

**Nutrition and Health in Developing Countries**  
**Presented by Mohamed Ag Ayoya, MD, PhD Candidate**  
**International Nutrition - Cornell University**  
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Malnutrition includes problems of deficiency, of excess and of imbalance in the intake or use of the over 50 nutrients that are recognized as necessary for health and development. It results from the interaction between poor diet and disease and should not be equated exclusively with hunger or inadequate dietary intake. While in industrialized societies, problems of excess or of imbalance are generally dominant, problems of undernutrition in various forms remain the most prevalent in the world & are also rising in countries of the North. Malnutrition is not only associated with poverty, it also contributes to it, seriously impairing not only the health but also the social & economic development of entire societies.

This lecture provides an overview of the major problems of undernutrition in the world and some key directions towards their solution. Recent epidemiological data strengthens the relevance and urgency of addressing these problems. Solutions do exist and they are affordable. Everyone concerned with health and development should be aware of these opportunities.

**The major nutrition problems in the world:**

- \* Protein-Energy Malnutrition (PEM)
- \* Iron deficiency (ID)
- \* Vitamin A deficiency (VA)
- \* Iodine deficiency disorders (IDD)
- \* Nutrition related-chronic diseases

Though these problems frequently co-exist to various degrees in populations, some groups exhibit one or more of them more seriously. The first 4 ones are more prevalent in developing countries. In industrialized countries, nutrition related chronic diseases are among the major causes of morbidity and mortality. I will focus more on those known to be of public health importance in developing countries.

**PROTEIN ENERGY MALNUTRITION:**

PEM generally refers to undernutrition in young children (though older children and adults can also suffer from it). The term is generally used to designate both increasingly rare forms of severe clinical malnutrition (such as kwashiorkor and marasmus) and the more common forms of growth faltering or growth impairment (often termed mild or moderate malnutrition). Anthropometrics indices are used as the main criteria for assessing the adequacy of diet and growth in infancy. The more commonly used indices are derived by comparing height and weight measurements with reference curves: height-for-age, weight-for-age and weight-for-height to identify stunting, wasting and underweight.

***. Stunting:***

- Insufficient height gain relative to age
- Implies long term malnutrition and poor health

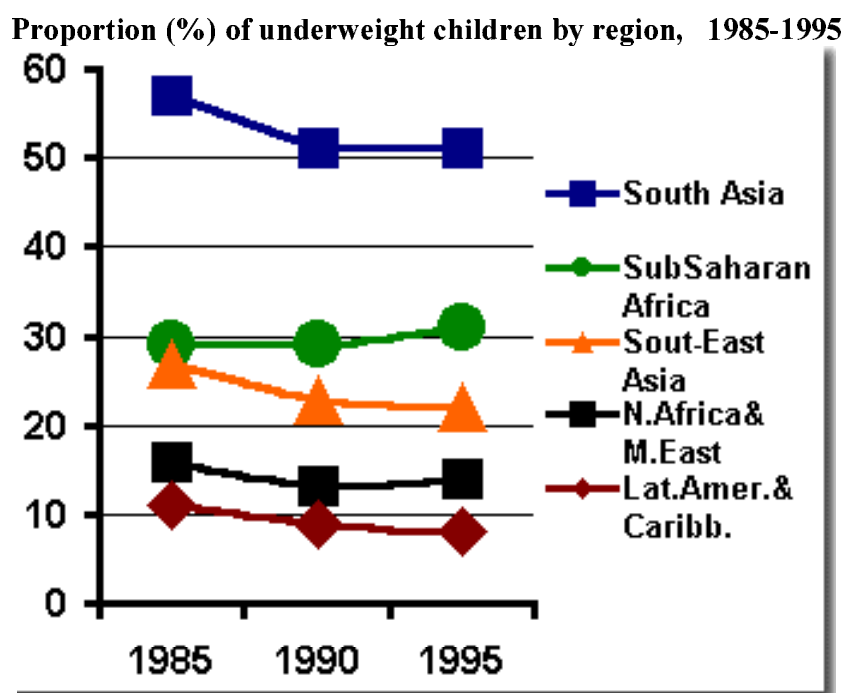
. **Wasting:**

- Insufficient weight gain relative to height/losing weight
- Implies recent/acute malnutrition

. **Underweight:**

- Insufficient weight gain relative to age or losing weight
- Implies various combinations of stunting and wasting

**Underweight:**



Underweight (weight for age) is still the most widespread indicator used. In 1995, 86 million children were underweight in South Asia, 36 million in South East Asia & the Pacific, 32 million in Sub-Saharan Africa, 7 million in North Africa & the Middle East and 4 million in Latin America & the Caribbean. While the situation in Sub-Saharan Africa has been nearly static over the last decade, its prevalence of underweight is still considerably below that in South Asia which includes more than half the malnourished children in the world. Global progress in reducing the prevalence of underweight since 1990, or even progress in most regions, is still less than one fifth of that necessary to reach the goal of halving the prevalence from 1990-2000.

**PEM and young child mortality:**

Malnutrition potentiates the effect of diseases on child mortality. The effects are both for mild-to-moderate as well as for severe. PEM has important consequences for the survival, health and development of young children. The results of recent research by David Pelletier of Cornell University clearly show that malnutrition contributes to 56% of all child deaths and this because of its potentiating

effects on infectious diseases. This is roughly 8-10 times higher than conventional estimates that ignore the potentiating effects of malnutrition on disease and the effects of mild and moderate malnutrition (MMM). In addition, 83% of the malnutrition-related deaths, are due to MMM as opposed to severe malnutrition; this is more significant than was commonly recognized. It also has important policy implications regarding the balance of various intervention strategies needed, interventions that combine health care, nutritional improvement, and reductions in disease exposure.

### **Other consequences of PEM:**

- Impaired cognitive and behavioral comporment
- Low educability
- Reduced productivity and income
- Poor reproductive health

PEM also has important consequences for cognitive and behavioral development of young children, and for their educability. Because small children become small adults, their work capacity is also reduced physically, in addition to that due to cognitive and behavioral development. Small women have more complications from pregnancy; they also give birth to smaller babies, perpetuating the cycle of poor growth and development.

### **Causes of malnutrition:**

To look for solutions, and especially to sustainable solutions to the problem of PEM, or to favor good growth, survival and development, it is useful to examine the causes of PEM beyond the immediate causes which are related to the synergy between poor diet and disease. Poor diet and disease actually result from underlying causes related to insufficient access to food by families or households, inadequate caring practices provided to vulnerable members of the household, generally mothers and young children, and inadequate access to health services and to a healthy environment (e.g. clean water). It is necessary to identify in a specific situation what are the major constraints to providing adequate access to food, to health services and to care. These can be influenced to a certain extent by education but they fundamentally result from how resources are used in society and who controls them; this in turn results from the political and ideological superstructure that is prevalent.

### **Solutions:**

To insure adequate growth and nutrition it is necessary to facilitate:

- The ability of households to provide care for mothers and young children (ex: breastfeeding, complementary feeding, love..)
- Access by households to sufficient foods to lead an active and healthy life
- Access to adequate health services (immunization for example) and a healthy environment (ex. clean water).

While access to sufficient food is a problem for many households (FAO estimates that 841 million persons still suffer from food inadequacy), it is less frequently the major constraint to adequate development of young children: they actually need only very small amounts of nutrient dense foods, but need them several times a day. Inadequate caring practices (e.g. sub-optimal breastfeeding, inappropriate or infrequent feeding of complementary foods...) & insufficient access to health services (e.g. lack of immunization) & a healthy environment (e.g. no clean water, poor sanitary facilities) are

often the major obstacles to adequate nutrition of young children. Actions which facilitate the daily deliberate actions and decisions made by parents for their young children, e.g. alleviating the workload of mothers, growth promotion activities (not just growth monitoring), protection of breastfeeding (which should be exclusive for the first 6 months and continued with appropriate complementary foods for 2 years and beyond) are critical.

### **IRON DEFICIENCY:**

- Over 2 billion people suffer from some form of iron deficiency
- Not all causes of anemia are nutritional in origin; yet anemia linked to iron deficiency and /or folic acid deficiency is among the world's major nutritional disorders
- Africa and south Asia have the highest overall incidence of anemia, followed by Latin America and East Asia.

Iron deficiency is the most common nutritional disorder in the world with anemia being the major clinical manifestation. In many countries, 40% or more of women of reproductive age are anemic & a similar prevalence is estimated to occur among preschool-age children. Among pregnant women, 56% are anemic in developing countries, compared to 18% in developed countries. The prevalence is lower among schoolchildren, non-pregnant women, adolescents and adult males. However, in the developing world 25% of men are also deficient in iron. If uncorrected, iron deficiency leads to increasingly severe anemia, reduced work capacity, diminished learning ability, increased susceptibility to infection & greater risk of death associated with pregnancy and child birth.

### **Consequences of iron deficiency:**

- Reduces work capacity, thus productivity, earnings and ability to care for children
- Associated with 50% of maternal deaths, and wholly blamed for up to 20%
- Retard fetal growth, causes low birth weight and increases infant mortality
- Impairs ability to resist disease; in childhood, reduces learning.

Iron deficiency results from consuming diets with insufficient iron, reduced dietary iron availability, increased iron requirements to meet reproductive demands and losses due to parasitic infections; these factors often operate concurrently. Increasing the intake of iron rich foods and that of factors which enhance iron absorption (e.g. simultaneous intake of a source of vitamin C, separate intake of tea, other sources of tannin or other inhibiting factors to between meals) are necessary prevention measures. Fortifying commonly used basic foods can be an important adjunct as well as the use of low-cost iron tablets, especially when combined with measures to control parasitic infections and malaria, which sap human iron reserves. That the problem of anemia remains so widespread and apparently resilient has been attributed to the low compliance with daily iron tablets in the population affected as well as to the problems associated with maintaining supplies in distribution centers (in addition to insufficient intake of Iron from foods).

### **Improving iron status:**

- Iron tablets (daily vs. weekly)
- Iron fortification of basic foods
- Increased consumption of iron rich foods, and factors which enhance absorption
- Control of parasitic infections

## **VITAMIN A DEFICIENCY:**

It is only recently that serious attention has been given to documenting the situation of vitamin A status in most countries. Information therefore remains incomplete around the world. Currently, Vitamin A deficiency (VAD) is a moderate to serious public health problem in 76 countries, particularly in Africa, South-East Asia and the Western Pacific. When vitamin A deficiency occurs, the integrity of epithelial barriers and the immune system are compromised before the visual system is impaired. This leads to increased severity of some infections and risk of death, especially among children. When vitamin A depletion is sufficient to affect the visual system, night blindness occurs first, followed by xerophthalmia which can affect both the conjunctiva and cornea, and may lead to irreversible partial or total blindness.

- Sub clinical, severe and moderate: 251 million children 0-4 years old
- Clinical (exophthalmia): 2.8 million children 0-4 years old
- Blindness, total or partial: at least half a million a year; about half die within a few months.

## **Consequences of VAD:**

- Onset of childhood diseases increases
- Partial or total childhood blindness
- Child mortality increases at least 20-30%
- May increase maternal mortality
- May increase HIV transmission

While VAD has long been recognized as the leading cause of preventable childhood blindness, more recent research has shown that mild and moderate deficiencies can significantly increase the onset of childhood diseases and can cause death. Improving vitamin A status could reduce child death by around a third, even in otherwise adequately nourished children. Recent research suggests that improving vitamin A status could also significantly reduce the rate of HIV transmission such as can occur in pregnancy, and can significantly reduce maternal mortality. While these results still need to be confirmed by further research, they appear very promising.

## **Improving va status:**

- Increased intake of vitamin A rich foods (eggs, butter, whole milk, liver, red palm oil, dark green, yellow and red fruits and vegetables)
- Fortification of basic foods with vitamin A
- Supplements, ex 2 capsules a year to young children

These devastating problems could be easily prevented by promoting the production and consumption of foods rich in vitamin A or by supplementing children's diets with just two vitamin A capsules per year at a production cost of around two US cents per capsule. Availability of vitamin A rich foods should not be confused with consumption. For example, per capita availability is very high in the Sahelian belt and West Africa, as well as in South Asia. Yet VAD is endemic in these regions. Availability clearly masks problems of uneven distribution, generally associated with poverty. Several countries have now begun to take action to improve the intake of Vitamin A. Food based measures have again been neglected until now.

## **IODINE DEFICIENCY DISORDERS:**

- In 1990: 1,6 billion people at risk worldwide of IDD
- At least 655 million with goiter
- 43 million with some degree of mental impairment
- 11 million with cretinism

An inadequate intake of iodine can cause ill health at any age, but is most serious in pregnant women and young children. In pregnancy, it results in retarded fetal development. Severe deficiency may result in fetal death or severe physical and mental retardation, a disease known as cretinism. Milder deficiencies cause less severe but significant mental & physical retardation. In childhood, it may also result in speech & hearing defects, delayed motor development & impaired physical growth. In adults, chronic deficiency causes goiter, a swelling of the thyroid gland at the base of the neck, which may be disfiguring. Grouped together, goiter, cretinism & delayed physical & mental development due to iodine deficiency are known as Iodine Deficiency Disorders (IDD).

The soil in many regions of the world is very poor in iodine and all food produced in this environment will likely be iodine deficient. In these areas, IDD will continue unless a new source of iodine is provided, either from imported food or from a supplement.

## **Other consequences of IDD:**

- Moderate iodine deficiency: associated with average reduction of over 13 IQ points
- Adequate intake of iodine: can prevent all IDD, milder forms of goiter disappear, and improve development of older children mildly affected
- Severe forms of IDD such as cretinism, cannot be reversed, can only be prevented by adequate intake of I during pregnancy.

Iodine Deficiency Disorders are best controlled by fortifying table salt with iodine. Capsules or injections of oil containing iodine can be given to people in areas of severe iodine deficiency as an interim control measure until the iodization of salt is well established. In 1990, participants at the World Summit for Children promised to iodize at least 90 per cent of edible salt by 1995 and to virtually eliminate IDD by the year 2000. Few developing countries had large-scale salt iodization programmes in 1990 and fewer than 20 per cent of people at risk consumed iodized salt. Substantial progress has now been accomplished in a large number of countries and currently it is estimated that 60% of all edible salt in the world is iodized.

## **PROGRESS IN IODIZINE SALT:**

- 14% of all edible salt in the world was iodizing in 1997
- Before 1990, some 40 million children were born each year at some risk of mental impairment due to I deficiency in their mother's diet. By 1997, is closer to 28 million.

The progress achieved in salt iodization is remarkable but is not due to chance. It is the result of policy-makers successfully joining efforts with legislators, salt producers and distributors, as well as consumers, to effect these substantial changes. International groups e.g. the Kiwanis have also provided major support in many different forms.

**IMPROVING NUTRITION CAN LEAD FUTURE PROGRESS IN HEALTH AND  
DEVELOPMENT AROUND THE WORLD**

As is well outlined in the 1998 State of the World's Children Report, advances in nutrition and in how to best apply our accumulated knowledge, provide many new opportunities for improving the lives of millions of children and their families. Much more needs to be done to reduce the global toll of severe and moderate malnutrition. Governments in poor and rich countries must also show leadership and commitment and must provide funding to mount and support actions to combat malnutrition that can be implemented by communities themselves.