

Commentary: The changing focus for improving nutrition

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Introduction

The Nutrition for Growth event co-hosted by the Governments of the United Kingdom and Brazil and the Children's Investment Fund Foundation (CIFF) on 8th June 2013 was the latest act in the current global rejuvenation of interest in nutrition policies and programs. This renaissance arises both from the growing body of seminal research that has provided a much better understanding of effective approaches to improve nutrition outcomes in low-income countries, and from the significantly increased pressure on the global health and development community to make good its commitments on hunger and undernutrition, as defined in the Millennium Development Goals, before the 2015 deadline.

Causes and consequences of malnutrition

Malnutrition manifests as overnutrition and undernutrition, both of which significantly impair health and reduce life expectancy. Overnutrition, at its simplest an imbalance between energy intake and energy expenditure, causes obesity and other noncommunicable diseases, is rising dramatically globally, and will in due course result in significant development concerns in almost all parts of the world [1]. Undernutrition is a direct consequence of the combined effects of a poor

diet in terms of insufficiency in energy, critical macronutrients, and key vitamins and minerals, together with repeated infections. There are multiple underlying causes of undernutrition, including unclean water and poor sanitation, inaccessible or ineffective health services, low income, and lack of maternal education. Poor dietary intake and environmental conditions during fetal life and the first 2 years of life (the first 1,000 days) cause largely irreversible deficits in growth and cognitive development [2]. Undernutrition in childhood is defined either by measuring physical growth (anthropometry) and comparing these measures with those of an international reference of healthy children, or by biochemical and clinical measures of specific nutrient deficiencies. Although actions must be taken to tackle malnutrition in all its forms, there is clearly an ethical imperative first to resolve the global burden of undernutrition.

Effective actions on undernutrition

The complexity of undernutrition and its lifelong consequences have made rapid improvements elusive. The World Food Conference held in 1974 emphasized the potential for improved food production to reduce global undernutrition rates and resulted in significantly increased investments in agricultural research. The Green Revolution technologies that flowed from this increased investment, a combination of high-yield seed varieties, irrigation and fertilizer use, and enhanced agricultural production and incomes of the rural poor [3], were essential for improving food security but only slowly improved nutrition outcomes [4].

The nutrition community has made great strides since the 1970s in evidence and policy generation, and a recent series of reports has served to reinforce key messages on the evidence base and the importance of nutrition interventions. The World Bank publication *Repositioning Nutrition for Development* [5] makes a compelling argument for aggressive investment in nutrition for three primary reasons: there can be high

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economic returns in terms of improved population health and well-being; investments can stimulate economic development through strengthened human capital; and finally, many investments in nutrition are by their very nature designed to be poverty-reduction actions. The evidence from epidemiological and intervention research suggests that many health and nutrition interventions designed to directly impact undernutrition are highly effective. Analysis published in the second *Lancet* series on Maternal and Child Nutrition estimated that a set of 10 of these nutrition-specific interventions, including support for exclusive breastfeeding with appropriate complementary feeding after 6 months of age, and micronutrient supplementation during pregnancy and infancy, if delivered at scale, has the potential to reduce stunting (poor height growth) by 20% and mortality by 15% among children under 5 years of age [6]. From a policy perspective, the endorsement by the Copenhagen Consensus 2012 Expert Panel that fighting undernutrition is the single most cost-effective development intervention and should be the top development priority has been critical [7].

However, it is clear that nutrition-specific actions are essential but not sufficient to resolve the global problem of undernutrition. Current statistics on undernutrition in women and children (**table 1**) show that rates of specific measures of undernutrition remain globally alarming, despite some progress [8–10]. The number of undernourished children is highest in South Asia, while the pace of reduction of undernourishment is slowest in sub-Saharan Africa.

Multisectoral interventions to reduce undernutrition

The inability of nutrition-specific actions fully to resolve the global problems of undernutrition has long been understood and was clearly conceptualized in 1990 in the UNICEF framework on undernutrition (**fig. 1**) [11]. The underlying causes of undernutrition do not lend themselves to direct nutrition-specific interventions and can most successfully be tackled by actions in other sectors that by their implementation have indirect effects on nutritional outcomes. These so-called nutrition-sensitive interventions are multisectoral and include education, especially for girls; improvement in water, sanitation, and hygiene (WASH); poverty reduction; and agricultural development. However, although national and international development plans are emerging that explicitly stress the need for multisectoral approaches to decrease undernutrition [12], the reality is that there is currently little evidence that multisectoral projects have been effective in achieving nutrition goals.

One of the most researched areas is the linkage between agricultural development and food and nutrition security. But even here, recent reviews of the effects of agricultural interventions on the nutritional status of children in producer (farmer) households have identified a surprising paucity of evidence [13]. There are many plausible reasons for this lack of evidence, including the poor quality of studies, their time frame, and their small size. However, agriculture–nutrition linkages are complex [14], and there is currently a lack of clear delineations of the assumptions of how agricultural innovations are expected to improve nutrition outcomes. Recently published data on the Millennium Villages Project indicate only a modest effect on

TABLE 1. Prevalence of poor growth and of selected mineral and vitamin deficiencies by region in 2010/11

Outcome	Ref	Latin America and the Caribbean	Africa	Asia
Low birthweight (% < 2,500 g)	[8]	10	14	18
Stunted (% children < 5 yr with height-for-age z-score < -2)	[8]	15	39	31
Wasted (% children < 5 yr with weight-for-height z-score < -2)	[9]	2	10	11
Anemia in children (% children < 5 yr with hemoglobin concentration < 110 g/L)	[8]	36	59	40
Anemia in nonpregnant women (% with hemoglobin concentration < 120 g/L)	[8]	25	43	41
Anemia in pregnant women (% with hemoglobin concentration < 110 g/L)	[8]	24	48	40
Zinc deficiency (defined by International Zinc Nutrition Consultative Group)	[10]	Moderate	High	High
Vitamin A deficiency (% total population with serum retinol < 0.7 µmol/L)	[8]	12	36	31
Iodine deficiency (% total population with goiter)	[8]	10	15	14
Iodine deficiency (% total population with urinary iodine < 100 µg/dL)	[8]	16	39	35

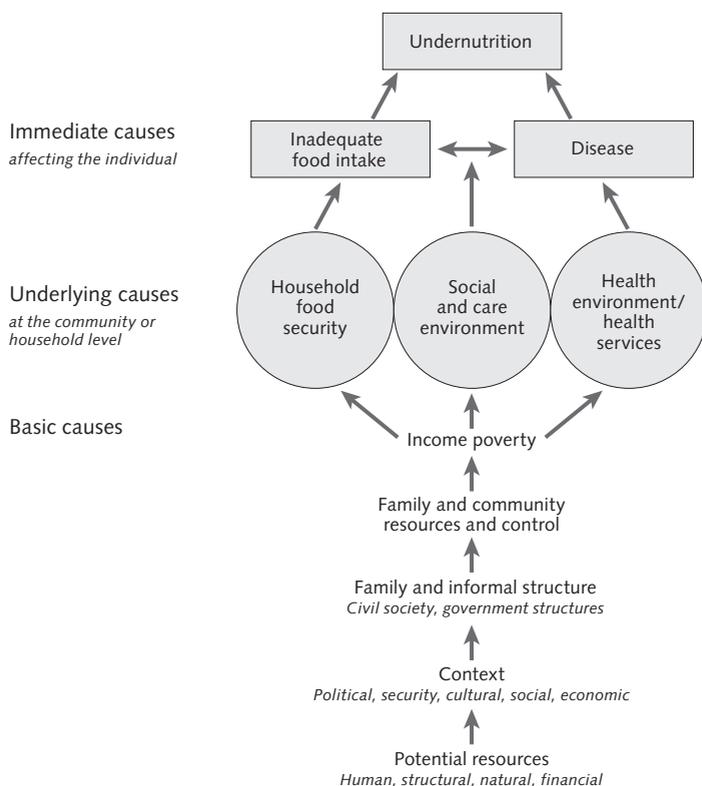


FIG 1. UNICEF Conceptual Framework on causes of undernutrition (adapted from UNICEF [11])

childhood nutritional status of a complex and high-cost set of agricultural and other developmental interventions [15]. This is not an argument against multisectoral approaches, but rather a plea for more evidence, including translational research. There is also a need to generate information on the process of implementing agriculture–nutrition strategies and, equally important, to provide policy-relevant data on the appropriate mix of components in different locations.

At the moment, a number of developing countries are revisiting ways in which agriculture and nutrition can be more effectively linked. For example, research in several rural communities is assessing whether diversification of women farmers' crop production into micronutrient-enriched vegetables (biofortified crops such as vitamin A-rich sweet potato), combined with behavior change campaigns stressing exclusive breastfeeding and appropriate complementary feeding, is effective in improving the quality of diets and the physical growth of children. There are several explicit assumptions in this agriculture–nutrition model: that the nutrient-rich vegetables will be consumed by the target children, that the overall value (both nutritional and economic) of agricultural production will increase, and that mothers' time devoted to

child-rearing activities will not be negatively affected. These and other underpinning assumptions require empirical testing.

Policy and cost-effectiveness research is also critical to understand which sectors, beyond agriculture, lend themselves to the achievement of nutrition goals. Currently the evidence on the effectiveness of economic development to reduce national undernutrition rates is mixed [16, 17], the evidence on the impact of targeted cash transfers on undernutrition is similarly mixed [18], while the evidence, for example, on the links between WASH and undernutrition is extremely limited [19]. The metrics used to measure success vary across sectors, and a core set of indicators needs to be identified and tested to evaluate the impact of the mosaic of indirect, nutrition-sensitive approaches.

Global advocacy efforts

The substantial research base that confirms the cost-effectiveness of nutrition-specific interventions provided the technical basis for advocacy for increased investment in nutrition, especially for pregnant women and children up to 2 years of age (the first 1,000 days), since this is the critical period of development in

childhood. The essence of the new nutrition agenda has revolved around three premises. First, there is credible evidence that nutrition-specific interventions work and are highly cost-effective, and the priority should now be scaling up from pilot to national-level programs. Second, the influences on nutrition are complex, and despite clear shortcomings in the evidence base, there needs to be a multisectoral approach for improving nutrition. Finally, individual countries need to determine the most effective ways to scale up nutrition programs and lead this effort; thus, interventions and approaches that appear similar should be tailored to national contexts and capabilities.

The Scaling Up Nutrition (SUN) Movement provides the coordinating mechanism for this approach on a global scale and is an artful combination of science-based action, communication, and advocacy. The Framework for Action calls for implementation of direct nutrition interventions as well as nutrition-sensitive development, which entails making nutrition central to the strategies of other sectors [20]. SUN was launched in September 2010 by US Secretary of State Hillary Clinton and Irish Minister for Foreign Affairs Micheál Martin, who committed to giving the Movement 1,000 days of high-level political support. To date, 40 countries that are home to more than 50 million chronically undernourished children have signaled their intention to scale up nutrition and join the Movement. The Movement aims to align the support of international actors (donor governments, development banks, philanthropic foundations, civil society, and private sector and UN bodies) behind national nutrition plans. In 2012 the UN Secretary General convened a group of leaders to oversee the Movement and be accountable for its impact. Along with other international actors, donor governments are aligning their efforts behind this approach. For example, the US Agency for International Development Feed the Future initiative is exploring innovative ways to link the agriculture and health sectors to improve nutrition in a number of low-income countries [21]. Similarly, the UK Department for International Development has committed to scaling up nutrition-specific interventions as well as to leveraging more nutritional impact from investments in agriculture, WASH, and social protection [22].

SUN faces some key challenges going forward, not least of which is to demonstrate the results of the Movement through scale-up and increased coverage of key interventions and reductions in undernutrition, and to do this fast enough to maintain the political momentum which it has now secured. Second, SUN is providing a forum for multiple stakeholders, bringing in public and private sectors, government, and civil society actors. The involvement of a range of actors is critical for achieving the scale-up needed but requires trust-building, measures to mitigate conflicts of interest,

and innovative approaches to working together. Third, while energy and resources must be focused on delivery of programs, the considerable evidence gaps on how to scale up nutrition-specific interventions and the impact of nutrition-sensitive interventions must be simultaneously addressed through research and robust program evaluation. It is clear that some significant policy decisions and investments must be made before all the necessary evidence is available; inaction is not acceptable. Finally, in-country skills and capacity to deliver effective nutrition programs will be a critical limiting factor. Capacity at all levels needs strengthening, including the strategic capacity of mid-level managers, and ways need to be identified for much greater sharing of teaching and training resources between high- and low-income countries.

Conclusions

Global actions on solving the burden of undernutrition at scale have been strengthened by the advancing evidence base and the increasingly successful advocacy efforts. Much of the evidence currently relates to direct nutrition-specific interventions with proven cost-effectiveness, and a key requirement is for more research related to both single and packaged multisectoral interventions that may be effective in improving nutrition outcomes. For this to be accomplished, rigorous evaluation designs, including but not limited to randomized, controlled trials, need to be developed and tested often in new sectors unused to these evaluation methods, bringing together skills from multiple disciplines. At the moment, there is an opportunity to make tremendous strides in improving nutrition. There is the equally daunting challenge to produce results that indicate this new nutrition agenda is making a difference. A thousand days go by quickly.

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Alan Dangour and Eileen Kennedy defined the

outline of the article. All authors contributed to drafting the article and revising it critically for important

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