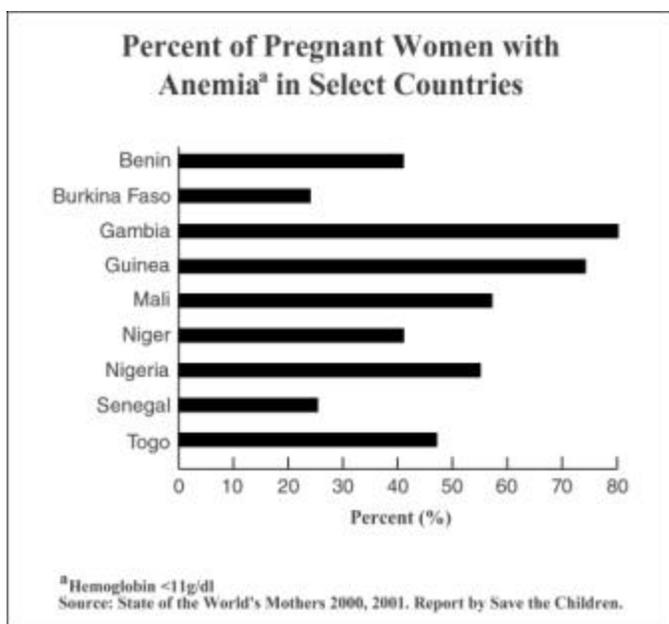
- **Immediate causes:** inadequate dietary intake and disease.
- **Underlying causes:** insufficient food available to families (household food insecurity), inadequate care of women and children, insufficient health care, and an unhealthy environment.
- **Basic causes:** inadequacies in educational, political, and economic systems and problems with the availability and control of resources.

### A Food Security Crisis

Food security, is defined as access by all people, at all times, to sufficient food. Food insecurity can result in the loss of fat stores, micronutrient malnutrition, chronic undernutrition, extreme seasonal fluctuations in weight, and decreased work capacity. Women are particularly vulnerable to these effects.

Household food security depends on access to food, as well as the availability and utilization of food. Four factors are determinant:

- **Seasonal fluctuations in food availability:** Nutritional stress is highest during the wet season and just before the harvest, because food supplies are low and energy expenditures are high.
- **Quality of the family diet:** Poor diets are low in protein, energy and fat; limited in variety, and deficient in essential vitamins and minerals.
- **Intrahousehold distribution of food:** In many homes, women eat last and least, despite the fact that they work longer hours and are responsible for all food preparation. African women have been shown to consume less protein and fewer micronutrients than African men.
- **Cultural beliefs and customs:** Nutritional stress can be compounded by norms and taboos that limit the intake of foods that contain important nutrients, particularly during pregnancy.



# Successful Nutrition Programs: Lessons Learned

## **Integrate approaches to address the many causes of malnutrition**

Many people suffer from numerous and concurrent health and nutrition problems. Using a variety of strategies and interventions can help to target the multiple causes of malnutrition in specific settings, as can refocusing social and community-based services on nutrition.

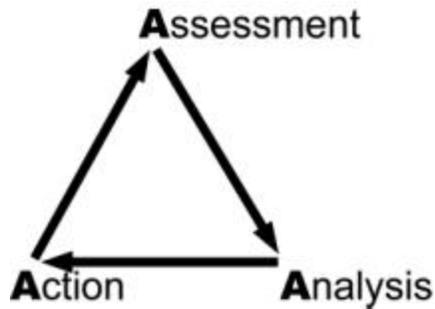
## **Strike a balance between bottom-up and top-down approaches**

Participatory approaches at the household and community levels can be particularly effective in changing key behaviors that affect nutrition. But some interventions, such as food fortification, involve broader strategies and complex technologies and require more top-down approaches.

## **Involve those directly affected and stress the benefits to them**

The people who suffer, or whose children suffer, from malnutrition must become involved in addressing their nutritional problems. Finding the appropriate mix of available

interventions requires use of the “Triple A” approach—a continuous cycle of **Assessment**, **Analysis of the situation**, and **Action** using appropriate approaches and interventions.



## **Take advantage of periods of illness and convalescence to provide nutrition information**

Nutrition information can be provided whenever people come into contact with the health system. For example, women can be counseled about good nutrition during prenatal and postpartum care. Mothers can be educated about appropriate child feeding during their children’s sick visits.

## **Support the efforts of families and communities**

Households and communities will need outside support from governments, nongovernmental organizations (NGOs), and others to find and implement effective solutions to their nutritional problems.

Further improvements in the health and overall well-being of most Africans will depend on increased awareness and use of the simple, relatively low-cost tools and methods now available to improve nutrition status significantly.

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# Educational Success Depends on Adequate Nutrition

*Better nutrition enhances school enrollment, attendance, and performance, especially for girls. Success in education leads to greater economic productivity in the medium term and to improved health and nutrition for future generations. Formal and non-formal schools also provide opportunities to teach nutrition education and to target nutritional interventions at school-age children most in need.*

It has been shown that education is the cornerstone for social development. Better nutrition enhances school enrollment, especially for girls. When children are weakened by poor nutrition and ill health, their capacity to learn is diminished, and they may be forced to end their schooling early or never enroll in school at all.

Conversely, a lack of access to basic education is one cause of malnutrition. Girls and women who face discrimination in education may lack the skills for productive employment and the knowledge that can help them support the health and nutrition of their families.

For many children, schools also can be a haven from the economic, social, and civil problems that affect their households and communities. Schools can give children opportunities for learning and creativity that they would otherwise lack by providing them with physical safety, clean water, good sanitation, health care, nutritious food,

and food supplements. Schools can also equip children with life skills to overcome other problems that may threaten their health and well-being later in life.

School-based treatment of children is especially cost-effective. Schools often provide social services that reach many children at risk for malnutrition or poor health, and they generally provide more effective community outreach than health facilities or clinics. Girls who stay in school tend to have their first child later in life than those who leave school earlier, and delaying childbearing brings a myriad of benefits to future generations in terms of lower birth rates, better birth outcomes, and

Malnourished children enter school later, miss more days of school, have difficulty paying attention and concentrating, and drop out earlier.

improved child health (see graph on page 2). Furthermore, female literacy is positively associated with reduced infant mortality. For example, increasing primary school enrollment of girls by 10 percent can decrease infant mortality by about 4.1 deaths per 1000 and the same increase in secondary school enrollment of girls by an additional 5.6 deaths per 1000.

## Causes and Effects

The relationships between nutrition and education are numerous and complex. Several forms of malnutrition increase the risks and severity of illness for children, which affect their ability to attend school and learn.

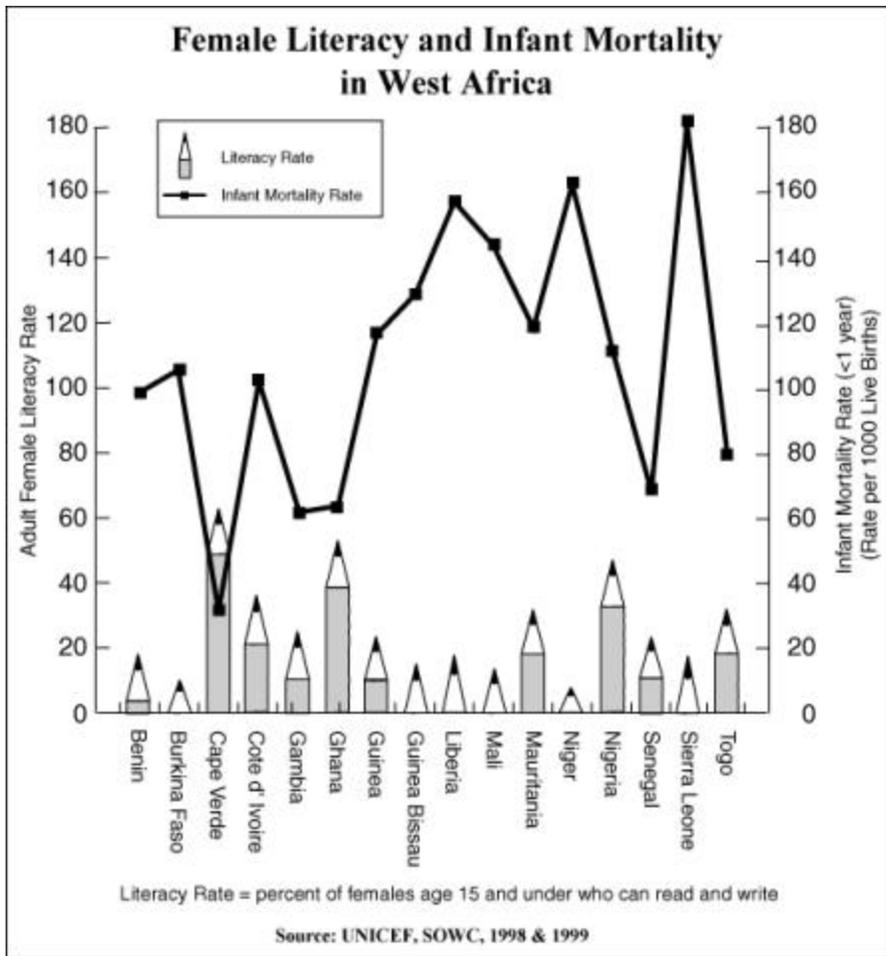
### Protein-Energy Malnutrition (PEM)

Stunting (low height for age) is a primary indicator of chronic malnutrition. It is also an indicator of poor school performance in developing countries. Children who are stunted during their preschool years tend to enroll in school later. Moreover, taller children score higher on tests in arithmetic, reading, spelling, and verbal ability.

### Micronutrient Malnutrition

Micronutrient deficiencies are linked to poor school performance throughout childhood. Even moderate vitamin A deficiency can cause vision problems that make it difficult for children to participate in school. More severe vitamin A deficiencies cause blindness and mental retardation that can preclude a child from attending school altogether.

Severe deficiencies of both iodine and iron impair cognitive development and influence children's school attendance and performance.



evaluation of an on-going school feeding program in Burkina Faso showed that having a school canteen was associated with increased school enrollment, regular attendance, consistently lower repeater rates, lower dropout rates in disadvantaged provinces, and higher success rates on national exams especially among girls.

**Increase Girls' School Enrollment**

In many West African countries, great gender differences still exist in school enrollment. Primary school enrollment of girls lags slightly behind that of boys (see graph on page 3) and in most cases, the gap widens for secondary school enrollment. Increasing girls' enrollment and, especially, keeping them in school delays their first birth, increases their age at marriage, and improves their lifetime earnings and overall health.

School feeding programs may help keep girls in school. For example, girls' enrollment increased in Ghana when they were given extra food rations to take home, in addition to their meals at school. Other strategies include ensuring their safety and privacy at school, establishing schools close to home, increasing the number of female teachers, and making school hours more flexible to accommodate work demands on girls.

Giving girls a greater awareness of their opportunities for the future can

“Sound nutrition can change children’s lives, improve their physical and mental development, protect their health and lay a firm foundation for future productivity.”

- Kofi Annan, UN Secretary General

**Helminthic Infection**

Intestinal parasitic infections, especially with hookworm, delays psychomotor development. More severe infection leads to PEM and iron deficiency anemia, which further reduces the chances for the child to attend or succeed in school.

On a global scale, the long-term loss of mental capacity, educational achievement, and economic and social productivity attributable to malnutrition is staggering: over 225 million children under age 5, or nearly 40 percent of all children in this age group, suffer from moderate to severe stunting. In West Africa, the figure ranges from 16–44 percent.

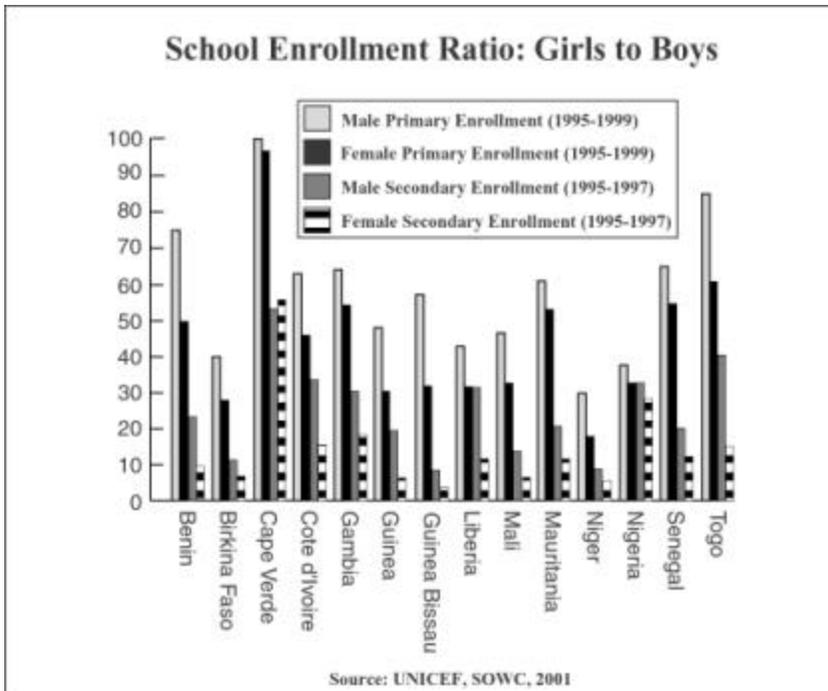
**Approaches that Work**

**Use School-based Programs to Implement Key Health and Nutrition Interventions**

Targeting nutrition interventions to school-age children can help reverse some, though not all, of the ill effects of poor nutrition during infancy and early childhood. The task requires a multisectoral effort that involves parents, communities, nutrition and health workers, and educators.

**Focus on Improving School Performance**

Improving school children’s health and nutrition can improve educational effectiveness. For example, an



Teaching today's young people the skills they need to lead healthier lifestyles can lower their risks of a range of preventable diseases and can improve the health of future generations.

### Target the Non-formal Education Sector

Schools and institutions outside the formal sector should be targeted to help disseminate key nutrition messages, particularly to women. These programs include literacy training schools, youth and women's associations, and other training institutions such as Islamic schools.

### Address High-priority Problems in a Cost-effective Manner

- **Apply deworming medications to everyone:** Treating all school children helps eliminate any stigma or shame.
- **Deliver micronutrients, particularly vitamin A, iron and iodine:** Vitamin A capsules cost about 2 cents per dose, and only two to three doses are needed per year per child. A single annual dose of iodine costs just 32 cents, and a year's worth of iron folate tablets costs less than 10 cents per child.
- **Treat injuries and routine health problems:** Treating cuts and injuries can prevent infections, and treating other diseases (where feasible) can help slow their spread in the wider community.

help lengthen and improve their school careers. This can also help improve their self-esteem and give them a sense of empowerment, which in turn reinforces other long-term benefits of education, such as delayed child rearing, better health, and improved income-earning potential.

### Involve the Community

School-based community nutrition programs can effectively deliver both preventive and curative services. These include health and nutrition education, family planning, and micronutrient supplementation, and such curative services as deworming and first aid.

### Teach Health and Nutrition Skills

Integrating nutrition and health messages into the teacher-training curriculum can positively influence health-related attitudes and behaviors among students and their families. The curriculum can include nutrition, family planning and reproductive health, and services to help postpone first births.

In Nigeria, there are a number of Early Childhood Care Development (ECCD) programs that have expanded since 1987. Each program offers free immunization and concentrates on children's nutrition. Many of the ECCD programs advocate for deworming to help control parasitic infection in children as well. The ECCD facilities are located in culturally acceptable facilities within a community, such as market places, churches, mosques, community halls, annexes to primary schools, and homes in poor areas. The plan is to provide the ECCD services to all Nigerian children less than six years of age.

Source: UNICEF, SOWC, 1999

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# Better Health through Improved Nutrition

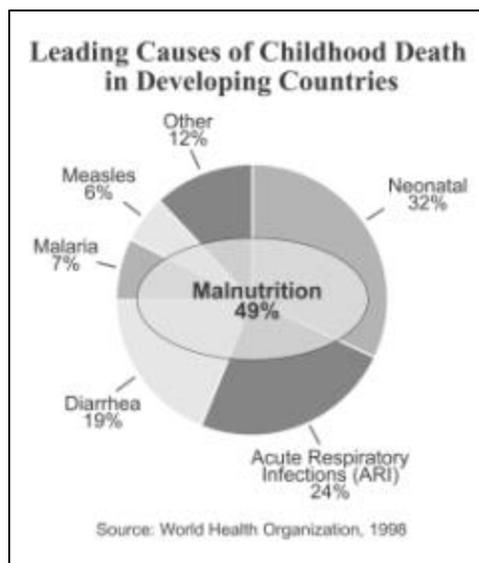
*Chronic malnutrition affects more than a third of children in many West African countries, increasing the incidence, duration, and severity of childhood illness and contributing to childhood deaths. Malnutrition also diminishes the health and well-being of millions of adults in the region, particularly women of reproductive age. Improving the nutritional status of children and women is essential for improving the health and socioeconomic prospects of future generations.*

Chronic malnutrition halts growth in children. More than one-third of children in West Africa are stunted (low height for age), a key measure of chronic malnutrition. Another general indicator of the reach of malnutrition is the prevalence of iron deficiency anemia, the most common nutritional disorder in the world. In some countries, anemia strikes 40 percent of children under 5, and up to 80 percent of pregnant women. For example, in Gambia and Togo, respectively, 80 and 48 percent of pregnant women are anemic (Hemoglobin < 11g/dl), and 30 and 22 percent of children under 5 are stunted.

Such pervasive malnutrition increases the risk and severity of infectious disease in the region, particularly among children and women of reproductive age. In fact, malnutrition is a contributing factor in about half of all childhood deaths (see graph on page 2).

Malnutrition, however, is not only a cause of illness, it is also an effect. Under-nutrition affects the immune

system's response to infection and interferes with the body's ability to utilize food. Many diseases cause appetite loss and interfere with the body's ability to utilize nutrients effectively. This is true of diarrheal disease, which reduces nutrient intake by reducing intestinal absorption, and of intestinal parasitic worms, which cause iron deficiency and anemia, retard growth in older children, and infect more than one billion people



worldwide. A significant cause of these conditions is inadequate access to safe water—a problem in some areas of the region (see figure on page 2).

Malaria is another leading cause of malnutrition. In particular, infants born to mothers who contract malaria during pregnancy (a time when they are more susceptible) are more likely to have low birth weight and anemia. In addition, HIV/AIDS, which is prevalent in sub-Saharan Africa, is also a major cause of malnutrition. The negative impact of the malnutrition-infection relationship is compounded in the presence of more than one type of malnutrition or illness.

## A Crisis for Child Health

The effects of malnutrition are particularly devastating for infants and young children. The problems associated with severe micronutrient deficiency are well known: blindness from vitamin A deficiency, goiter and mental impairment from iodine deficiency, and anemia from iron deficiency. More recently it has become clear that even mild and moderate forms of micronutrient malnutrition can substantially increase the rates of childhood illness and death.

In fact, childhood mortality increases exponentially with lower nutritional status. For example, vitamin A deficiency alone contributes to 23 percent of childhood deaths, primarily because it reduces children's resistance to diarrhea, which kills 2.2 million children a year, and to measles, which kills nearly 1 million a year. This underscores not only the importance of adequate nutrition but also of fully immunizing children against vaccine-preventable diseases.

## The Health Effects of Malnutrition

### Protein-Energy Malnutrition

- Stunting (low height for age)
- Decreased resistance to infection and disease
- Increased child mortality
- Wasting (marasmus)
- Kwashiorkor (i.e., a syndrome characterized by body and hair changes and swelling of the arms and legs)

### Iron Deficiency

- Decreased resistance to infection and disease
- Complications during pregnancy
- Spontaneous abortion, stress of labor, delivery complications
- Low birth weight and increased infant mortality
- Fatigue and apathy
- Lowered work productivity
- Vitamin A deficiency
- Impaired immune system
- Increased risk for infection, including HIV and reproductive tract infections
- Corneal scarring and, in severe cases, blindness and death
- Increased work absenteeism and lowered productivity

### Iodine Deficiency

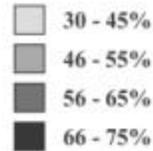
- Spontaneous abortion; stillbirth
- Impaired fetal brain development
- Increased infant mortality
- Goiter
- Cretinism
- Reduced mental capacity and productivity

### Zinc Deficiency

- Spontaneous abortion; stillbirth
- Intrauterine growth retardation, congenital malformation, pre-term delivery, reduced maternal-fetal transport
- Labor/ delivery complications, fetal distress, increased neonatal mortality
- Low birth weight
- Impaired immune system
- Impaired growth, learning, and mental development

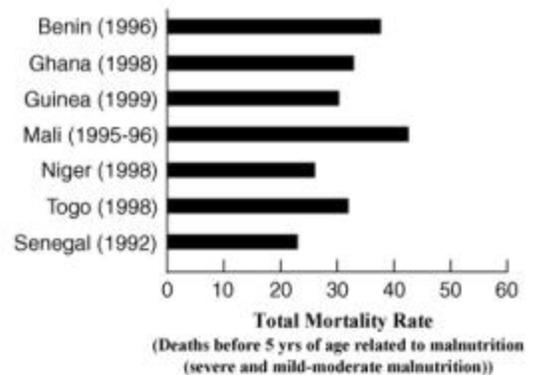
Source: J. Baker et al., *The Time to Act: Women's Nutrition and Its Consequences for Child Survival and Reproductive Health in Africa*, SARA/AED for USAID, 1996.

## Percent of Population with Access to Safe Water in West Africa (1990-1997)



Source: UNICEF, SOWC, 1999

## Contribution of Malnutrition to Under 5 Years Mortality in Select Countries



Source: African Nutrition Chartbooks: Findings from DHS Surveys

## A Scourge for Women

Women’s nutritional status is compromised by a number of factors, many of which relate to their lower socioeconomic status. In many areas, women receive less and lower-quality food from birth, which perpetuates the cycle of poor health. Inadequate diet, early and frequent pregnancy, and continued poverty that typifies the lives of many women in the region are other contributing factors that compromise the nutritional status of a woman.

Women are healthier and better nourished when they are not overworked, when they have access to education and employment, and when they receive sufficient support and care from their families and communities during and after pregnancy. When women are healthier and better nourished, so are their children.

Women’s nutrition is greatly affected by disease. Hookworm infection leaves women anemic, anorexic, and fatigued. Malaria destroys red blood cells and leads to anemia. In addition, an

increasing number of women (> 2 million women aged 15-49) in West Africa are infected with HIV/AIDS; this increases their risk for malnutrition and is compounded by their low socioeconomic status.

Several other factors combine to decrease women’s nutritional status:

- **Unequal division of labor:** Women spend nearly twice as much time as men on family and household maintenance, beginning in childhood and continuing through pregnancy and the postpartum period. Such byproducts of underdevelopment as inadequate water supplies, lack of electricity, and poor sanitation increase the burden of work for many women. Despite their heavy workloads, however, women often consume fewer calories and less protein than men.
- **Discrimination in education and employment:** Nutrition is directly related to income, and women who earn less are less able to provide their families with an adequate diet. Girls often receive less schooling than boys, which reduces their lifetime income prospects and those of their children.

- **High fertility rates:** The risk of pregnancy-related death increases with frequent childbearing, in part because the woman cannot regain lost fat and nutrients. The average woman in the region—which has some of the highest fertility rates in the world—bears between five and seven children.
- **Adolescent pregnancy:** Adolescent pregnancy increases the risks of low birth weight, complications with pregnancy and delivery, and maternal mortality.

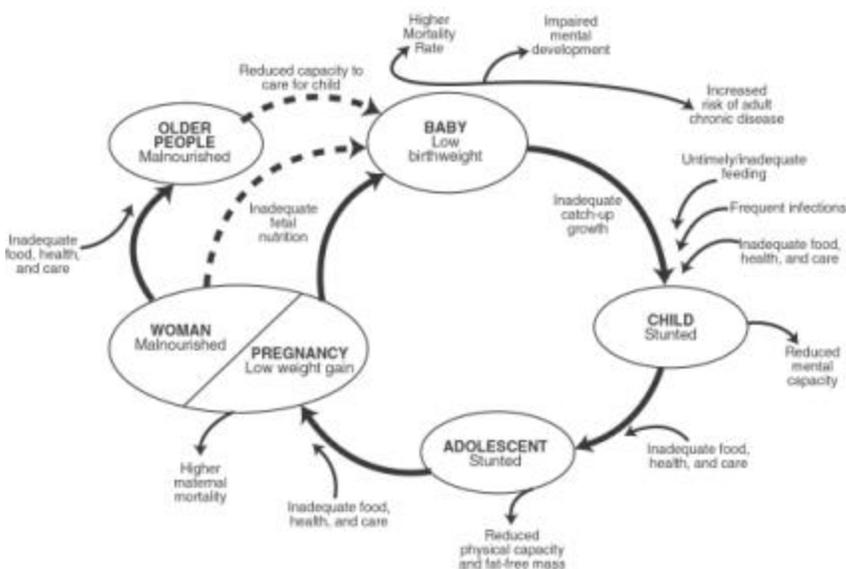
## The Generational Legacy

For many children, the devastating health effects of malnutrition begin in the womb and extend throughout the lifecycle, especially for girls. The result, is an increased likelihood of damage to future generations (see figure). Pregnant and nursing women need care and support from their families and communities to ensure a healthy pregnancy and delivery and to provide adequate nutrition and nurture to their children. This comes in the form of food, relief from labor, and health care.

Numerous studies indicate that, in general, African women do not take in sufficient calories during pregnancy to ensure their health or the health of their unborn child. In fact, many women eat *less* than normal, despite their bodies’ increased nutritional needs during this period. In part, this reflects beliefs that eating too much or eating certain foods will complicate labor and delivery.

The consequences of malnutrition during pregnancy can be severe, both for the women and for their children. Anemic women are more likely to die of postpartum hemorrhage than non-anemic women. Stunted women are at greater risk of obstructed labor, and

### Nutrition Throughout the Life Cycle



Source: 4th Report on the World Nutrition Situation, 2000

women deficient in vitamin A are more susceptible to infection.

Children born to malnourished women are more likely to have low birth weight, which decreases their chances of ever attaining full growth and increases their mortality risks. In addition, few women reduce their heavy physical workloads during pregnancy or after childbirth. Heavy physical labor has been shown to have a negative effect on birth weight.

As a result of these interrelated factors the prevalence of maternal deaths in the region is high. About 87,000 maternal deaths occurred in western Africa in 1995 from pregnancy-related causes. When a woman dies, her infant is highly likely to die within a year.

## Lessons Learned

### Integrate Child Nutrition and Health Programs

Integrating nutrition interventions into broader child health programs can be a doubly effective means of improving child health and survival because it can reduce malnutrition among children and simultaneously lessen the negative impact of illness. For example, recent studies indicate that children who receive zinc supplements showed a decrease in malaria-related fever, that giving vitamin A to children with measles reduces death from that disease by two-thirds, and that vitamin A can also decrease the severity of acute respiratory infection (ARI) and diarrheal disease.

Integrated Management of Childhood Illness (IMCI) is a strategy that combines improved case management for sick children with nutrition, immunization, and other programs that influence child health. The World Bank estimates that IMCI could reduce child deaths in areas of high mortality by 50–70 percent.

### Improve Feeding Practices

Appropriate feeding of children helps ensure proper nutrition, avert stunting, and prevent illness and death. For example, encourage exclusive breastfeeding for the first six months and after six months of age, ensure that children are fed age appropriate nutrient rich complementary foods in addition to breastmilk. Adequate amounts of vitamin A help children resist illness and prevent visual impairments, iron rich foods help children to develop physically and mentally, and iodized salt helps prevent certain disabilities and developmental impairments associated with iodine deficiency. Proper feeding is particularly important during and after illness because of the synergistic relationship between nutrition and infection. Nutrition education programs can motivate health providers and mothers to follow appropriate feeding practices, including to encourage children to eat during and after illness.

### Prioritize Women's Health Issues

In the short term, three priorities exist for improving women's nutrition. The

first, which is particularly important, is to postpone the first pregnancy and ensure adequate child spacing. The second is to prevent transmission of HIV/AIDS and treat other sexually transmitted infections (STIs). The third is to meet the needs of pre-pregnant, pregnant and lactating women better, including those related to diet, prenatal and postpartum care, and decreased workloads. Investing in maternal nutrition, hence eliminating malnutrition among pregnant women, would decrease disabilities among their infants by almost one third. Women should be empowered to make decisions that will improve their health and the health of their families.

### Encourage Community-Based Education Programs

Community-based programs that provide interpersonal counseling about nutrition are successful in improving feeding practices and have led to improved nutritional status for children. Such programs stress maternal nutrition, breastfeeding, appropriate complementary foods, and active feeding of sick children, among other things.

A key to success for such programs is a thorough assessment of current causes of child malnutrition at the household and community level. Many effective programs also are characterized by broad community participation, the use of local institutions, well-trained and qualified staffs, the integration of a variety of activities, and flexibility.

Prepared by Dorcas Lwanga, Nutritionist, Sustainable Approaches to Nutrition in Africa (SANA) project, and Dr. Ellen Piwoz, Project Director, Sustainable Approaches to Nutrition in Africa (SANA) project. The Nutrition Briefs were adapted for West Africa based on Nutrition Briefs that were developed for countries in the East, Central and Southern Africa (ECSA) region.

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# Investing in Nutrition Promotes Sustainable Human and Economic Development

*Good nutrition is a pre-condition for, rather than merely a result of, human and economic development.*

*Malnutrition in children today slows economic growth and development for decades by increasing illness and mortality and reducing the productivity of tomorrow's labor force. Therefore, investing to improve the nutrition of children and women today is an effective way to improve the living standards of generations to come.*

Malnutrition is economically costly, particularly when it occurs among children, because the effects are cumulative over a lifetime. Nutrition deficiencies lead to child deaths, increased health costs to families and the government, decreased mental capacity, and lower future productivity, all of which hinder the economic development of a nation.

The link between economic growth and nutrition cuts several ways. Improved nutrition increases human capacity and fosters economic growth. In turn, increasing food intake and improving nutrition often is best achieved by raising the incomes of poor households. In fact, malnutrition is both a cause and a consequence of poverty.

## Lost Productivity from Malnutrition

### Iodine Deficiency Disorders

Among the common types of nutritional deficiencies, iodine deficiency disorders have one of the most severe impacts on learning performance and mental impairment. Iodine deficiency during pregnancy hinders fetal development and can cause significant and irreversible mental and physical damage. The consequences are alarming including reduced mental and physical capacity, resulting in very low economic productivity and cretinism. But cretinism is just the most visible part of the problem. We now know that in communities affected by iodine deficiencies, virtually all children suffer from mental impairment.

### Iron Deficiency Anemia

Low iron reduces the amount of hemoglobin, the oxygen-carrying component of the blood. Iron deficiency anemia results in impaired mental and physical function, including poor fetal development and growth when anemia strikes during pregnancy. In fact, conclusive evidence shows that anemic workers are less productive at physical labor, including agricultural work, than non-anemic workers. Research shows that there is at least as 1 percent reduction in productivity for each 1 percent drop in iron status. For example, in Ghana using PROFILES application (see next page), a loss of 90 million dollars in agricultural productivity was projected between 1997-2001 as a result of iron deficiency anemia in the female labor force.

### Protein-Energy Malnutrition (PEM)

Protein-energy malnutrition among children—a failure to grow adequately as a result of the interaction between poor diets and frequent infections—exponentially increases their risks of dying during childhood. These findings have been observed in several studies in Asia, Africa, and Latin America.

Another effect of inadequate food intake is stunting, a failure to reach full height. Children who lack adequate nourishment during their first two or three years are stunted for life. When they reach adulthood, their physical capabilities and labor productivity suffer as a result. This, in turn, impacts on economic productivity at the national level.

Stunted children grow up to become stunted adults. One of the most significant consequences of adult stunting is reduced capacity and productivity.

In West Africa, more than one-third of all children are stunted (low height for age). This restricts the potential for growth in productivity, output, and consumption in the region

**PROFILES: Making the Link**

PROFILES is a tool that uses interactive, computer models to demonstrate the potential contribution of improving nutrition to human and economic development. PROFILES projects the consequences of poor nutrition on morbidity, mortality, and health care costs, and estimates the cost savings that can be realized through nutrition programs.

In Ghana, PROFILES showed the dramatic benefits of targeting three severe nutrition problems—stunting, iodine deficiency and iron deficiency anemia—which together if not addressed would cause an estimated loss in productivity of over US\$359 million between 2001 and 2005.

In Burkina Faso, PROFILES analysis was also used to calculate the benefits of targeting four severe nutrition problems—iodine deficiency, stunting, iron deficiency anemia, and sub-optimal breastfeeding—which together, if not addressed, would cause an estimated loss in economic productivity of FCFA 675 billion (more than US\$1 billion) between 2000 and 2010. The analysis showed a cost-benefit ratio of 5.3 if investments were made to address these nutrition problems.

**The Cost-Benefit Ratio**

The economic value of investing in nutrition may become most clear when the benefits are compared to the costs. In country after country, the economic benefits of nutrition interventions outweigh the costs. In Ghana, every



\$100 invested will generate over \$960 in economic productivity gains.

**Targeting Nutrition Investment**

**Income and Nutrition**

Higher-income households can buy more food and can also afford a better variety of foods for a more balanced diet. In addition, these households are more likely to utilize clean water and adequate sanitation facilities, and access and afford health services.

For poor households, a rise in food prices or a decline in income generally means a reduction in food intake. Poor households also are more likely to experience seasonal fluctuations in food availability and affordability.

**Distribution of Household Income**

Nutrition is affected not only by how much money is in the household but also by who controls that money. Income controlled by women is more likely to be spent on better nutrition than income controlled by men, and

The Benefits and Costs of Nutrition Interventions in Ghana, 1997			
Disorder	Benefits of Eliminating (millions of US\$ per capita)	Cost of Interventions (millions of US\$ per capita)	Benefit-Cost Ratio
• Iodine Deficiency Disorder	105.3	6.6	16.0
• Protein-Energy Malnutrition	32.3	5.2	6.2
• Iron Deficiency Anemia	15.5	5.4	2.9
Total	153.2	16.0	9.6

Source: PROFILES workshop 1997.

households with greater control of income by women are more likely to be food secure.

Even so, women continue to account for 70-80 percent of household food production in sub-Saharan Africa, despite unequal access to land, agricultural inputs, education, and training. Women's lack of access to such resources makes the productivity of their work quite low.

As a result, women in poor households spend much more time working than men, and their work is generally physically demanding. In Gambia, for example, women spend between 45-65 percent of their time performing moderate to heavy activities during their work-day. It is also common for women to continue with physically demanding work throughout pregnancy.

#### **Intrahousehold Access to Food**

Despite their heavy work loads, women often eat less and consume poorer-quality food than men in the household. This combination of heavy work and reduced food intake has a negative effect on the nutrition of both women and their children. It weakens the nutritional status of pregnant and lactating women and their babies, limits the duration of exclusive breastfeeding, and reduces the time available for food preparation and child care and feeding.

## **Approaches that Work**

### **Increase Income Distribution**

The most effective national strategy for reducing malnutrition may be to focus on increasing national income and improving the equity of income distribution.

### **Improve Women's Productivity**

Women are clearly key economic actors in most developing countries. In addition to their primary role in agricultural production, they also are involved in manufacturing, services, trading, and micro-enterprises—although much of women's economic activity occurs in the informal sector or the home and is therefore not included in official statistics.

Because of women's key roles as economic actors *and* as caregivers, development programs that improve the quality of women's labor and enhance their productivity can yield significant improvements in household food security and nutrition. In Africa, 30-40 percent of households are headed by women. As elsewhere in the developing world, African households headed by women are more likely to be poor; women work as much as men but they lack access to key inputs, including credit.

Improving the quality and productivity of women's work will be accomplished

by providing women and girls with greater access to education, enhancing women's skills, developing and distributing appropriate technologies to improve women's productivity inside and outside the home, and empowering women in the legal, social, and economic arenas.

### **Advocate for Nutrition**

Policy makers should advocate strongly for better nutrition and its socio-economic consequences (with the help of tools such as PROFILES) and invest in the most appropriate and effective strategies to address them.

In this way, policy makers can begin to prioritize nutrition programs and address several of the leading causes of disability and death in West African countries effectively.

In Ghana, the recommendations resulting from PROFILES illustrated that a bold new nutrition investment strategy was required to reap benefits in education, agriculture, industry, and for the economic future of the country as a whole.

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# Nutrition and HIV in West Africa

*Malnutrition and HIV work in tandem. HIV compromises the nutritional status of infected persons, which then increases their susceptibility to other infections. Malnutrition on the other hand exacerbates the effects of HIV by further weakening the immune system. Studies have shown that the clinical outcome of HIV is poorer in individuals with compromised nutrition. HIV also decreases food security of affected households contributing toward malnutrition. Improving nutrition is important in the context of HIV as it strengthens the immune system and can delay the progression of the disease making it possible for infected individuals to remain productive. The challenge for policy makers therefore, is to slow the spread of HIV infection while continuing to improve the nutrition and food security of all individuals.*

Southern Africa (ECSA) region. Less than 5 percent of adults aged 15-49 are infected with HIV in most of the West African countries (see chart below).

Reports show that Senegal has managed to slow transmission, but, in some countries the rates are on the rise. In Côte d'Ivoire, for example, the prevalence rate is high, over 10 percent of adults are infected with HIV, when compared with other countries in the region.

HIV infection continues to spread rapidly particularly among young women. Over 50 percent of adults living with HIV/AIDS in the region are women age 15-49 (see chart below). These are women in their most reproductive and productive years. The large number of children who are orphaned by the disease cannot be ignored. For example, 320,000, 420,000, and 1,400,000 AIDS orphans were living in Burkina Faso, Côte d'Ivoire, and Nigeria respectively, at the end of 1999.

## How Does the Current Situation of HIV/AIDS in the Region Relate to Nutrition?

Access to food is one of the major problems noted by persons living with HIV in sub-Saharan Africa. In Africa, the struggle to provide adequate food and nutrition to meet basic needs continues to be a challenge that is now compounded by the HIV/AIDS epidemic. Over 36 million people are currently infected with the HIV virus and over 24 million of them are in sub-Saharan Africa. HIV/AIDS is now the single most pressing development challenge confronting African countries. In West Africa, prevalence rates of HIV are still much lower than those seen in the East, Central and

HIV/AIDS in West Africa			
Estimated number of PLWHA, end of 1999			
Country	Adults (15-49)	Women (15-49)	Adult prevalence rate (%)
Benin	67,000	37,000	2.45
Burkina Faso	330,000	180,000	6.44
Cape Verde	*	*	*
Côte d'Ivoire	730,000	400,000	10.76
Gambia	12,000	6,600	1.95
Ghana	330,000	180,000	3.60
Guinea	52,000	29,000	1.54
Guinea Bissau	13,000	7,300	2.50
Liberia	37,000	21,000	2.80
Mali	97,000	53,000	2.03
Mauritania	6,300	3,500	0.52
Niger	61,000	34,000	1.35
Nigeria	2,600,000	1,400,000	5.06
Senegal	76,000	40,000	1.77
Sierra Leone	65,000	36,000	2.99
Togo	120,000	66,000	5.98
* = no data available			

Source: Report on the Global HIV/AIDS Epidemic. UNAIDS. Geneva. June 2000.

How do orphans relate to nutrition and food? The impact of the epidemic has stretched the ability of extended family networks to provide for orphans adequately. Caregivers, usually grandparents, older siblings or other relatives, are often unable to meet the needs of these children, particularly if they are very young. As a result, these orphans will be vulnerable to hunger and malnutrition, abuse and exploitation, illness, and death.

HIV/AIDS has a strong impact at the national level by weakening societies and hindering economic development. The World Bank estimates a 1.1 percent loss of GDP (gross domestic product) per year in countries with high rates of HIV/AIDS. Such a loss will substantially retard economic growth. Furthermore, according to the Food and Agricultural Organization (FAO), 44 of the 49 sub-Saharan countries are Low-Income Food-Deficit Countries (LIFDCs). The food situation in these countries could deteriorate further in the face of the HIV/AIDS pandemic.

HIV/AIDS is reducing life expectancy. In Nigeria, for example, AIDS has cut life expectancy by four years. The decline in life expectancy will have a tremendous impact on Africa's economic growth and human capital formation. It impacts directly on food security, which in turn exacerbates the problem of malnutrition in the face of the HIV/AIDS pandemic.

Agriculture is an important part of the livelihood of most of the poor who live in the countries of West Africa most affected by HIV/AIDS. In many parts of Africa, nutritional requirements are usually met through food production, as subsistence farming is a primary occupation for most households. However, when food producers, men and women, become ill with HIV-

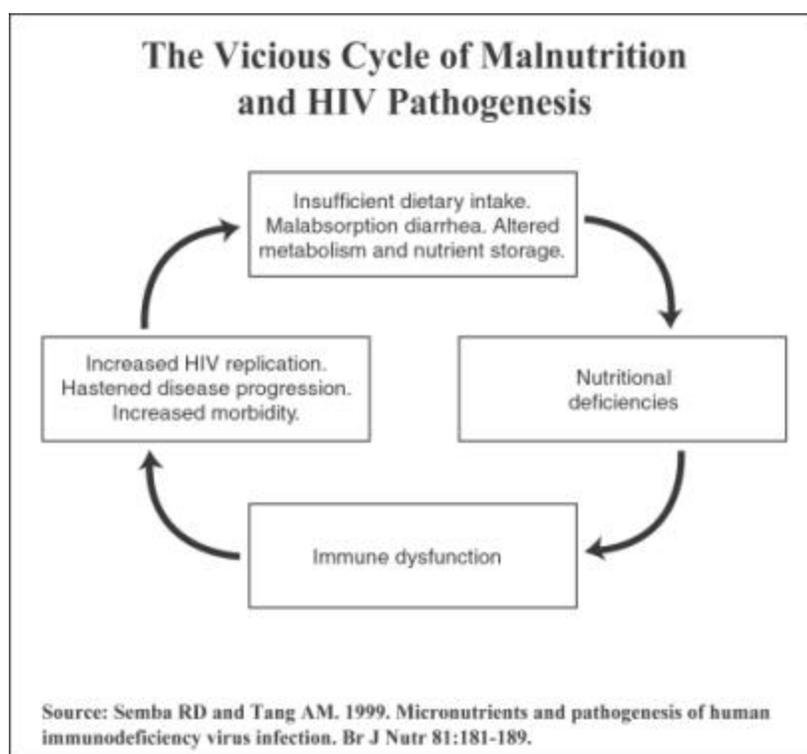
related infection or are required to care for sick family members, farm incomes, food productivity, and nutritional status often suffer. A study in Côte d'Ivoire showed that following an AIDS death, household consumption fell by 44 percent from the previous year and households with an AIDS patient spent twice as much on medical expenses compared to those with no AIDS patient.

Reports suggest that in households affected by HIV/AIDS, labor intensive crops, which generate more income, are being replaced with root crops that require less physical labor but are also less nutritious and less profitable. In Côte d'Ivoire, a 1997 report noted that one method by which households were coping with HIV/AIDS was by switching from cash crops to food crops resulting in a decline in production of two-thirds from previous years. This change in crop patterns contributes to food insecurity and increases malnutrition among the affected households.

Unlike other diseases, HIV/AIDS weakens and kills the most productive members of the population. As the HIV disease progresses, workdays are missed, wages are reduced, and crop production declines. Eventually the infected individual becomes too weak and sick to work, and receives medicine and special foods that are costly. The nutritional well-being of all household members is affected.

## The Relationship between HIV/AIDS and Malnutrition

The relationship between HIV/AIDS and malnutrition is a vicious cycle, as illustrated in Figure 1. Malnutrition and HIV work in tandem. HIV compromises nutritional status, and this in turn increases susceptibility to opportunistic infections. Malnutrition, on the other hand, exacerbates the effects of HIV by further weakening the immune system. Clinical studies show that HIV disease progression is more rapid in individuals with compromised nutrition. HIV/AIDS also



decreases food security of affected households, contributing toward malnutrition.

Malnutrition in HIV/AIDS presents as weight loss and muscle wasting, altered metabolism, and increased use and excretion of nutrients. Deficiencies of vitamins and minerals such as vitamins A and E, B vitamins, selenium and zinc, needed by the immune system to fight infection, are commonly observed. When individuals are undernourished they become debilitated more easily, resulting in a loss of independence and ability to perform activities of daily living.

Good nutrition, particularly starting at the early stages of HIV, can prevent weight loss and strengthen the immune system, and play an important role in living positively with HIV. Providing food and nutritional supplements may be an important intervention in addition to medications to treat opportunistic infections.

## **Nutritional Care and Support for Persons Living with HIV/AIDS**

A number of factors contribute to malnutrition in people living with HIV. These include loss of appetite, mouth sores, intestinal complications, persistent diarrhea, increased nutrient requirements from fever and infection, side effects of medications, access to food, and psychosocial factors.

Providing early and adequate nutrition support and care may be one of the most important interventions for people who are diagnosed with HIV. The benefits of providing adequate nutrition are listed in the next column.

### **Benefits of Adequate Nutrition**

- Helps reduce vulnerability to weight loss and wasting
- May help delay the progression of HIV disease
- Improves the effectiveness of medications
- Enhances the body's ability to fight opportunistic infections
- Improves quality of life
- Prolongs independence

Nutrition education and counseling should be an integral part of the care and support for people living with HIV/AIDS. Nutrition education is important in helping individuals understand the need for maintaining an adequate diet and optimum nutrition status at all stages of the HIV infection.

The goals of nutrition support are to:

- Improve eating habits and diet
- Maintain adequate weight and prevent weight loss
- Replenish nutrient losses
- Prevent muscle wasting
- Manage AIDS-related symptoms that affect food intake
- Ensure understanding of the basic principles of food safety.

Safe food handling is important not only for the person infected with HIV but also for the affected family members and caregivers so as to minimize opportunistic infections through improper food handling. A list of safe food handling practices is provided in the next column.

### **Safe Food Handling Practices**

- Wash hands before food handling and preparing, before eating, and after using the toilet.
- Do not eat moldy, spoiled, or rotten foods.
- Wash all fruits and vegetables before cooking and serving.
- Drink and use only boiled water.
- Do not eat raw eggs or foods that contain them.
- Cover all food items when not in use.
- Keep food preparation surfaces and utensils clean.
- Ensure all food is cooked thoroughly, especially meat and chicken.
- Avoid contact between raw and cooked food.
- Serve food immediately after preparation and avoid storing cooked food.
- Thoroughly reheat leftovers.
- Store food safely away from insects, rodents, and other animals.

These goals can be reached through locally appropriate nutrition care and support programs, especially if these programs are provided as part of a holistic care package and received in a supportive and informed family environment.

## **The Challenges Ahead**

Scaling up of services to prevent and control HIV/AIDS and improve nutrition will be challenging. In a keynote address delivered in April 2001 at the Sub-Committee for Nutrition (SCN) meeting in Nairobi, Dr. Peter Piot, UNAIDS Executive Director, identified some of these challenges:

- Break the vicious cycle between food insecurity, malnutrition, and HIV/AIDS.
- Deliver essential HIV care, including food and nutrition as key components.
- Attack stigma and discrimination. This requires leadership, compassion and commitment.
- Face the gender challenges of HIV/AIDS, including women's vulnerable social status and legal rights.
- Recognize that there is no nutrition without food, and support agricultural programs that will reduce vulnerability of HIV-affected communities.
- Expand voluntary testing and counseling services and make them more accessible.
- Use behavior change communication to promote and sustain positive living practices.

## Conclusion

Today's challenges of malnutrition, food insecurity, and HIV/AIDS are of great economic and social concern to countries in the sub-Saharan Africa. In comparison to the industrialized

countries where the average length of time between HIV infection and AIDS is about 8 to 10 years, in developing countries this time period is shortened by malnutrition, poor health care, and other infectious diseases.

Nutrition care and support of HIV positive persons is important. It will help the infected individual maintain and optimize his or her nutritional status, improve immunity to opportunistic infections, prevent the development of nutrition deficiencies, and weight loss. Above all, it will help to improve the quality of life for HIV positive individuals, as well as other family members. Improving nutrition for all must be a top priority in the region.

## The Way Forward

The following are first steps that can help national health officials and policy makers meet the more immediate challenges associated with HIV/AIDS.

- Strengthen the involvement of persons living with HIV/AIDS in policy and program interventions to prevent transmission of and to control the epidemic.

- Promote government commitment to address food security and nutrition problems for all persons infected and affected by the epidemic.
- Support and encourage community-based care.
- Develop, test, and disseminate practical guidelines for health workers and community volunteers on nutrition care and support for persons living with HIV. Materials developed should be culturally acceptable and feasible. Involve people living with HIV in the development process.
- Promote and mainstream voluntary counseling and testing (VCT) services.
- Place the commitment to fight HIV/AIDS at the center of the national capacity building agenda.
- Tailor and share information that will empower and enable politicians, policy makers, program managers, and service providers to mobilize partnerships for HIV/AIDS prevention and control.

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# Collaborating with Private Industry to Combat Malnutrition

*Strong partnerships between the public and private sectors can be an important weapon in the fight against malnutrition. The private sector can be a valuable partner to the public sector in planning and implementing food fortification and supplementation programs, two important strategies for combating micronutrient deficiencies. In particular, private industry brings a wealth of experience and expertise in product packaging and positioning, advertising, communications, and social marketing.*

Over the long term, the most sustainable and effective means of reducing or eliminating deficiencies in vitamin A, iron, iodine, and other key micronutrients is to build and expand markets for micronutrient-rich foods. This involves increasing the supply (production) and demand (consumption) of such foods and ensuring their affordability and safety.

Two other strategies are available to address the more immediate need to correct existing micronutrient malnutrition, while advancing the long-term objective of expanding the availability and consumption of micronutrient-rich foods. These two strategies are:

- **Food fortification:** the addition of any nutrient to widely consumed foods, usually staples such as salt, sugar, flour, milk, cooking oils, and cereals.
- **Supplementation:** the extra-dietary provision of key vitamins

and minerals, generally in the form of capsules or tablets.

These approaches are inexpensive and are cost-effective ways of reducing mortality, blindness, mental impairment and anemia secondary to vitamin A, iodine and iron deficiencies (see page 2). In most countries, fortified foods and supplements are generally available through commercial distribution channels and through the public health system. Both methods of distribution, however, require close collaboration between the food and pharmaceutical industries and public health and regulatory agencies. Thus, a long

Food fortification and supplementation are cost-effective strategies for correcting existing malnutrition while helping to expand the availability and consumption of micronutrient-rich foods.

history of public-private partnership in this area already exists, despite some fundamental differences in the priorities and approaches of the key players.

## Public-Private Partnerships for Fortification

### The Success of Salt Iodization

Growing evidence from around the world shows that food fortification is highly effective in reducing deficiencies of iron, iodine, and vitamin A when supported by complementary programs and policies in the health, agriculture, trade, and food-processing sectors.

One great success has been the virtual elimination of iodine deficiency in most industrialized countries and the commitment of most developing countries to iodize their entire salt supplies within the next few years. This success has come from the hard work of dedicated international policy makers, child health advocates, and salt producers.

### The Role of Legislation

In many countries, successful salt iodization and other food fortification efforts have been undertaken only after national legislation or regulations for mandatory fortification have been passed. Fortified foods are more expensive to produce and, therefore, carry a higher price tag and, often, lower profit margin. In some areas, the market for such products may be undeveloped or untested, which heightens the risks for food producers and distributors. Mandatory fortification can level the playing field.

In addition, mandatory fortification programs can spur collaboration among the public health sector and industry to develop better products, launch social

marketing campaigns to build demand for fortified products, and overcome logistical barriers to efficient production and distribution of fortified products.

## Supplementation

Pharmaceutical supplementation programs are necessary to meet the short-term needs of groups who suffer from or are at high risk for micronutrient malnutrition. Historically, however, the effectiveness of such programs has been weakened by complicated logistics and low coverage and compliance among the population segments most at risk.

Enlisting the help of private pharmaceutical firms may increase the effectiveness of these critical programs. For example, one reason for low compliance with supplementation is a lack of products that are suitable and/or appealing. Private firms have significant expertise in producing effective products with safe, attractive, and easy-to-use packaging, with helpful labeling, in appropriate doses, and at affordable prices.

One successful means of broadening the coverage of supplementation programs is to use schools, and especially school feeding programs, as the locus for delivering supplements. In Ghana, for example, iron supplementation effectively administered by teachers was noted to significantly improve school performance for a period of up to six months.

Over the long-term, food-based approaches are the most cost-effective and sustainable means of combating micronutrient malnutrition. National nutrition strategies should emphasize

The Cost-Effectiveness of Fortification and Supplementation			
Intervention	Target Group	Approximate cost (US dollars)	
		Per death averted	Per DALY* saved
Iron supplementation	Pregnant women	800	13
Iron fortification	Entire population	2,000	4
Iodine supplementation	Women of reproductive age	1,250	19
Iodine supplementation	Entire population	4,650	37
Iodization of salt or water	Entire population	1,000	8
Vitamin A supplementation	Children under 5	50	1
Vitamin A fortification	Entire population	154	4
Food supplementation	Children under 5	1,942	63
Food supplementation	Pregnant women	733	24

\* disability-adjusted life year  
*World Development Report 1993: Investing in Health.* World Bank, Washington DC, 1993.

food fortification and educational and communication efforts that gauge and build community and political support for improved nutrition-related behaviors. Targeted supplementation should continue to be used to meet the needs of vulnerable and high-risk groups, including pregnant women, new mothers, and children. All efforts in this area should be complemented by other food-based approaches, such as:

- **Agricultural policies** that promote crop diversification, agroforestry, and production of traditional and wild foods.
- **Horticultural and extension services** that encourage the production and safe preservation and processing of fruits and vegetables.
- **Land-use regulations** that support household and community gardening activities, even in urban areas.

Such an integrated strategy is most effective and sustainable because it is preventive (encourages dietary behavior change) and adaptable (appropriate for large groups with various cultural and dietary traditions). It also addresses broader issues of food security and can generate income for households and communities.

Most important, however, such an integrated strategy serves the ultimate objective of building sustainable, environmentally sound, food production systems, in at least three ways. First, it creates consumer demand for safe, wholesome foods. Second, it helps sensitize agricultural planners and producers to the need to protect the micronutrient content of soil and crops. Third, it spurs partnerships among governments, consumer groups, the food industry, and others to overcome micronutrient malnutrition.

## Behavior Change Communications

Increasing the supply of fortified foods and vitamin and mineral supplements is only half the battle; the other half is to encourage people to consume them.

Private industry can help the public sector combine effective communication strategies with appropriate social marketing interventions to improve results. Fortification efforts can benefit from targeted market research and effective and appealing packaging. Compliance rates for supplementation programs could be increased by improving the appeal of tablets.

Furthermore, private industry could help build effective messages for key nutrition behaviors into new or existing programs. These could include the importance of exclusive breastfeeding and the need for appropriate feeding of children during and after illness.

Health ministries and donors have worked closely with commercial firms in recent years to build viable markets for some simple, low-cost, commercially available health products that can prevent millions of deaths each year, particularly among children. The focus so far has been on hand soap to prevent diarrheal disease, oral rehydration salts (ORS) to prevent dehydration from diarrhea, key fortified foods to prevent micronutrient malnutrition, and insecticide-treated bed-nets to prevent mosquito-borne malaria.

These partnerships often tap the branding, marketing, advertising, and distribution expertise of the private firms to develop educational and promotion campaigns that effectively reach the key target audiences. The

public sector often contributes key data about the existing and potential market for such products drawn from demographic and health data, field programs, and government-funded research. In addition, the public sector partners often reduce the risks and costs associated with launching new products or promotions by offering tax breaks, subsidies, and research support.

## Approaches that Work

### Encourage the private and public sectors to collaborate on launching fortification ventures

This generally requires collaboration between the public sector and one or more commercial food or agricultural companies. Such public-private partnerships help ensure that the effort fulfills the following criteria for success:

- **Create public awareness**  
Building a market for fortified foods requires informing the public about the risks and prevalence of micronutrient malnutrition and the role that micronutrient-rich foods can play in promoting health and productivity.
- **Use market research**  
When fortified food products fail in the marketplace, the reason is often because they are developed using public health data on the prevalence of micronutrient malnutrition. Instead, such products should be developed, priced, packaged, and promoted using market data on food purchasing patterns, the size of the market, and consumption habits.
- **Segment the market**  
The commercial sector seeks to maximize profits, and the public sector seeks to maximize reach or

coverage. A good starting point for fortification efforts is to target the 80 percent of the population in the middle of the economic spectrum. This way, the commercial sector can position other, higher-priced foods to consumers who can afford them, and the public sector can target other nutrition interventions (e.g., supplementation) to more needy groups.

### Tap the private sector's expertise in social marketing

The private sector can implement dynamic social marketing programs to target specific nutrition and health messages effectively to audiences that would not otherwise have access to such information. Public-private alliances help to create a sense of social responsibility among the private sector for control of micronutrient deficiencies. Such alliances also result in government recognition of private-sector economic risk concerns. The private sector can also be enlisted to help improve sustainability. Private sponsors and partners can ensure adequate funding, staffing, and support for important programs.

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