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Stunting: Considerations for Use as an Indicator in Nutrition Projects

USAID ADVANCING NUTRITION
The Agency's Flagship Multi-Sectoral Nutrition Project

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Introduction

Since 2008, evidence of the long-term consequences of undernutrition, which had been long understood by public health nutritionists, has gained increased attention among global health practitioners, donors, and national decision makers. This resulted in expanded investment in evidence-based nutrition interventions as an essential cornerstone of development. Key papers published during this period—specifically, two series published in *The Lancet* in 2008 and 2013—highlighted the association between stunting (very low height-for-age: see box 2 in the next section) and long-term adverse health and development outcomes (Victora et al. 2008). This evidence led nutrition programs to shift their emphasis from reducing underweight (very low weight-for-age), which, for a long time, has been associated with a high risk of mortality (Pelletier et al. 1995; Schroeder and Brown 1994), to reducing stunting. In the past 10 years, many national and donor-funded programs identified reduction of stunting as a primary objective, with the assumption that improvement in linear growth would also minimize long-term adverse outcomes. However, this movement may be grounded in a misinterpretation of stunting and mistaking association for causality.

This attention to stunting resulted in a strong emphasis on using the prevalence of stunting as the primary indicator for assessing nutrition interventions. This is problematic, in part, because reducing stunting is complex and difficult to achieve in the short term in many contexts. Therefore, programs and projects that rely on stunting as an indicator of success may appear to fail despite achieving numerous other positive results in nutrition and human development. Widespread acceptance of such "failure" could lead donors to lose interest and, as a consequence, reduce investment in nutrition (Leroy and Frongillo 2019). Furthermore, evidence suggests that reducing the prevalence of stunting will likely require examination of the broader factors in countries, societies, and communities—not only nutritional, but also social, political, economic, and other factors—that underlie stunting. Such factors may require long-term investment in fields that are not directly related to nutrition. Thus, for programs funded by the U.S. Agency for International Development (USAID), with a pattern of five-year investments, stunting may not be the best indicator of success, and focusing entirely on it may detract from the many positive changes that nutrition programs can accomplish. Key takeaways from this review are highlighted in box 1.

Box 1. Stunting: Quick Takeaways

- Emerging evidence supports the need to reexamine stunting as the primary indicator of the success or failure of nutrition interventions.
- Stunting should be interpreted not as an indicator of short-term programmatic success, but rather of the overall well-being of populations.
- Not all nutrition programs, projects, or activities should be expected to reduce the prevalence of stunting.
- The prevalence of stunting remains a useful indicator to inform program design. It can be used to identify large sub-groups of children within a population (e.g., children in a particular region) who may benefit not only from nutrition programming, but also from programs promoting health, education, economic growth, social safety nets, or other aspects of development.
- It is not appropriate to use stunting as the primary indicator of success of short-term (e.g., five-year) or single interventions.
- Failure to reduce the prevalence of stunting should not be interpreted as the failure of a nutrition program or project.
- Nutrition programs should consider—and measure—a broader range of the many benefits that programs can achieve. These include nutrition indicators such as diet quality, as well as other indicators of child well-being, for example, indicators of health status, development, or cognition.

This paper, based on examination of recent literature, discusses stunting as an indicator in three sections. Part 1 offers a brief background and examines the literature since 2013 to illustrate recent perspectives on stunting as an indicator. Part 2 describes some of the nuances of stunting measurement and suggests when the prevalence of stunting might—or might not—be an appropriate indicator. Part 3 offers perspectives on the process for identifying a broader set of indicators to monitor and evaluate nutrition programs.

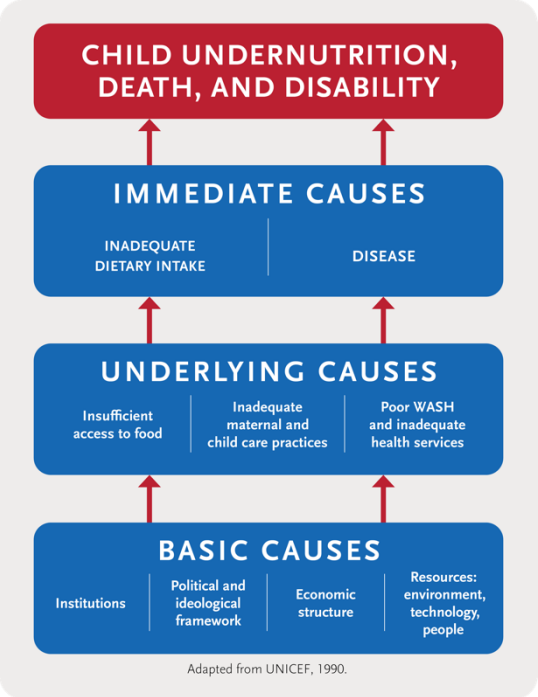
1. Background: Why Reconsider Stunting?

Conceptualizing Nutrition and Malnutrition

In 1990, the United Nations Children's Fund (UNICEF) developed the conceptual framework shown in figure 1 and included it in its nutrition strategy (UNICEF 1998). The conceptual framework, which remains relevant and widely used, describes the immediate, underlying, and basic causes that lead to undernutrition. Note that the framework links the immediate causes of undernutrition (disease and inadequate dietary intake) with factors such as household food insecurity, poor environment, and inadequate health care—and subsequently to the social, economic, and political factors that predispose certain groups to undernutrition.

Since its publication, this framework has been used to guide development of nutrition policies, programs, research, and evaluations. It should be noted, however, that the framework does not mention stunting, but rather undernutrition, which takes many forms.

Figure 1. UNICEF Conceptual Framework



Adapted from UNICEF, 1990.

The 2008 *Lancet* Series and the Shift to Stunting

In 2008, *The Lancet* published a five-part series on maternal and child undernutrition that described the long-term effects of undernutrition on development and health and provided clear direction for the policy actions dictated by those findings.

The series authors presented data to show that "the number of global deaths and DALYs [disability-adjusted life years] in children less than 5 years old attributed to stunting, severe wasting, and intrauterine growth restriction constitutes the largest percentage of any risk factor" (see box 2) (Black et al. 2008).

Box 2. Definitions

Stunting: Being short relative to one's age—a height more than two standard deviations below the World Health Organization Child Growth Standards median. Stunting is generally associated with socioeconomic factors. Stunting in early life, especially during the 1,000-day window, is associated with long-term future health and development (WHO 2020b).

Underweight: Having low weight relative to age. A child who is underweight may be stunted, wasted, or both (WHO 2020a). Underweight is associated with a greater risk of mortality if not addressed (Pelletier et al. 1995).

Wasting: Having low weight relative to height, usually associated with inadequate nutrition and/or recurring illness. Wasting can be reversed, but is associated with a greater risk of mortality if not addressed appropriately (WHO 2020a).

Undernutrition: Deficiencies or imbalances in an individual's intake of nutrients. The term includes four sub-forms—wasting, stunting, underweight, and deficiency in vitamins/minerals (WHO 2020a).

Intrauterine growth restriction: Below normal fetal growth relative to the infant's growth potential, associated with infants born with clinical signs of malnutrition and in-utero growth retardation (Sharma, Shastri, and Sharma 2016).

Previously, child mortality due to undernutrition had been associated with being underweight (Pelletier et al. 1995; Schroeder and Brown 1994). A more recent article identified that children who are wasted and simultaneously stunted are at highest risk of mortality (Myatt et al. 2018). The 2008 series confirmed the high risk of mortality among children who are underweight and wasted; children who are moderately underweight and wasted are two and a half to three times at greater risk of dying from malaria, diarrhea, pneumonia, and measles than those who are normal weight for their age and height (Black et al. 2008). However, although the risk of death associated with stunting is lower, comparatively, because it is the most prevalent form of undernutrition, it was highlighted as a public health concern (Black et al. 2008).

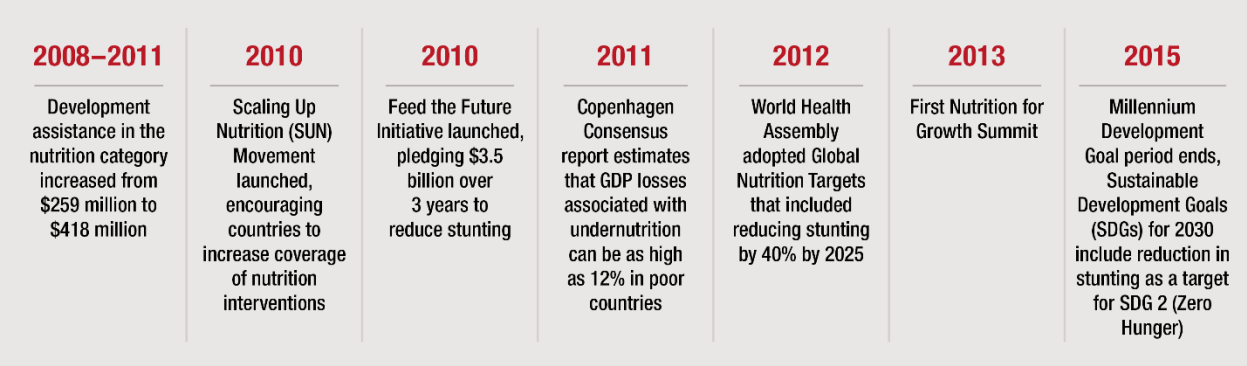
Adverse outcomes in adulthood were also associated with child undernutrition from the fetal period to the end of the second year of life, the so-called 1,000-day window of opportunity (Horton 2008). Stunting in the first two years of life is associated with shorter adult height, lower attained schooling, reduced adult income, and—for women of short stature—lower birthweight among their offspring (Victora et al. 2008).

The *Lancet* series identified nutrition as a major gap in maternal, newborn, and child health programs. This then motivated a surge of advocacy for and investment in programs to prevent undernutrition, especially during the first 1,000 days (see figure 2). Given the emphasis in the 2008 series on the burden of disease and deaths attributable to stunting and the associations between stunting and long-term adverse outcomes, many nutrition programs, initiatives, and policies established in the period that followed this series aimed to reduce the prevalence of stunting.

The 2013 *Lancet* Series

In a follow-on series in *The Lancet*, published in 2013, researchers and international nutrition experts reevaluated gaps, achievements, and new evidence for improving the nutritional status of populations. The authors applauded the major increase in national and global commitments to decreasing undernutrition (Bhutta et al. 2013a).

Figure 2. Global Attention to Nutrition 2010–2015



The authors also provided further evidence that scaling up 10 proven nutrition-specific interventions[1] for women and children from current population coverage to 90 percent could reduce the prevalence of stunting by 20 percent in the 34 African and Asian countries where 90 percent of stunted children live (Bhutta et al. 2013a; 2013b). Scaling up these interventions would help meet the World Health Assembly targets for 2025 and save close to 1 million lives (Bhutta et al. 2013a; WHO 2012). They urged the

1 The 10 nutrition-specific interventions included were grouped by target population and included the following: for pregnant women, multiple micronutrients, use of iodized salt, calcium, and balanced energy protein supplementation; for infants and young children, breastfeeding promotion and complementary feeding education, preventive zinc and vitamin A supplementation; and for children identified as malnourished, management of moderate and severe acute malnutrition.

nutrition community to fully fund, implement, and evaluate a combination of high-priority interventions to enable the greatest number of children to survive and thrive**.** However, for reaching better outcomes, integration of nutrition-sensitive interventions is also needed (Ruel and Alderman 2013).

In the years that followed these two series of papers, several evaluations of large nutrition programs were published, showing little impact on stunting (Menon et al. 2013b; Pickering et al. 2019; Frongillo, Leroy, and Lapping 2019). At the same time, several articles were published that questioned whether stunting was being used appropriately as an indicator in these and similar evaluations (Frongillo, Leroy, and Lapping 2019). This brief reviews the recent literature published on stunting and provides additional information on the use of other nutrition indicators to complement stunting as an indicator.

The Review

We conducted a literature review of articles in PubMed published since 2013, focusing on low- and middle-income countries that included any of the following key terms: stunting, linear growth, height-for-age z-score, undernutrition, and malnutrition. We also searched for articles that described evaluations of the following programs and studies: Alive & Thrive; Transform Nutrition; Sanitation, Hygiene, Infant Nutrition Efficacy (SHINE); Water Quality, Sanitation, and Hygiene (WASH) Benefits; PROCOMIDA; and Tabaramure. We identified 141 papers and reviewed their abstracts for inclusion. Sixty-three articles were excluded for at least one of the following reasons: the population studied was either over 5 years of age or a subpopulation (e.g., sick children), the objectives of the paper were not related to stunting as an indicator (e.g., costing studies), or the paper reported on the evaluation of programs that were not designed to address stunting (e.g., vitamin A supplementation). Later, we added several important references from both the peer-reviewed and grey literature to arrive at the references cited in this paper.

2. Complexities of Interpreting Stunting as an Indicator of Nutrition Program Success

In the transition from millennium development goals (MDGs) to sustainable development goals (SDGs), stunting gained unprecedented attention as a development indicator and an indicator of success for nutrition programs. This section describes the positive aspects of stunting as an indicator and lists some of the major concerns about the expectations placed on nutrition programs to reduce the prevalence of stunting and use stunting as an indicator of success.

Several factors made stunting an attractive indicator of program performance.

- Data on stunting are relatively easy to collect. Compared to measures of other outcomes, such as child development, biomarkers of micronutrient status, or health status, stunting is relatively easy to measure at a large scale, since it requires only height measurements and age data. It is also non-invasive and relatively easy to incorporate into evaluation surveys. Though obtaining accurate measures of height needed to construct the indicator requires special training and supervision, tools and protocols exist to guide field-level data collection (WHO and UNICEF 2019; Cashin and Ott 2018; Centers for Disease Control 2007).
- Stunting is relatively easy to understand. Because stunting is expressed as a prevalence and it is also a measure of a very visible characteristic (e.g., body size), it is fairly easily understood by lay audiences and thus is used by the nutrition community to communicate the issue of undernutrition to donors, decision makers, and program implementers (Frongillo, Leroy, and Lapping 2019).

Problems with Using Stunting as an Indicator of Program Success

These benefits notwithstanding, recent experience suggests several reasons why use of stunting as an indicator of program success should be reconsidered.

Misuse of stunting indicators in nutrition programs

Though it has proven to be very useful to call attention to the relevance of nutrition, the prevalence of stunting has also been misinterpreted. Though some studies show an association between stunting and metabolic diseases later in life, the biology related to stunting is not well understood (Hoffman et al. 2007; Hoffman 2019; Raiten and Bremmer 2020). Recent papers explain that the associations between stunting and many long-term health, educational, and economic outcomes have been overstated or often represented as causal; that is, a reduction in stunting would lead directly to reduced developmental delays; higher capacity for schooling, work, and income generation; and reduced risk of chronic disease and adverse birth outcomes (Perumal et al. 2018; Leroy and Frongillo 2019).

Current evidence and understanding of the mechanisms linked to those outcomes do not support this causal relationship—with two exceptions. Short stature among mothers is a cause of difficult births and poor birth outcomes (Leroy and Frongillo 2019). In addition, Leroy and Frongillo (2019) reviewed the evidence to understand the relationship between stunting and the longer-term health outcomes previously associated with it. They concluded that poor linear growth is *associated* with delayed child development, reduced earnings in adulthood, and chronic diseases, but there is no evidence that it *causes* these phenomena. These associations are explained by a deficient environment that contributes to both poor growth and reduced earnings in adulthood (through a potential pathway of reduced child development, schooling, and work capacity). Thus, stunting as an indicator is not solely a descriptor of a nutritional state. It reflects the deficient environment to which children are exposed that, in turn, affects a child's diet and health.

1. Stunting is not equivalent to undernutrition.

Reducing stunting is complex and may require: 1) multiple and multi-sectoral interventions implemented simultaneously, 2) high levels of coverage and exposure, and 3) a long period of implementation. Stunting should not be used as the primary indicator of success for short-term (i.e., five years or less) or single-intervention activities.

Stunting is often erroneously equated with chronic undernutrition, when in fact it is a marker of undernutrition that can result when children live in an environment that is poor, not only in terms of their diet intake, but possibly also in caregiving, frequency and severity of illness, and use of health services, among other factors (Leroy and Frongillo 2019).

Thus, stunting is a consequence of several factors that limit physical growth and general development, but it is not specific to undernutrition. For example, stunting could indicate a deficit in home hygiene environment or access to health systems services. As a marker, stunting shows that one or more factors have affected linear growth, but does not reveal what those factors are. Nevertheless, the contributions of dietary intake to undernutrition and stunting have been disproportionately emphasized. This has resulted in programs that focus excessively on improving dietary practices to prevent undernutrition while frequently disregarding other underlying causes of undernutrition, such as environmental and social determinants, that also urgently need to be addressed to improve long-term outcomes for children (Leroy and Frongillo 2019).

Also, not all forms of undernutrition are biologically related to linear growth (Raiten and Bremer 2020). The consequences of micronutrient deficiencies are wide-ranging and of public health importance. These include stillbirths (iodine), blindness (vitamin A), neurological impairment (iron), compromised immune function (zinc), and others (Caulfield et al. 2006).

2. Stunting is a statistical measure, not a clinical condition.

The cutoff (-2 standard deviations from the median of a reference population) used to define stunting is based on statistical distributions, rather than biological or clinical attributes related to poor growth (Hoffman 2019). Stunting is a descriptor of the distribution of height-for-age in a population, as compared to a reference population defined by the WHO in 2006. This reference population represents growth under optimal conditions. For a given population, a prevalence of stunting equal to or lower than 2.5 percent is considered normal. However, proportions greater than 2.5 percent suggest that more children have a low height-for-age than would be expected if they were living and growing under optimal conditions (Roth et al. 2017).

The cutoff point for stunting (-2 standard deviations from the median) is often interpreted as a threshold for healthy growth, which has resulted in the flawed interpretation of stunting as an all-or-nothing condition—a child is either stunted or not stunted. In reality, the risk associated with stunting increases along a continuum, and the risk of adverse outcomes associated with being stunted does not change dramatically simply by crossing the cut-off line of -2 standard deviations. In contexts where the prevalence of stunting is high, many children, even those who are not considered stunted, are not achieving their full growth potential. Conversely, some—but not all—children who are classified as stunted are in poor health (Perumal, Bassani, and Roth 2018).

3. Not all nutrition interventions should be expected to reduce the prevalence of stunting.

Decades of research show that, overall, some nutritional interventions have little effect on linear growth (Perumal, Bassani, and Roth 2018; Frongillo, Leroy, and Lapping 2019). The 2013 *Lancet* paper estimated through modeling that a 20 percent reduction in stunting was possible. A major assumption to arrive at this figure was that all 10 evidence-based nutrition-specific interventions would be implemented simultaneously and achieve 90 percent coverage (Bhutta 2013a). This may

not be in line with how programs operate or are funded or the levels of coverage that could be achieved under real-world conditions.

Another paper in the 2013 *Lancet* series emphasized coupling effective nutrition-specific interventions (those that address the immediate causes of undernutrition) with nutrition-sensitive interventions (those that address the underlying causes) (Ruel and Alderman 2013). A systematic review of program evaluations concluded that the most effective programs combined health and nutrition interventions with a safety net component in contexts with strong political commitment and community engagement (Hossain et al. 2017).

A new series of papers in *The American Journal of Clinical Nutrition* analyzed stunting with the aim of identifying the drivers of stunting reduction. The most recent multi-country study on the drivers of stunting, a 2020 analysis of more than 70 countries, concluded that approximately 50 percent of the observed declines in stunting over the last 15-20 years are explained by interventions that were non-health-sector interventions, such as poverty alleviation and education, especially for girls (Vaivada et al. 2020). This review emphasized again the need for multi-sectoral approaches to reduce stunting (Bhutta et al. 2020).

Nutrition interventions[2] and single interventions are probably not sufficient to reduce stunting (Hossain et al. 2017). For example, one evaluation showed that a social and behavior change program that promoted complementary feeding in Bangladesh improved many young child feeding practices, but did not reduce stunting (Menon et al. 2016). Two large-scale programs were evaluated to understand whether WASH interventions could reduce the prevalence of stunting; these concluded that WASH interventions, on their own, did not have an impact on linear growth (Pickering et al. 2019).

Further, and relevant to USAID's practice of funding activities over five-year periods, reducing stunting may require time to show impact. Even some countries that were identified as exemplary for their high rates of stunting decline relative to their economic growth over a 15-20 year period achieved relatively small annual rates of reduction (2.5 percent in Ethiopia and 3.4 percent in Senegal) (Bhutta 2020).

4. Stunting does not capture many important benefits of nutrition programs.

Assessing only stunting misses other benefits of nutrition programs, which themselves are associated with improved health and development outcomes. Linear growth is not a proxy for, and is not directly related to, the numerous positive effects that improved nutrition can have in terms of biological, cognitive, and behavioral outcomes (Frongillo, Leroy, and Lapping 2019; Frongillo 2016). The emphasis on the prevalence of stunting, while ignoring other important benefits of improved nutrition, may fail to fully reflect the impacts of USAID investments on children's health and well-being.

For example, in Bangladesh, substantial reductions in infant mortality were observed among infants whose mothers received multiple micronutrients and food supplements early in their pregnancies, even though there was no difference in birth length (Persson et al. 2012; Khan et al. 2011). Increasing exclusive breastfeeding can also lower the risk of mortality in infants 0–5 months old; the risk among infants in this age range who are not breastfed at all is 14 times greater than those

2 The nutrition interventions reviewed by Hossain et al. (2017) must have included the following nutrition-specific or nutrition-sensitive interventions, implemented alone or in combination: nutrition during adolescence, preconception, pregnancy, and lactation; maternal dietary or micronutrient supplementation; breastfeeding promotion; complementary feeding counseling; dietary or micronutrient supplementation or fortification for children; treatment of severe acute malnutrition; disease prevention and management; nutrition in emergencies; agriculture and food security; social safety nets; early child development; maternal mental health; women's empowerment; child protection; schooling; water, sanitation, and hygiene; and health and family planning services.

who are exclusively breastfed (Sankar et al. 2015). The Alive & Thrive intervention in Bangladesh, which provided counseling on infant and young child feeding through home visits and community mobilization, linked the interventions to substantial improvements in language and gross motor development among children 6–23 months. These results were partially explained by improvement in minimum dietary diversity and increased consumption of iron-rich foods, even though these improved feeding practices did not result in stunting reduction (Menon et al. 2016; Frongillo et al. 2017).

A broad range of nutrition, health, and other outcomes should be measured to capture the many benefits that nutrition programs, projects, and activities may achieve. Failure to reduce stunting should not be interpreted as the failure of a nutrition program, project, or activity.

3. Using Stunting as an Indicator within USAID Programs

The prevalence of stunting remains a useful population-level measure that reflects overall living conditions and welfare (de Onis and Branca 2016). Stunting is also a useful metric to compare progress within the same population over time and to identify large sub-groups within a population (or country) who are relatively more vulnerable due to inequalities. Below are several scenarios in which data on the prevalence of stunting can be informative.

Identifying Sub-Populations at Higher Risk of Poor Outcomes

Because stunting is a marker of children's exposure to broad deficiencies in the environment, it is an appropriate indicator for assessing which populations may benefit from increased investment in health and development programs. The increased availability of population-based data through numerous national surveys makes it possible to disaggregate data by sub-populations, allowing comparisons of the prevalence of stunting to identify inequalities by socio-demographics (Restrepo-Mendez et al. 2014). For example, the severity and prevalence of stunting can be used to compare among groups, such as those based on geographic area, wealth quintile, urban and rural residence, or other characteristics (Leroy and Frongillo 2019).

Examination of these subgroups and factors can enable program implementers to use stunting data in various ways: to target resources to areas or sub-populations in greatest need of interventions, to advocate for nutrition and other interventions, or to design not only nutrition interventions, but a range of other health and development interventions. Analyzing trends in stunting by sub-population can also reveal whether improvements that reduce the prevalence of stunting are equitably distributed.

Assessing Long-Term, Complex, Multi-Sector, Multi-Intervention Programs and Projects

As noted above, reductions in the prevalence of stunting tend to be small in the short term, such as the five-year period for a typical USAID project. The mix of interventions that may reduce stunting varies by context, but the evidence suggests that multi-sectoral and multiple interventions implemented simultaneously are most likely to reduce stunting. Though USAID-funded activities usually address multiple causes of undernutrition and can be expected to contribute to reducing stunting, this effect may not be observable immediately, given the slow rate of reduction in most contexts. These two factors make stunting more appropriate for understanding the results of high-level, multi-sectoral, long-term programs such 10-year nutrition programs, rather than single interventions and/or short-term activities. Other indicators are more appropriate to measure the changes that can be achieved by programs of shorter duration within the time frame that they operate; these indicators should be reflective of the interventions implemented, for example, minimum diet diversity.

Selecting Indicators for USAID Activities

Monitoring and evaluating projects and activities should include indicators directly associated with the interventions. A broader set of indicators will not only demonstrate progress toward improving some of the causes of undernutrition, but also measure the benefits of nutrition programs, which may or may not be related to growth. In this section, we suggest a process for selecting indicators to use for monitoring and evaluation (M&E) at the activity level. Box 3 provides definitions of some key elements in M&E for USAID projects.

Box 3. M&E: USAID Definitions

Monitoring: Continuing, systematic tracking of data or information relevant to USAID strategies, projects, and activities (USAID 2016).

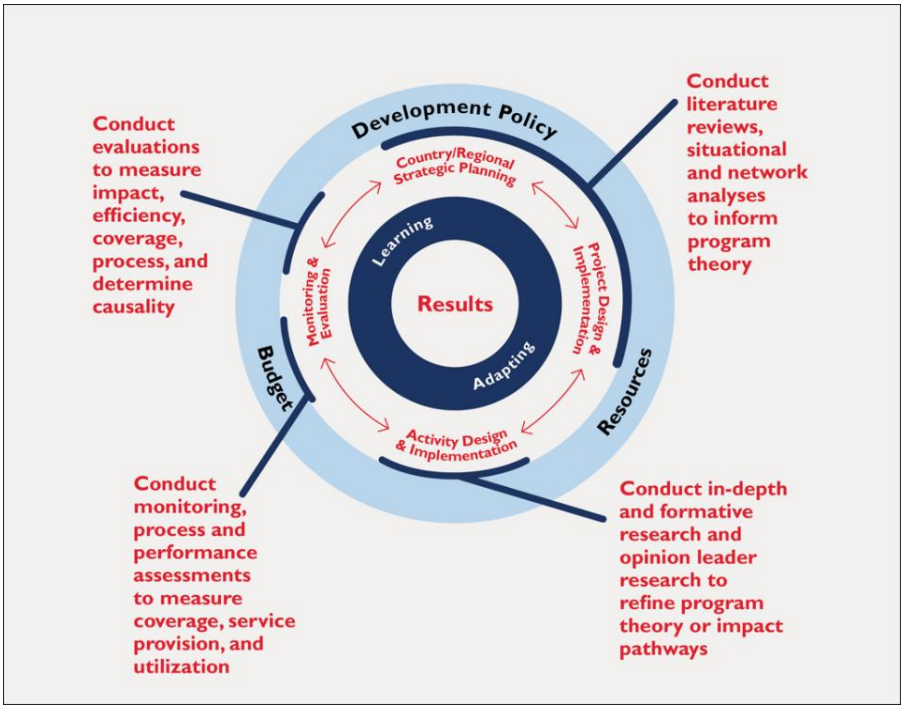
Evaluation: Systematic collection and analysis of information about the attributes and outcomes of strategies, projects, and activities, conducted to enable assessment to improve effectiveness, and timed to inform decisions about current and future programming (USAID 2016).

Impact evaluation: Examination and quantification (if possible) of changes that can be directly attributed to a specific intervention or project, including both intended and unintended impacts (UNICEF 2014).

1. Develop a clear logic model.

At the development stage of an activity, it is essential to document a logic model. Logic models can take various forms, including logical frameworks (logframes), results chains, results frameworks, local actor-oriented models, and program impact pathways, among others (USAID 2017; Frankel 2016). Regardless of the model used, what is essential to successful M&E is to describe, in theory, *how* the program, project, or activity is expected to achieve the stated results (Frongillo 2016). A program theory systematically lays out assumptions about the changes and actions underlying a program and the plausible pathways through which the program will have impact. These make explicit the connections between program inputs and the desired outputs and outcomes, while accounting for factors that could influence program effectiveness. Figure 3 lays out considerations for M&E through the program cycle and describes what can be measured during each stage to understand whether and how the program works (adapted from Frongillo 2016 and USAID n.d.). An example of a program impact pathway for the USAID-funded Suaahara project in Nepal is included in annex 1 (Choufani, Jamaluddine, and Cunningham 2019). Program theories and pathways are developed from information gathered through literature reviews, analysis of existing data, qualitative data collection, and consultations with subject matter experts and other stakeholders. At this stage, it is critical that the theories be grounded in evidence to avoid overstating the potential impacts of a program.

Figure 3. Evaluation through the USAID Program Life Cycle (adapted from Frongillo 2016 and USAID n.d.)



2. Identify indicators that will allow measurement all along the logic model.

Regardless of the type of logic model used, articulating how activities will lead to impact is a critical step in identifying indicators and planning for data collection. The next challenge is to find indicators that can meaningfully measure project elements *throughout the entire pathway* (see box 4). At a minimum, these indicators should meet two criteria: they must *measure the desired result* (even if progress is incremental), and they must be *feasible to collect* (Rojon-Sandhu n.d.). M&E indicators should allow decision makers to assess data throughout the life cycle and at all levels, including estimates of coverage and utilization, as well as changes in behaviors that can be attributed to an activity. These are used to inform and describe "implementation functioning" (Frongillo 2016). There are several types of indicators (see box 5).

Box 4. Measuring throughout the Continuum

Achieving programmatic impacts often first requires achievement of lower-level, intermediate results. A major objective of M&E activities is to document what a project or activity has accomplished, but a related objective is to understand program performance (process and output indicators). Even when evaluation designs are not rigorous enough to attribute outcomes to a project, measuring all elements of the logic model will allow results to be plausibly linked to the program, project, or activity. To determine the effectiveness of a program, project, or activity, the indicators selected should measure not only outcomes and impacts, but also intermediate results and specific outputs expected from the interventions. These intermediate results may also include, for example, improved quality of services, increased knowledge, changes in social norms, and shifts in the environment as factors that are expected to influence the desired behaviors (Habicht, Victora, and Vaughn 1999). The lack of data on coverage of the full suite of evidence-based nutrition interventions, as identified in the *Lancet* series, is an important data gap (Guillespie et al. 2019). Therefore, it is important to measure intermediate outcomes, including the coverage of interventions.

Box 5: What to Measure

Process indicators measure the program's activities, such as training, materials development, and technical assistance. *Outputs*, according to USAID, are immediate products or results of a USAID activity (USAID 2020). Outputs contribute to but are not solely responsible for *outcomes*, which are higher-level measures showing progress or lack of progress toward achievement of project/program goals. Outcomes can be "intermediate or end outcomes, short-term or long-term, intended or unintended, positive or negative, direct or indirect" (USAID 2017).

Some indicators of nutritional status—though not all—are outcome indicators; they measure conditions that indicate progress toward a given goal among individuals or groups. For example, a program that distributes iron-folic acid or multiple micronutrient supplements to pregnant women may be expected to result in reduced iron deficiency among this group (assuming that inflammation has been considered). In this case, an indicator of iron status or iron deficiency among pregnant women would be an outcome measure.

For USAID activities, results frameworks included in requests for proposals, proposals, and design documents should identify the highest-level result that activities *could feasibly achieve within the implementation period,* avoiding inclusion of results that are longer-term or could be undermined by factors not within the control of the program. By this standard, the highest result for a nutrition activity to achieve might not be "reduced stunting," but behavioral improvements that are the *immediate* result of an intervention, such as increased dietary diversity, increased consumption of a particular micronutrient, increased household-level food security, increased consumption of a fortified food, etc.

Logic models often show the longest-term, highest-level results as "impact." These may be population-level, such as changes in health and cognitive status, including physical growth. However, these long-term outcomes, such as reduction of stunting or mortality, are difficult to attribute to a single USAID program or activity. Usually, these programs or activities are not implemented in isolation, and changes in these outcomes result from improvements in multiple underlying factors. Furthermore, results at this level tend to be observable only in the long term and could be considered aspirational.

It is important to note that "impact evaluations" measure the changes that can be attributed to a program or activity. In this case, the term "impact" does not describe the level or type of indicators being measured in the evaluation; instead, it refers to changes that can be attributed directly to a project or activity. Impact evaluations may measure outcomes rather than impact-level indicators (Frankel 2016). Though a reduction in the prevalence of stunting may be the sought-after impact articulated in a logic model, it is not necessary to measure stunting to claim that a given intervention achieved impact. Outcome-level indicators can be used to estimate the "impact" of a project or activity, as long as the evaluation methods used allow attribution of results to the project or activity being evaluated.

Conclusions

The welcome investment in nutrition interventions in the past decade has brought about increased examination of what constitutes success in such programs and how to measure it. Since the publication of the two series in *The Lancet* in 2008 and 2013, donors, program implementers, and researchers have started using stunting as an indicator of success in nutrition projects. A fuller examination of stunting reveals its strengths and limitations as an indicator. Stunting is a useful marker of current broader society- or population-level conditions and a predictor (though not a cause of) long-term health and development outcomes. For these reasons, it remains a useful indicator for examining population sub-groups that require further investment in nutrition, health, and development and for comparing the same populations over time. As a higher-level indicator of the cumulative, longer-term impacts of a variety of environmental factors, reducing stunting is complex and not generally feasible to address within the five-year timeframe of USAID activities. A reduction in the prevalence of stunting is not always necessary to improve the well-being or nutritional status of children, and in some contexts, it is not sufficient to reach this goal (Leroy and Frongillo 2019). A project's failure to reduce stunting should not be interpreted as a lack of benefits or a reason to discourage continued investment in nutrition. Instead, program implementers need to measure a broader range of nutrition-related and other health and development outcomes to fully account for the many benefits that nutrition programs can achieve.

Rather than only relying on stunting to measure project success, project managers should consider a broader set of lower-level indicators (output, outcome, and intermediate outcome) that can be attributed more directly to project activities and that demonstrate the benefits of the full range of nutrition interventions delivered by the program. These indicators should be informed by a logic model that reflects the full pathway between interventions and results. As programs shift to include broader, multi-sectoral interventions, these principles can also be used to examine the project's contributions and the benefits of interventions in other sectors. The better we can monitor and evaluate projects and programs, the more we can contribute to the evidence on what works to address nutrition effectively and the more likely we are to improve nutrition in the vulnerable populations where we work.

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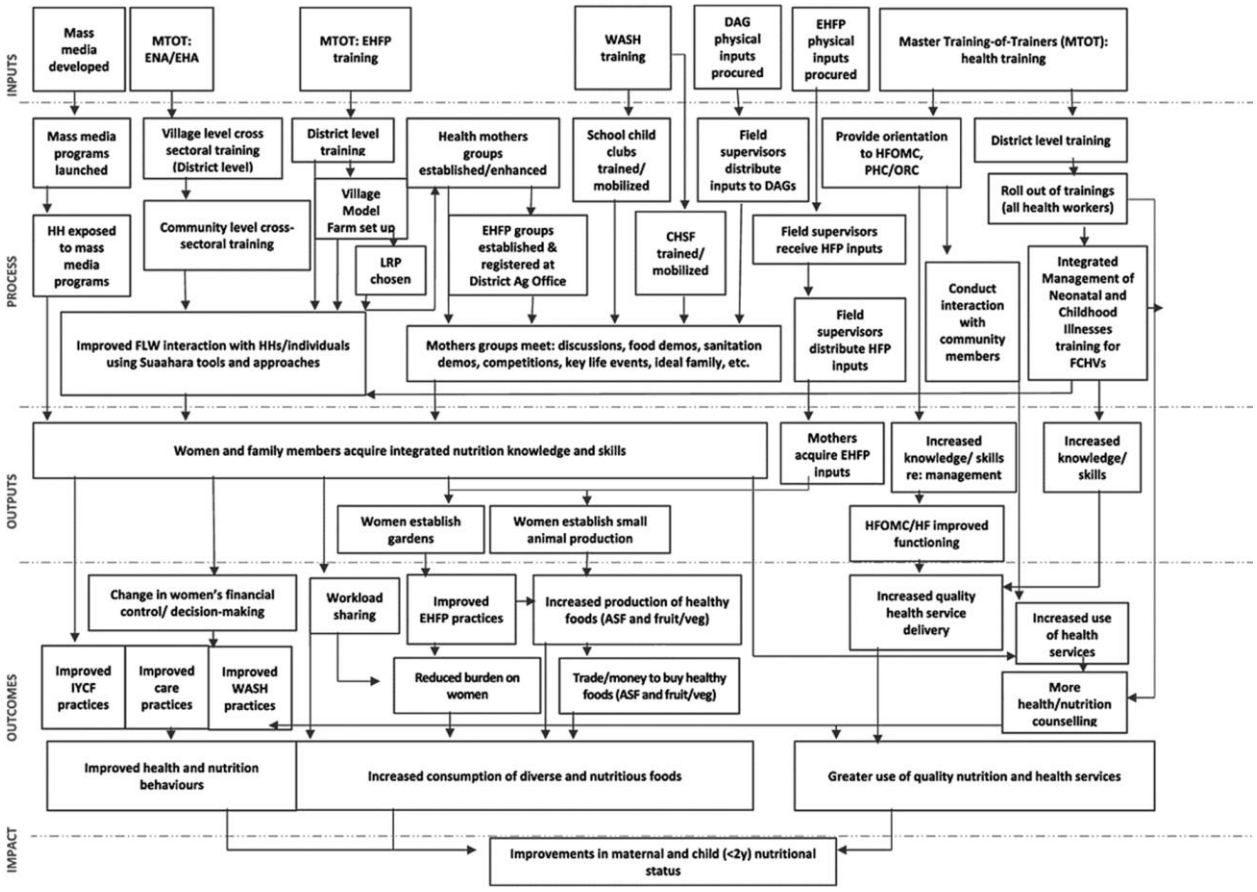
Annex 1. Suaahara I Program Impact Pathway Diagram

(Choufani, Jamaluddine, and Cunningham 2019).



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