Impact of child malnutrition and its long-term implications

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Abstract : The prevention of low birthweight and the promotion of adequate growth and development during early childhood will result in healthier, more productive adults. Such investments, because they build human capital, are best viewed as long-term economic strategies. These clusters of nutritional problems flourish during periods of vulnerability, namely in utero and during the first three years of life, and affect at least a third of all young children in developing countries. Survivors of malnutrition in early childhood suffer functional disadvantages as adults, including diminished intellectual performance, low work capacity, and increased risk of delivery complications. The problem of malnutrition in poor societies is best viewed as a "syndrome of developmental impairment," which includes growth failure; delayed motor, cognitive, and behavioural development; diminished immunocompetence; and increased morbidity and mortality. Growth retardation is often found in association with other problems, such as vitamin A deficiency and anaemia.

IndexTerms **- Birthweight, Nutrition problem, morbidity and mortality.**

1. Introduction

The objective of this brief article is to review why it is important for developing countries to improve child nutrition. The reasons are simple. First, child malnutrition is a very common problem in poor countries. Second, child malnutrition has short- and long-term adverse consequences that are of great significance for the individuals affected and for the societies in which they live. Third, if the nutrition of children is improved, future generations will be healthier and more productive, and this will be an asset for national economic development.

The nature of malnutrition in children

The problem of malnutrition in children is best viewed as a "syndrome of developmental impairment" caused by a complex of multifactorial factors [1]. The word "syndrome" implies that there is a group of signs and symptoms that occur together and that serve to characterize the problem of malnutrition. At the extreme of severity is severe, clinical malnutrition, illustrated by kwashiorkor and marasmus and their well-known clinical, metabolic, and anthropometric features [2]. These extreme conditions, although they are life-threatening medical problems with lifelong dysfunction for survivors, are less important, from the public health point of view, than the less severe forms of malnutrition. This is so because mild and moderate forms of malnutrition are many times more common than severe clinical malnutrition.

The hallmark of child malnutrition is growth failure, and the most commonly used indicator of growth failure is underweight, defined as a weight-for-age more than 2 standard deviations below the reference mean. In the reference curve, 2.3% of the population is below this criterion. The Sub-Committee on Nutrition of the United Nations Administrative Committee on Coordination (ACC/SCN) estimates that 29.3% of pre-school children (i.e., < 5 years of age) in developing countries were underweight in 1995. This is lower than the 34.3% estimated for 1985. However, in absolute numbers, the number of underweight children changed little over this period, from 163.8 million in 1985 to 157.6 million in 1995. For South-East

Asia, which includes Indonesia, rates of underweight are reported to have come down from 39.8% to 32.4% of pre-school children and the number of malnourished children to have decreased from 39.8 million to 32.4 million between 1985 and 1995 [3].

Many young children in developing countries also suffer from a number of nutritional deficiencies. Often, underweight and nutritional deficiencies cluster in the same villages, families, and individuals. The older literature in Latin America referred to the problem of malnutrition in young children as the *síndrome pluricarencial* or "multiple deficiency syndrome," a very apt designation. Although less than 1% of pre-school children have clinical vitamin A deficiency, many more have subclinical vitamin A deficiency. Using the cutoff point for serum retinol of less than 0.7 mol/L to define subclinical vitamin A deficiency, many countries are found where 30% or more of children are affected; 58% of pre-school children in Indonesia, according to a 1991 survey, were affected with vitamin A deficiency [4]. Anaemia, defined as less than 11 g of haemoglobin per deciliter, is estimated to occur in more than a third of pre-school children in developing countries [4]. According to UNICEF, about a third of babies born in 1990, or some 40 million infants, were iodine deficient in utero or in early childhood, but now this figure is much less because of the widespread use of iodized salt [5]. Other nutritional problems are also common in young children and include folic acid and zinc deficiencies [4].

Beaton et al. [1] called attention to the fact that the syndrome of child malnutrition includes, in addition to growth failure, other indications of impairment, such as delayed motor, cognitive, and behavioural development, diminished immunocompetence, and increased morbidity and mortality. The "complex of multifactorial factors" that cause child malnutrition includes three classes of underlying causes at household and family levels, which are known simply as food (i.e., insufficient access to food), health (i.e., poor water/sanitation and inadequate health services), and care (inadequate maternal and child-care practices). These in turn lead to deficient nutrient intakes and to infections and diseases, which are the immediate causes of child malnutrition [6]. Much has been learned over the last half century about the causes of malnutrition, and this knowledge has improved our policy and programme recommendations. In the 1950s and 1960s, emphasis was placed on protein deficiency, followed by a period in the 1970s and beyond during which low energy consumption due to food insecurity was thought to be the most limiting problem in the diets of poor people. Today, poor dietary quality, which refers to inadequate concentrations of protein and micronutrients and/or to poor bioavailability, is recognized as an additional, important dietary limitation. Infections, particularly diarrhoeal diseases, are recognized as important causes of poor appetite in children and of metabolic and clinical disturbances that lead to poor nutrient utilization [6].

Finally, one of UNICEF's greatest contributions has been to underscore the role of caring behaviours in shaping the nutrition of young children [6]. Household food resources and health-care availability are necessary but not sufficient ingredients for good child health and nutrition; in addition, caretakers must use household resources wisely and meet the nutritional, health, and psychosocial needs of young children for children to be healthy and to develop normally [7].

Windows of greatest developmental vulnerability

Childhood malnutrition flourishes during periods of vulnerability. One such period is *in utero*. The prevalence of low birthweight (< 2.5 kg) is 18% in developing countries but is as high as 50% in Bangladesh [6]. These affected newborns are at high risk for serious morbidity and mortality during infancy. As adults, they tend to be smaller than others in the community by 5 cm and 5 kg, with reduced work capacity and strength [8]. There follows a brief period of relative well-being after birth, even in settings of marked poverty, but only if babies are breastfed. At some point in early infancy, by three to six months generally, growth rates begin to falter dramatically, particularly before one year of age. By the time children are two or three years of age, many are underweight and stunted. From three years of age into the school

period, children from even very poor countries will grow generally as well as children from the United States, remaining small but neither falling further behind nor catching up appreciably [9]. Some catch-up occurs in some settings during adolescence and is associated with delayed maturation [10, 11]. Currently, there is no evidence that stunting can be reversed during adolescence through nutrition intervention programmes; on the other hand, adoption studies suggest that dietary interventions may accelerate maturation, shorten the adolescent growth period, and reduce final adult stature [12].

Thus, to prevent underweight and its consequences, efforts must be made to prevent low birthweight and to promote good growth and development in the first two to three years of life. Why are children at greater risk of malnutrition during these windows of vulnerability? *In utero* the reasons include growing up in the restricted environment provided by a stunted mother, herself the product of a malnourished childhood. Maternal reserves of fat, lean tissue, minerals, and micronutrients will be poor. In addition, dietary intakes will often be deficient in quantity and quality, and prenatal care may be poor. Why are children less than three years of age most vulnerable to malnutrition and its effects? One reason is that growth rates in the first few years are higher than at other times after birth, and thus adverse factors have a greater potential for causing growth retardation early in life than at later years. Young children have high nutritional requirements per kilogram of body weight, in part because of their needs for growth. Another reason for the vulnerability of young children is that their immunological systems develop and mature with time; young children are more susceptible to frequent and severe infections than older children with mature immune systems. Yet another reason for the vulnerability of young children is that they are less able to make their needs known and are more vulnerable to the effects of poor parenting [9].

Of particular relevance to the central nervous system is that the wiring of cognitive and emotional abilities, a delicate interplay of nature and nurture (i.e., stimuli), largely occurs during the early years of life. Thus, it is particularly important that young children live in an environment that provides the necessary security, experience, and stimuli for optimal growth and development of the central nervous system and associated intellectual, social, and emotional competencies.

2. Consequences of childhood malnutrition

Some years ago, Scrimshaw et al. [13, p. 265] wrote that “Synergism between malnutrition and infection is responsible for much of the excess mortality among infants and pre-school children in less developed regions.” Yet, infections, rather than the underlying malnutrition, are usually regarded as the cause of mortality in young children, and for these reasons, many estimates of the relative importance of causes of preschool mortality give little importance to malnutrition. Pelletier et al. [14] carried out an analysis demonstrating the “potentiating effect of malnutrition” on mortality rates. By their estimates, more than half of deaths among children less than five years old are due to malnutrition, mostly mild and moderate malnutrition. These estimates have received wide dissemination, and policy makers now have a better appreciation of the importance of nutrition for survival. The improvement of vitamin A status has been demonstrated to lead to a reduction of 23% in mortality among children one to five years of age [15]. This is perhaps due to effects of vitamin A improvements on the severity of infections, particularly diarrhoeal diseases and measles. Recent research indicates that zinc supplementation in pre-school children leads to important reductions in both the number and duration of episodes of diarrhoea [16]. This probably means that improvements in zinc status have important effects on child mortality, but no studies on this question have been carried out to date.

Childhood malnutrition also leaves its imprint on the minds of those who survive it. A review of the literature reveals that poor nutrition during intrauterine life and the early years leads to profound and varied effects, which include delayed motor development, general effects on cognitive development resulting in lower IQ, and a greater degree of behavioural problems and deficient social skills at school age, as well as

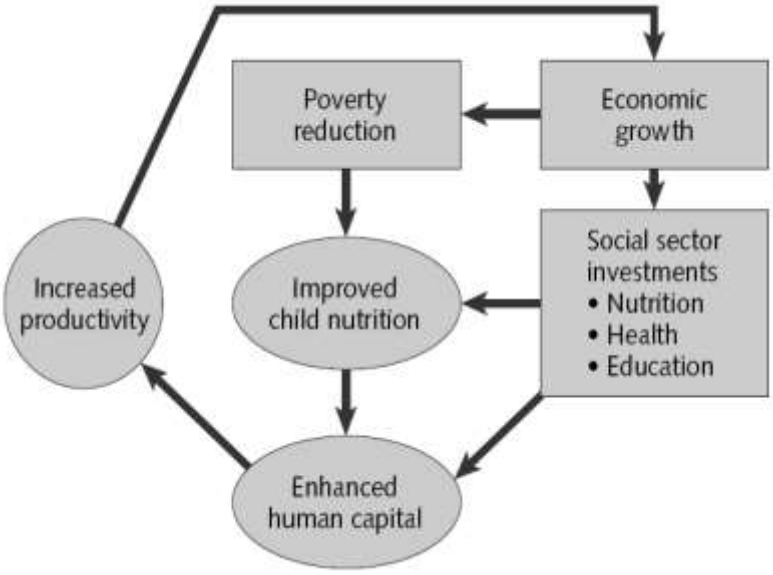
decreased attention, deficient learning, and lower educational achievement. The bodies of survivors of child malnutrition are also affected, as demonstrated by studies conducted in rural Guatemala. Improved nutrition during pregnancy and the first few years of life, achieved through the consumption of daily food supplements rich in energy, protein, and micronutrients, improved growth during early childhood and reduced stunting at three years of age. As adults, subjects who received dietary improvements were taller and had greater lean body mass, work capacity, and strength than those who did not receive dietary improvements.

This is important for adults in several ways. In men engaged in hard physical labour, better work capacity and strength can lead to increased productivity. In women, more lean body mass will mean higher birthweights, and increased height and larger body frame may decrease the risk of delivery complications due to cephalopelvic disproportion. The Guatemalan study demonstrates that improving nutrition in early childhood is important, but not that improvement is necessarily achieved through food supplementation.

The benefits of improving micronutrient status are also great. Reference has been already made to some of the effects of deficiencies in vitamin A and zinc. Also important is the prevention of iron-deficiency anaemia in children and adults. Anaemia can result in impaired learning, diminished work capacity, and perhaps low birthweight and increased maternal mortality. Iodine deficiency in pregnancy and early childhood, even when not severe enough to result in cretinism, can cause poor growth, delayed maturation, and diminished intellectual performance.

3. Improved child nutrition and economic development

The relationship between improved child nutrition and economic development is shown in figure 1. In this paper, the evidence justifying the arrow going from “improved child nutrition” to “enhanced human capital” has been reviewed. There is considerable evidence as well for other relationships depicted in figure 1. Economic growth, particularly that which leads to poverty reduction in urban as well as in rural areas, is one of the key factors driving change in nutrition at national levels. But much more can be achieved, and more quickly, if governments invest in nutrition, health, and education programmes. There are examples of successful community-based programmes [5, 6,], and we know much about what is needed for successful programme implementation]. Enhanced human capital, through improvements in nutrition and health, is thought to explain half of the economic growth of the United Kingdom, France, and other European nations in the previous two centuries.



4. Conclusions

Three points are emphasized in this paper. First, nutritional problems are very common in poor countries. Second, these problems lead to short- and long-term functional consequences that limit human potential. Third, improving child nutrition is a national priority and an important strategy for long-term economic development. As countries face difficult choices during times of economic crisis, it becomes imperative to advocate strongly for social sector investments, including nutrition programmes for mothers and young children. Dismantling effective programmes is a counterproductive, short-term coping strategy, just as would be said in the case of households in famine-stricken areas who consume the seeds needed for future plantings and who sell their agricultural tools. In both these cases, future productive potential is compromised. Whereas options may be limited in a famine, governments in economic crises have more latitude. Public nutritionists are compelled to seek continued funding for priority programmes as well as better use of the limited resources available (i.e., increased cost-effectiveness).

References

[1] Beaton G, Kelly A, Kevany J, Martorell R, Mason J. Appropriate uses of anthropometric indices in children. ACC/SCN State-of-the-art Series Nutrition Policy Discussion Paper No. 7. Geneva: United Nations Administrative Committee on Coordination/Sub-Committee on Nutrition, 1990.

[2] Jelliffe DB. The assessment of the nutritional status of the community. WHO Monograph Series No. 53. Geneva: World Health Organization, 1966.

[3] Administrative Committee on Coordination/Sub-Committee on Nutrition (ACC/SCN). Update on the nutrition situation 1996. Summary of results for the third report on the world nutrition situation. SCN News, No. 14, July 1997.

[4] Administrative Committee on Coordination/Sub-Committee on Nutrition (ACC/SCN). Chapter 2. Micronutrients. In: Third report on the world nutrition situation. Geneva: ACC/SCN, 1997:19–46.

[5] Alnwick DJ. Combating micronutrient deficiencies: problems and perspectives. International and Public Health Nutrition Group Symposium on "Can nutrition intervention make a difference?" Proc Nutr Soc 1998;57:1–12.

[6] United Nations Children's Fund (UNICEF). The state of the world's children 1998. Bringing science to bear. Oxford, UK: Oxford University Press, 1998.

[7] Engle PL, Menon P, Haddad L. Care and nutrition. Concepts and measurement. Washington, DC: International Food Policy Research Institute, 1997.

[8] Martorell R, Ramakrishnan U, Schroeder DG, Melgar P, Neufeld L. Intrauterine growth retardation, body size, body composition and physical performance in adolescence. Eur J Clin Nutr 1998;52(S1):S43–53.

[9] Martorell R. Promoting healthy growth: rationale and benefits. In: Pinstrup-Andersen P, Pelletier D, Alderman H, eds. Child growth and nutrition in developing countries. Priorities for action. New York: Cornell University Press, 1995:15–31.

[10] Martorell R, Kettel Khan L, Schroeder D. Reversibility of stunting: epidemiological findings in children from developing countries. Eur J Clin Nutr 1994;48:S45–57.

[11] Simondon KB, Simondon F, Simon I, Diallo A, Bénéfice E, Traissac P, Maire B. Preschool stunting, age at menarche and adolescent height: a longitudinal study in rural Senegal. Eur J Clin Nutr 1998;52:412–8.

[12] Proos LA, Hofvander Y, Tuvemo T. Menarcheal age and growth pattern of Indian girls adopted in Sweden. Acta Paediatr Scand 1991;80:852–8.

[13] Scrimshaw NS, Taylor CE, Gordon JE. Interactions of nutrition and infection. WHO Monograph Series No. 57. Geneva: World Health Organization, 1968.

[14] Pelletier DC, Frongillo EA, Habicht J-P. Epidemiologic evidence for a potentiating effect of malnutrition on child mortality. Am J Public Health 1993;83:1130–3.

[15] Beaton GH, Martorell R, Aronson KJ, Edmonston B, McCabe G, Ross AC, Harvey B. Effectiveness of vitamin A supplementation in the control of young child morbidity and mortality in developing countries. ACC/ SCN State-of-the-art Series Nutrition Policy Discussion Paper No. 13. Geneva: United Nations Administrative Committee on Coordination/Sub-Committee on Nutrition (ACC/SCN), 1993.

[16] Black RE. Zinc for child health. Am J Clin Nutr 1997; 68(2S):410S–516S.