Key strategies to further reduce stunting in Southeast Asia: Lessons from the ASEAN countries workshop

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Abstract

Background. To further reduce stunting in Southeast Asia, a rapidly changing region, its main causes need to be identified.

Objective. Assess the relationship between different causes of stunting and stunting prevalence over time in Southeast Asia.

Methods. Review trends in mortality, stunting, economic development, and access to nutritious foods over time and among different subgroups in Southeast Asian countries.

Results. Between 1990–2011, mortality among under-five children declined from 69/1,000 to 29/1,000 live births. Although disease reduction, one of two direct causes of stunting, has played an important role which should be maintained, improvement in meeting nutrient requirements, the other direct cause, is necessary to reduce stunting further. This requires dietary diversity, which is affected by rapidly changing factors: economic development; urbanization, giving greater access to larger variety of foods, including processed and fortified foods; parental education; and modernizing food systems, with increased distance between food producers and consumers. Wealthier consumers are increasingly able to access a more nutritious diet, while poorer consumers need support to improve access, and may also still need better hygiene and sanitation.

Conclusions. In order to accelerate stunting reduction in Southeast Asia, availability and access to nutritious foods should be increased by collaboration between private and public sectors, and the Association of Southeast Asian Nations (ASEAN) can play a facilitating role. The private sector can produce and market nutritious foods, while the public sector sets standards, promotes healthy food choices, and ensures access to nutritious foods for the poorest, e.g. through social safety net programs.

Key words: ASEAN, complementary foods, private sector, public sector, stunting, undernutrition, dietary diversity

Introduction

Stunting (short stature for age) is the result of not meeting nutrient requirements for growth over a long period of time between conception and 24 months of age. The presence of stunting indicates that nutrient intake has been suboptimal not only for growth, but also for other critical functions of the body, such as brain development and the immune system. Because of the critical physical and mental development that takes place between conception and 24 months of age, development during this phase determines the individual's potential for life in terms of risks of morbidity and mortality, school achievement, income earning potential, physical strength, and risk of chronic disease [1]. This period is called the 1,000-days window of opportunity. Stunting is the outcome of inadequate nutrition during this critical developmental phase of
life. Because this phase does not reoccur later in life, reversing or treating the developmental consequences of early childhood undernutrition later in childhood is almost impossible. Stunting and its consequences should be prevented by ensuring access to appropriate nutrition during the first 1,000 days of life.

The economic consequences of stunting are considerable. Approximately 11% of the health burden is related to malnutrition [2], leading to increased healthcare expenditure at both the family and the national levels. It is estimated that the average income of a stunted individual is 20% lower than that of someone of average height [3, 4]. A conservative estimate of the costs of malnutrition to a country is 2% to 3% of its GDP [5].

For these reasons, stunting prevalence is a very important indicator of the health and nutrition status of a population, and stunting prevention is an extremely important goal, for example, of the Scaling Up Nutrition (SUN) movement [6].

In this paper we assess the trends of stunting prevalence over time in Southeast Asia, explore the underlying causes for the trends and how they have changed over time, and propose key strategies for a further reduction, including recommendations that the Association of Southeast Asian Nations (ASEAN) can act upon.

Trends of stunting prevalence in Southeast Asia

**Figure 1** shows the prevalence of stunting in Southeast Asian countries between 1996 and 2011. By 2011, country prevalence figures ranged from 4% in Singapore to 48% in Laos PDR. Globally, the prevalence of child stunting is 26%, with the highest rates in sub-Saharan Africa (40%) and South Asia (39%) [7]. Despite considerable differences among and within countries in Southeast Asia, and the fact that in all these countries stunting prevalence was much higher 20 to 25 years ago, **figure 1** does not show a further decline in prevalence in the six countries for which data are available for three points in time between 1996 and 2011.

**Figure 2** shows that Southeast Asian countries with a higher GDP tend to have a lower prevalence of stunting. However, this does not mean that any country with a higher GDP than another country also has a lower prevalence of stunting. For example, Indonesia’s GDP is more than twice that of Myanmar, but Myanmar has a lower prevalence of stunting. Therefore, it is important to look more closely at how GDP is related to stunting and how GDP is distributed within a country.

Direct, underlying, and basic causes of stunting and trends in Southeast Asia

The UNICEF conceptual framework of malnutrition (**fig. 3**) shows that dietary intake and disease are the two direct causes of stunting, because these factors represent nutrient intake, and nutrient needs and utilization, respectively. In turn, these direct factors are dependent on underlying factors: access to food, caring practices, healthcare services, and environmental hygiene (water and sanitation), which are all related to basic causes at the individual and household levels, such as education and income, as well as societal factors, including economic situation, gender roles, governance, etc.

This framework helps us understand the relationship between GDP and stunting prevalence and the observation that within a country, stunting prevalence is higher...
FIG. 2. Stunting rates by GDP in PPP$ per capita in selected ASEAN countries: 2010 data [7, 9]

FIG. 3. UNICEF conceptual framework for the cause of malnutrition (modified by Bloem et al. [10]).
among groups with lower socioeconomic status (see, for example, fig. 4). Higher income improves access to foods, healthcare, and more hygienic circumstances and can also improve caring practices by increasing knowledge about care and/or time available for care. Both disease and nutrient intake can be positively impacted by these underlying factors, and in that way stunting can be prevented.

In order to be able to make further progress with reducing stunting prevalence, we need to understand which pathways are the most important in particular contexts, so that the most suitable interventions and strategies can be identified.

Between 1990 and 2011, mortality among children under 5 years of age in Southeast Asia declined from 69/1,000 to 29/1,000 live births [13] (fig. 5). With an average annual decline of 4.1%, Southeast Asia is on track to reach Millennium Development Goal 4. Although the number of neonatal deaths also declined during this period, the proportion of deaths of children under 5 years of age due to neonatal mortality increased from 35% to 50% [13]. The drastic decline in under-five mortality is related to the fact that healthcare services, including antenatal care, immunization, distribution of high-dose vitamin A capsules, and curative services for major childhood illnesses, as well as sanitary conditions and access to safe drinking water, have markedly improved in Southeast Asia over the past 20 years [14, 15]. This also means that, while provision of healthcare service and hygiene conditions should be maintained and where possible improved, or its coverage should be extended to also include the poorest, and efforts to maintain or improve exclusive breastfeeding up to 6 months and continued breastfeeding until 24 months

FIG. 4. Prevalence of stunting among children under 5 years of age in Indonesia according to urban or rural location and wealth quintile in 2007 and 2010 [11, 12]

FIG. 5. Mortality among children under 5 years of age in Southeast Asian countries in 1990 and 2011 [13]
of age should continue to be supported, further gains in improving nutritional status should mainly come from dietary improvements during pregnancy and lactation and the complementary feeding period. Meanwhile, efforts to reduce neonatal mortality will make an important contribution to further reducing under-five mortality.

If we look closely at nutrient requirements, many different nutrients are required besides the ones that are best known—i.e., energy, protein, vitamins (A, C, D, and B-complex), and minerals (iron, zinc, iodine)—such as essential fatty acids and essential amino acids, growth-promoting factors in, for example, milk (insulin-like growth factor), type II nutrients such as magnesium and phosphorus, etc. [16, 17]. These nutrients are required for growth of muscle tissue and bones, brain development, and bodily functions such as the immune system, cofactors for enzymes, etc. Because these nutrients are present in different foods, dietary diversity is required to meet nutrient needs [18].

Dietary diversity refers to consumption of foods from different food groups, including animal-source foods (dairy, fish, meat, eggs), fortified foods, vegetables, fruits, pulses, staple foods, oil, etc., as well as breast milk (exclusive in the first 6 months and continued until at least 24 months). Also, from within each food group, different foods need to be consumed. Fortified foods, or home fortification with micronutrient powder or small-quantity lipid-based nutrient supplements, are particularly important for meeting requirements of specific vitamins and minerals, such as iron and zinc, because requirements are very high compared with feasible intakes, especially between 6 and 23 months of age [18–20].

Factors affecting diet and its relationship with stunting

As discussed above, a diverse diet, which also includes fortified foods, is required in order to meet nutrient requirements and hence prevent stunting, and different underlying and basic factors can increase access to and consumption of a more diverse diet. The most important underlying and basic factors, and their changes over time in Southeast Asia, are discussed below.

Dietary diversity increases as purchasing power improves

There is substantial evidence for the relationship between higher dietary diversity and lower prevalence of stunting [21–25]. Whereas Arimond and Ruel controlled their analysis for socioeconomic status [21], other analyses have shown that increased affordability and greater expenditure on a larger variety of foods, in particular nongrain and animal-source foods, are associated with lower prevalences of underweight [22] and stunting [24, 25]. An analysis of longitudinal data on child growth from urban and rural Filipino children collected between 1988 and 1990, showed that the relationship between socio-economic status and stunting emerged after the age of 6 months, suggesting a relationship with nutritional quality of complementary foods. The relationship emerged at the age of 6–11 months among rural and 12–29 months among urban children [26]. Together, these findings confirm that dietary diversity, because of improved nutrient intake, is a key link in the relationship between higher income and lower prevalence of stunting.

Modernizing food systems

Economic development and improvements in GDP go together with changes in the food system [27–29]. At one end of the spectrum of food systems are agrarian societies where the majority of the population grows food, often as subsistence farmers; there are few possibilities to sell surplus food; there is virtually no food manufacturing; and only a small proportion of people buy processed foods, which are usually imported. On the other end of the spectrum are the food systems of developed countries, where a very small proportion of the population grows food, most people buy their food in supermarkets, and the distance between food producers and consumers is long, with a large role for food manufacturers.

As food production is modernized, yields improve, staple food prices decline, and incomes, throughout the population, increase. The increase in income and the lowering of the prices of staple foods lead to increased dietary diversity, and food systems produce a greater variety of foods and increase food availability through increased transport, preservation, and processing by food manufacturers. It is important to note that many small-holder farmers are net buyers of food, and that their incomes improve when they gain better access to required inputs to improve yields and reduce postharvest losses, and are able to get a better price for their produce because of better linkage to markets [15, 27]. At the same time, though, we have seen an increase in food prices across the world since 2008, especially in countries that import foods, which leads to decreased dietary diversity [30]. While this process negates some of the effects of the modernization of food systems, both processes (modernization of food systems and increase in food prices) occur simultaneously, but due to other underlying mechanisms, and they affect different countries and population groups in different ways.

Increased availability and affordability of an increased variety of foods, including processed foods and foods with high nutritional value, increases consumer choices and convenience and has been highlighted as one of the major factors in the increase in
adult height in Europe in the second half of the 20th century [31].

The flip side of increased choices and greater availability of a wide range of foods that contribute to an increased intake of essential nutrients required to prevent stunting and micronutrient deficiencies is that the availability of foods that are calorie-dense but low in essential nutrients (high-fat and high-sugar snacks and high-sugar drinks) is also higher [27, 28]. Their consumption, together with an increasingly sedentary lifestyle, is an important factor in the obesity epidemic and related disorders of diabetes, cardiovascular disease, and some cancers. In Asia, the poor have a higher risk of both childhood stunting and, particularly among adults, overweight and obesity, because their diet tends to have a low micronutrient content as well as a relatively high content of foods that are calorie-dense but low in essential nutrients (e.g., white rice, refined cereals, high-sugar and high-fat snacks, together with few vegetables and fruits, animal-source foods, and fortified foods) [15, 28, 32].

Urbanization

The prevalence of stunting is lower in urban than in rural populations [26, 33] (see also fig. 4); this has also been observed when the urban poor are compared with the rural population, for example in Bangladesh [34]. The factors underlying this urban versus rural difference include the better employment opportunities and hence higher income among the urban population, better access to processed foods and animal-source foods (greater availability, affordability, and participation in the cash economy), greater proximity to health-care services, and higher education levels [14, 27, 28].

Parental education

Several cross-sectional studies in a wide variety of contexts have found a relationship between higher maternal education and better child nutritional status [35]. Maternal education is usually an indicator of the highest level of schooling that a child’s mother has reached, which may have been up to 25 years prior to giving birth to the particular child. Maternal education can be related to several things that can positively influence child nutrition, including income-earning potential, a later age at marriage and first pregnancy and therefore higher birthweight of the child, empowerment and bargaining power within the family for resources and prioritizing children’s nutrition and healthcare, and knowledge and aptitude to act on new information related to nutrition and health. Maternal education can also be a proxy for paternal education and income-earning potential [36–39]. The combination of female literacy and urbanization in developing and emerging economies also increases women’s income, empowerment, and control over resources, which can contribute to better child nutrition.

All of the above factors—purchasing power, urbanization, modernization of food systems, and increased maternal as well as paternal education—that increase dietary diversity and thus, by improving nutrient intake, contribute to reducing stunting prevalence, are rapidly increasing in Southeast Asia.

Reducing the risk of stunting, targeting different groups

As the example from Indonesia in figure 4 shows, the prevalence of stunting varies across socioeconomic groups, from 43.1% in the lowest wealth quintile to 24.1% in the highest wealth quintile. Similarly, over 70% of stunted and wasted children under 5 years old live in middle-income countries, with the largest number living in lower-middle-income countries [7]. This indicates inequality of access to economic development and a more nutritious diet during the critical window of opportunity, but it also shows that although the prevalence of stunting is higher among the poor, the wealthier are also affected. The fact that stunting occurs in different socioeconomic groups means that different approaches can be used to improve nutrition among these groups. Furthermore, among the poorer quintiles of the population, disease-related issues, such as poor environmental hygiene and limited access to preventive health services, are also still important causes of undernutrition, in addition to diet-related causes. Among them, both aspects need to be addressed simultaneously, i.e., improving nutrient intake as well as improving environmental hygiene (especially safe drinking water and reduced environmental pollution) and health education.

The Cost of the Diet (CoD) analysis in Indonesia reported in the paper by Baldi et al. in this Supplement illustrates how the prevalence of stunting is considerably higher in West Timor, where few households can afford a nutritious diet, than in urban Surabaya, where a much greater proportion can afford a nutritious diet [25]. The households in urban Surabaya have more spending power, and the availability of nutritious foods for the general population, including women of reproductive age, and special nutritious foods for young children, such as instant, fortified complementary foods, is greater. However, the fact that nutritious foods are more available does not automatically mean that children in households that can afford these foods consume them, and if they do, it may not be in adequate amounts. The situation in West Timor is very different. First of all, fewer nutrient-dense foods are available; secondly, they cost more because of the higher costs to transport them from where they are produced; and thirdly, household purchasing power is much less, and
in addition to that, disease-related causes are still more important in this population as well.

Role for the private sector

In both situations described above, i.e., one where most people can afford more nutritious foods (Surabaya) and another where most people cannot afford them and where their availability is also less (West Timor), fortified processed foods can make an important contribution to improving nutrient intake by pregnant and lactating mothers and children aged 6 to 23 months. However, the way in which people in these two situations can access such foods is different.

Figure 4 shows that stunting prevalence decreased from 2007 to 2010 among Indonesia’s wealth quintiles 3, 4, and 5, with the largest decrease observed among the richest, who consume the most varied diet with a greater share of processed foods, manufactured and marketed by the private sector. This indicates that the households in these quintiles still need further improvement of dietary quality in order to better meet the nutrient requirements of their most vulnerable members, which requires further increased availability and accessibility of nutritious complementary foods and awareness about their benefits. Households in the 3rd and 4th quintiles, as opposed to the wealthiest 5th quintile, may also require improved access through lower prices and/or greater availability in the areas where they live.

Targeting of these higher quintiles with processed nutritious foods and their marketing can be done by the private sector. For these groups, the role of the public sector is to set standards on nutritional value and safety for such products and to increase consumer awareness about healthy and nutritious diets.

Role of the public sector

The stunting prevalence among the lowest quintile shown in figure 4 increased, whereas that in the second quintile remained the same. This means that the households in these poorest quintiles are not yet able to afford adequately nutritious diets for their pregnant and lactating women and young children, while their need for an increased intake of nutritious foods is greater than that of people in the wealthier quintiles. They would thus benefit from the same processed nutritious foods that are marketed to the higher-income quintiles but would require public sector support to be able to access them.

A good public sector distribution channel for such special nutritious products would be social safety net programs, which already support poor households with cash and/or subsidized foods, such as rice for the poor (Raskin) in Indonesia. Those programs can either provide such special nutritious products in kind, or they can provide vouchers to obtain these products from local stores that also sell the same products to other customers. In the case of distribution using a voucher system, marketing and packaging of products could be the same as for the consumers who purchase the products. Also, the requirement for food standards and raising consumer awareness about healthy, nutritious foods would be the same, irrespective of which consumer group is targeted.

The fact that the food system in Southeast Asia already includes manufactured, fortified foods, and that a sizeable proportion of the population already buys such products, can be built upon to further increase availability, lower cost, and improve nutritional quality of foods, particularly targeting pregnant and lactating women as well as children 6 to 23 months of age. Depending on socioeconomic status, consumers can access such foods through existing commercial channels, or they can get access through vouchers that are distributed by social safety net programs targeting the poorest. Such a model of distributing vouchers for specific foods through social safety nets and redeeming them at retail outlets requires a good, preferably electronic, registration system for the social safety net program and a good collaboration with manufacturers of specific products and retail outlets.

ASEAN can play a supporting role in improving access to nutritious foods for specific target groups by setting standards for special nutritious products and supporting cross-border trade, and by facilitating the sharing of experiences with development and implementation of strategies that provide access to these foods to consumer groups with a different socioeconomic status. The Business Network of SUN, which aims to forge effective public–private partnerships for the prevention of undernutrition, can also support the piloting of such approaches.

Conclusions and recommendations

The major pathway for further reducing stunting prevalence in Southeast Asia is through better meeting nutrient requirements from an increasingly diverse diet, including processed, fortified foods for pregnant and lactating women and children 6 to 23 months of age.

The modernization of food systems, increased purchasing power, urbanization, and increased maternal and paternal education levels in Southeast Asia increase availability of and access to more nutrient–dense diets, which are required for preventing undernutrition. These developments, including increasing enrolment in secondary school to increase the age at marriage of adolescent girls, should continue.

In order to accelerate the reduction of stunting in Southeast Asia, availability of and access to nutritious
products should be increased by collaboration between the private and the public sector, and ASEAN can play a facilitating role.

The private sector can produce and market special nutritious foods, while the public sector sets standards, promotes healthy food choices, and ensures access to special nutritious foods for the poorest, for example through social safety net programs.

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