

Prevention of acute malnutrition: Distribution of special nutritious foods and cash, and addressing underlying causes—what to recommend when, where, for whom, and how

Saskia de Pee, Rebecca Grais, Bridget Fenn, Rebecca Brown, André Briend, Jacqueline Frize, Jeremy Shoham, and Lynnda Kiess

Abstract

Acute malnutrition is associated with increased morbidity and mortality risk. When episodes are prolonged or frequent, acute malnutrition is also associated with poor growth and development, which contributes to stunting. Nutrition-specific and nutrition-sensitive strategies to prevent undernutrition during the first 1,000 days from conception to 24 months of age can reduce the risks of wasting, stunting, and micronutrient deficiencies. Under circumstances that exacerbate the underlying causes of undernutrition and increase the incidence of wasting, such as food insecurity related to lean seasons or emergencies, or increased incidence of illness, such as diarrhea or measles, additional efforts are required to prevent and treat wasting. Special nutritious foods directly meet the increased nutrient requirements of children at risk for wasting; assistance to vulnerable households, in the form of cash or food, enables households to better meet the food, health, and other needs of household members and may increase resilience; water, sanitation, and hygiene (WASH) and health interventions help prevent and address illness and hence reduce wasting risk. The contributions of specific interventions to reducing the incidence of wasting are difficult to assess under emergency conditions, due to ethical constraints

Saskia de Pee is affiliated with the Nutrition Advisory Office, World Food Programme, Rome, Italy and Friedman School of Nutrition Science and Policy, Tufts University, Boston, USA; Rebecca Grais is affiliated with Epicentre, Paris, France; Bridget Fenn is an independent consultant; Rebecca Brown is affiliated with CMAM forum; André Briend is affiliated with Department of International Health, Tampere University, Tampere, Finland; Jacqueline Frize is affiliated with Save the Children, London, UK; Jeremy Shoham is affiliated with the Emergency Nutrition Network, Oxford, UK; Lynnda Kiess is affiliated with Nutrition and HIV/AIDS, Policy, Programme and Innovation Division, World Food Programme, Rome, Italy.

Please address all inquiries to the corresponding author: Saskia de Pee, Nutrition Advisory Office (OSN), World Food Programme, Giulio Viola 68/70, 00148 Rome, Italy; e-mail: Saskia.depee@wfp.org

and to the fact that multiple strategies are implemented at the same time. However, pragmatic studies under real-life circumstances, using different designs, e.g., including a group receiving “best possible” treatment, can provide evidence about what works, to what extent, at what cost, and under which circumstances. Programs should address the most important causes in given contexts, be feasible to implement at scale, and assess implementation, coverage, and outcomes.

Keywords: Wasting, prevention, acute malnutrition, MAM, SAM, cash, special nutritious foods, underlying causes

Introduction

Children suffering from acute malnutrition are at higher risk for morbidity and mortality, and frequent or prolonged episodes of wasting increase the risk of stunting and micronutrient deficiencies [1]. According to recent estimates, at any point in time, 51 million children worldwide suffer from wasting: 17 million from severe wasting and 34 million from moderate wasting [2]. The total number of children affected over a period of 12 months is higher, but reliable estimates of incidence are not widely available.

Acute malnutrition occurs in a range of contexts: during emergencies, seasonally and endemically. In Asia, with 69% of the global burden of wasting [2], strategies required for prevention may have to be different as compared to an emergency situation that leads to an increase of incidence, because the context varies in terms of underlying causes and how the immediate and underlying causes can be addressed in the short and longer term, including the existing and potential additional capacity of food and health systems.

The associated increased mortality and morbidity of acute malnutrition and the long term health risks call for treatment, but prevention is preferred [3]. Whilst the treatment of MAM involves much smaller numbers

than prevention, it requires identification of individual children which can overburden the capacity of the health system. Prevention on the other hand not only benefits more children, it can also build on other food and health system interventions.

This paper discusses the prevention of acute malnutrition, both from an individual-level risk and biological perspective and from a population-level and programming perspective. The role of cash interventions is discussed. The paper ends with a discussion of ways of gathering evidence on which interventions work to prevent acute malnutrition.

Individual-level and biological perspective

A paper in this Supplement by Briend et al. describes the physiology of wasting and stunting and what biological processes underlie the increased risk of death among wasted children [4]. In the case where infection accompanies malnutrition, the increased risk of death is related not only to the infection but also to the loss of muscle mass. Fat stores, which are used up in cases of undernutrition without infection, may also play a role in survival and regulate bone linear growth. Children who are young, stunted, and wasted have the lowest amount of muscle mass and are therefore at highest risk for death when they suffer from infection. This may also be why low mid-upper-arm circumference (MUAC) is a better predictor of mortality than weight-for-height. Weight-for-height is more sensitive to dehydration, such as in the case of diarrhea, where dehydration causes weight loss that does not reflect loss of muscle mass [5]. Also, as z-score is a statistical concept, for every height there is a similar proportion of children with a weight < -2 or < -3 SD who are not all at a comparable risk of death, as the absolute muscle mass of taller, and older, children is greater. For MUAC, on the other hand, a fixed cutoff is used, which relates better to the amount of muscle mass and identifies a greater proportion of younger children who are below the cutoff [6].

Population-level perspective

Strategies to ensure good nutrition during the critical window of opportunity from conception to 2 years of age are considered the first line of prevention against undernutrition, including wasting.

In addition to this first line of prevention, strategies can be employed when the risk of a particular form of undernutrition, such as wasting, increases or its prevalence or incidence reaches above a specific cutoff point. Such a situation could, for example, exist in a population with a high prevalence of stunting when food insecurity increases, causing dietary quality to decline

further, while at the same time the rainy season causes malaria incidence to peak, so that the risk of illness and wasting among young children markedly increases, which needs to be mitigated using specific measures.

In essence, any intervention to ensure optimal nutrition or to reduce the risk of undernutrition, including wasting, needs to address, directly or indirectly, the direct causes of malnutrition: i.e., dietary intake, which needs to provide a large variety of up to 40 nutrients in adequate amounts [7], and prevention of illness, which increases nutrient needs, lowers dietary intake (anorexia), and leads to loss of muscle mass and ultimately death. Where the prevalence of stunting, wasting, and/or anemia, as indicators of micronutrient deficiencies, is high, irrespective of context, one or both of these direct causes need to be better addressed, directly through nutrition-specific interventions and/or indirectly through nutrition-sensitive interventions. It is important to note that the pathway to prevention of malnutrition from nutrition-sensitive interventions, which address the basic or underlying causes of malnutrition, goes through a change in one or both of these two direct causes of malnutrition.

As also emphasized very strongly by the Scaling Up Nutrition (SUN) Movement, prevention of malnutrition requires multi-sectoral action. This also applies to prevention of wasting, whether under stable, development conditions or in emergencies. This is challenging, also operationally, and particularly when operating under difficult circumstances that require immediate action.

Current programming practice

Reviews by Jimenez and Stone-Jimenez [8] and Mucha [9] undertaken with the Community-Based Management of Acute Malnutrition (CMAM) Forum found that many nutrition-specific and nutrition-sensitive interventions have been employed with the aim of preventing acute malnutrition, often within a broader strategy to prevent undernutrition as a whole; from food- or health-based interventions, to programs aimed at strengthening the position of women and the caregiving environment. Nutrition-specific interventions include supplementary feeding as well as support to pregnant women, infants, and young children: i.e., the nine “proven” interventions presented by the 2008 *Lancet* Series [10]. Nutrition-sensitive interventions include improving food security and livelihoods; water, sanitation, and hygiene (WASH); early childhood development; and positive caregiving. The reviews found that both nutrition-specific and nutrition-sensitive interventions are important to prevent acute malnutrition, and highlighted, among others, the importance of maternal nutrition for prevention of small-for-gestational age births and hence reducing the

risk of both wasting and stunting and related morbidity and mortality in the first 2 years of life, the importance of WASH because of the impact of diarrhea and poor hygiene on wasting, and the need for “improving the condition of women” so that they are able to provide adequate care for their children.

Although prevention of death related to wasting has traditionally been a major focus in humanitarian responses, it is now realized that the 1,000-days window for prevention of undernutrition is short and undernutrition has lifelong consequences, and that the risk of death is also high among stunted children. Emergency response operations therefore increasingly aim at ensuring adequate nutrition for vulnerable groups in order to prevent different forms of undernutrition and the associated increased risks of morbidity and mortality in the short- and longer-term.

Programming that exclusively focuses on the prevention of acute malnutrition, as opposed to the prevention of undernutrition during the 1,000-days window, is implemented when and where the incidence of acute malnutrition is high or the risk of an increase in incidence is high. Emergencies and seasonal factors, including lean seasons, exacerbate existing nutrition problems as well as the underlying causes of undernutrition, which increases the risk of wasting and other forms of undernutrition.

The MAM Decision Tool, Product Sheet and Guidance Note that the Global Nutrition Cluster's MAM Task Force (created in March 2011) produced is a guide to the design of an appropriate emergency response to address MAM [11]. The choice is to either implement treatment of MAM, prevent acute malnutrition, or both, based on the prevalence and incidence of MAM and SAM, as well as the risk of deterioration of the situation (aggravating factors).

A global MAM mapping, carried out in 2013 by the World Food Programme (WFP) and Valid, showed that many different food, health, and other interventions are implemented (unpublished). Many prevention programs included either a form of blanket feeding, mostly with special nutritious foods, or distribution of cash or vouchers. Blanket supplementary feeding programs (BSFP) were operational in 44 countries in 2013, reaching 7 million children. Coverage of BSFP programs varies. The WFP's target for coverage by these programs is 70%. There is an increase in focus on other, more nutrition-sensitive interventions that could help prevent acute malnutrition (see also the discussion of cash interventions below). BSFP programs are also used as a platform to also deliver other, nutrition-sensitive, interventions such as health and WASH interventions. Greater emphasis has been placed on preparing for transition, from emergency to development operations (and vice-versa), by ensuring that multi-sectoral responses are built on, or integrated with, existing systems and that these systems are prepared for the

possibility of being scaled-up (or down). With such adaptable systems in place, it is possible to intervene earlier when the nutritional situation deteriorates.

Debate: Cash to prevent acute malnutrition?

A recent paper published results of a longitudinal cohort study of nonmalnourished children in Niger, where households with children under 5 years of age received a monthly unconditional cash transfer equivalent to 38 euros per month provided by Save the Children-UK [12]. The children belonged to households that were classified as poor or very poor using Household Economy Approach methodologies (approximately 70% of the households in the area). The authors reported that 80% to 90% of the transfer was spent on food, and different improvements in underlying causes of malnutrition were observed, including living standards, food security, and women's empowerment. It was also found that children already had a relatively low weight-for-height z-score when the lean season started. Despite the mentioned improvements, a decline in the physical health of mothers (self reported) and their children was found. As the study used a before-after design with no control group, attribution of the improved weight-for-height z-score to the cash intervention cannot be made, and the probable pathways are unclear. An important lesson is that research, and programme design in general, needs to consider and monitor the pathways through which impacts are likely to take place, otherwise reasons for observed changes of nutritional status may remain unclear.

There are arguments pro and con to using cash transfers for the prevention of acute malnutrition. Conditional cash transfers (CCTs) used in social protection programs are quite different from cash transfers in an emergency. In the case of the latter, the transfer typically takes place during a few months only, when vulnerability is high, which has an impact on how the money will be used; the transfers are usually not implemented together with a human capacity investment component; and the context in terms of how the money can be used and what other services are provided, such as education, preventive health services, etc., is also very different. Cash transfers in an emergency response use, as much as possible, robust targeting methods and criteria for receiving the cash transfer. The transfers can be conditional or unconditional, meaning cash recipients may be free to spend the money on whatever they wish, or be limited (using a voucher mechanism) to using it for program-specific activities such as to improve their shelter, obtain seeds and tools for agricultural activities or buy nutrient rich foods to complement their basic food ration.

The procash arguments focus on the facts that the

underlying causes of acute malnutrition need to be addressed and that cash can play an important role in that. For example, income from cash transfers may be used to create more sustainable household assets, which may have a longer-lasting impact in preventing acute malnutrition and reducing vulnerability to shocks as well as freeing up time for caregiving. Moreover, distribution of cash respects the autonomy of households to decide on how to best meet their needs. In many contexts, cash transfers may need to be integrated with interventions from other sectors, such as health and WASH, in order to effectively reduce the risk of acute malnutrition in infants and young children. This requires very clear targeting criteria, setting the value of the cash transfer and the duration of the transfer as well as identifying the additional nutrition sensitive interventions that need to be in place to achieve the desired nutritional result. In the case of the Save the Children programme in Niger, the cash transfer was originally designed to be accompanied by increased health activities, but this related component could not be funded, so the cash intervention was limited to addressing the food intake related causes of malnutrition in the context and less able to address the disease related causes.

There are strong arguments in favor of “no cash for specific nutrition outcomes.” Epicentre, Médecins sans Frontières (MSF), the WFP and the Ministry of Public Health, Niger, published a study that was conducted during the lean season in Niger in which households with a child aged 6 to 23 months received either a special nutritious food (Super Cereal Plus [SC+] or Plumpy’Sup or Plumpy’Doz), cash (43 euros per month), special nutritious food plus cash (38 euros per month), or special nutritious food plus a household food basket [13]. Forty-eight villages were randomized to one of seven intervention groups, and standard health services were provided in all villages by Forum Santé Niger (FORSANI) in collaboration with MSF. The incidence of acute malnutrition was lowest in the groups that received both special nutritious food and household support in the form of cash or food support. The incidence in the groups with either special nutritious food only or cash only was comparable. These results indicate that improving nutrient intake, one of the direct causes of undernutrition, is very important and can be successfully achieved when households are provided with specific nutritious foods.

When cash is provided to achieve a specific nutrition outcome in a particular target group, the question to be asked is whether cash transfers can achieve the same nutritious outcomes in young children as direct provision of special nutritious foods [14]. In the case of cash, the outcome depends on the nutritional quality of the foods that are available for purchase locally, the choices households make to acquire these foods that are usually more expensive than the family

staple, and the quantity of these foods that the specific child consumes. It is likely that some of the impact of cash observed in the Langendorf et al. study [13] was through some improvement of the underlying causes, such as health care service utilization, hygiene and time available for caring practices. However, the cost of the intervention, including programming and distribution, was approximately four times higher in the cash-only group than in the special nutritious food-only groups, whereas the incidence of wasting was comparable [13]. The combination of the two interventions was the most effective (1.7–2.5 times lower incidence) but was also the most costly.

When considering cash versus special nutritious foods, it is important to note that cash transfers are a form of social protection that is provided to the most vulnerable households and can be designed to meet various specific needs in humanitarian contexts, whereas blanket provision of special nutritious foods serves the purpose of ensuring that nutritionally vulnerable groups, such as young children, better meet their nutrient requirements. The number of children at risk for acute malnutrition and hence in need of special nutritious food is much larger than the number of households that would be eligible for, or, considering available resources, could be provided with, an income transfer based on vulnerability, such as households with a high dependency ratio or an adult with a chronic illness. Therefore, separate criteria should be used to determine eligibility for one or both of these interventions.

Cash transfers are being used to respond to humanitarian responses more and more widely, with most cash interventions aimed at improving food security and shelter. The decision to provide cash over in-kind food rations or building materials is usually based on sound market analysis (i.e., can cash be spent?). The concerns over the risk of diversion of cash has contributed to more robust monitoring systems to track delivery and use of cash transfers which have also set the bar higher for monitoring of programs using in-kind goods. The evidence for using general household assistance, whether in the form of cash or a household food ration consisting of, for example, cereals, pulses, oil, and salt for nutrition-specific outcomes in vulnerable groups is less convincing and it is unlikely that a cash transfer or other form of general household assistance by itself will ever have the desired nutrition outcome in an emergency. Instead cash transfers should be considered a form of household support that requires additional interventions to prevent acute malnutrition in specific target groups.

Furthermore, in order to prevent acute malnutrition, good quality, easily accessible health care is very important and a non-negotiable component of an essential package of services to be provided. Thus, distribution of special nutritious foods, in conjunction

with household support, such as cash, for the most vulnerable, should remain key pillars of emergency interventions for preventing an increase in malnutrition and related morbidity and mortality.

How to evaluate preventive interventions in emergencies

In emergencies, the choice of interventions should be guided by evidence of what works. However, conducting studies in emergencies is challenging, both from a practical and from a design point of view, as interventions cannot be withheld under these circumstances, and interventions are implemented as part of a package of services, which makes it difficult to assess the impact of any specific intervention on its own [13, 15]. There are different opinions about which evidence “counts” for application in humanitarian situations, with some relying on randomized controlled trials, as the best quality and only reliable evidence, others pointing to the very large number of patients successfully treated in specific programs, and others also taking historical and observational studies into account. These divides are not helpful. There is an urgent need for pragmatic studies that are conducted under real-life programming circumstances involving integrated packages, study interventions that can be implemented at scale, randomize to the extent possible, track program implementation pathways, use appropriate indicators, and adequately acknowledge and discuss context [15, 16]. Evidence of impact of an intervention on nutrition in one context may not necessarily apply to other contexts.

There is an example of complementary designs of three separate studies that were conducted in Niger in subsequent years to assess the impact of different blanket interventions for prevention of acute malnutrition [13, 17, 18]. All three were nested in very large programs that provided health and nutrition interventions. One was a randomized trial, another was observational in design, and the third analyzed program experience. These subsequent studies in the same area using different designs enabled a triangulation of findings that aided the build-up of evidence to inform program design. Other possibilities are to include comparison with a historical group or with a group that receives the “best possible” intervention package in order to assess to what extent a more feasible, less resource intense, intervention package compares to such an ‘ideal’

intervention that would not be practical for large scale implementation.

The choice of interventions for programming should be guided by what is likely to have an impact; it should fit to context in the sense that it addresses the main direct and underlying causes of undernutrition in the specific context; it should be capable of being implemented at scale, given the infrastructure, the capacity of health and food systems, etc.; and it should have a good benefit–cost ratio. In order to contribute to the evidence base, it is important to monitor and document program implementation, coverage, and outcomes in order to continue to build evidence and experience about what works, to what extent, at what cost, and under which circumstances.

Conclusions

Prevention of acute malnutrition requires addressing, directly or indirectly, the two immediate causes of malnutrition, by ensuring that nutrient requirements are being met by a diverse diet and/or special nutritious foods and by preventing and treating illness and by strengthening care practices. Where this is not adequately achieved, as attested by a high prevalence of undernutrition (stunting, wasting, and/or micronutrient deficiencies), and where the prevalence or incidence of acute malnutrition is high or increasing, additional measures are required to prevent a worsening of wasting prevalence and incidence.

Depending on the context, either the efforts for prevention of undernutrition, including both nutrition-specific and nutrition-sensitive interventions, and applied across the 1,000-days window of opportunity, need to be increased in a way that can be sustained over a relatively long period of time, and/or specific more temporary measures need to be implemented during the period that risk is high or specific interventions can be implemented, such as in the case of a response to an emergency or a lean season. Interventions that address direct causes of undernutrition have a higher benefit–cost ratio, especially in the short term, whereas interventions that address underlying causes can make a good contribution, provided that they achieve substantial change in one or both of the direct causes of undernutrition, and potentially also provide protection for future periods of heightened risk.

References

1. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, de Onis M, Ezzati M, Grantham-McGregor S, Katz J, Martorell R, Uauy R; Maternal and Child Nutrition Study Group. Maternal and child undernutrition and overweight in low-income and middle-income countries. *Lancet* 2013;382:427–51.
2. UNICEF/WHO/World Bank. Levels and trends in child malnutrition: UNICEF-WHO-The World Bank Joint

- Child Malnutrition Estimates. Available at: http://www.who.int/entity/nutgrowthdb/jme_unicef_who_wb.pdf.
3. Ruel MT, Menon P, Habicht JP, Loechl C, Bergeron G, Pelto G, Arimond M, Maluccio J, Michaud L, Hankebo B. Age-based preventive targeting of food assistance and behaviour change and communication for reduction of childhood undernutrition in Haiti: a cluster randomised trial. *Lancet* 2008;371:588–95.
 4. Briend A, Khara T, Dolan C. Wasting and stunting—similarities and differences: policy and programmatic implications. *Food Nutr Bull* 2015;36:S15–23.
 5. Mwangome MK, Fegan G, Prentice AM, Berkley JA. Are diagnostic criteria for acute malnutrition affected by hydration status in hospitalized children? A repeated measures study. *Nutr J* 2011;10:92. doi: 10.1186/1475-2891-10-92.
 6. Briend A, Maire B, Fontaine O, Garenne M. Mid-upper arm circumference and weight-for-height to identify high-risk malnourished under-five children. *Matern Child Nutr* 2012;8:130–3.
 7. Golden MH. Proposed recommended nutrient densities for moderately malnourished children. *Food Nutr Bull* 2009;30:S267–343.
 8. Jimenez M, Stone-Jimenez M. Preventing Moderate Acute Malnutrition (MAM) through nutrition-specific interventions. CMAM Forum Technical Brief Sep 2014.
 9. Mucha N. Preventing Moderate Acute Malnutrition (MAM) through nutrition-sensitive interventions. CMAM Forum Technical Brief Dec 2014.
 10. Bhutta ZA, Ahmed T, Black RE, Cousens S, Dewey K, Giugliani E, Haider BA, Kirkwood B, Morris SS, Sachdev HP, Shekar M; Maternal and Child Under-nutrition Study Group. What works? Interventions for maternal and child undernutrition and survival. *Lancet* 2008;371:417–40.
 11. Global Nutrition Cluster. Moderate acute malnutrition. A decision tool for emergencies. Global Nutrition Cluster, 2014. Available from (accessed 3 August 2014): <http://www.cmamforum.org/Pool/Resources/MAM-Decision-Tool-2014.pdf>.
 12. Fenn B, Noura G, Sibson V, Dolan C, Shoham J. The role of unconditional cash transfers during a nutritional emergency in Maradi region, Niger: a pre-post intervention observational study. *Public Health Nutr* 2014;28:1–9.
 13. Langendorf C, Roederer T, de Pee S, Brown D, Doyon S, Mamaty AA, Touré LW, Manzo ML, Grais RF. Preventing acute malnutrition among young children in crises: a prospective intervention study in Niger. *PLoS Med* 2014;11:e1001714.
 14. Bailey S, Hedlund K. The impact of cash transfers on nutrition and transitional contexts. A review of the evidence. 2012. Humanitarian Policy Group, Overseas Development Institute, London.
 15. Webb P, Boyd E, de Pee S, Lenters L, Bloem MW, Schultink W. Nutrition in emergencies: do we know what works? *Food Policy* 2014;49:33–40.
 16. Kerac M, Seal A. Preventing acute malnutrition in young children: improving the evidence for current and future practice. *PloS Med* 2014;11(8):e1001715. doi: 10.1371/journal.pmed.1001715.
 17. Isanaka S, Nombela N, Djibo A, Poupard M, Van Beckhoven D, et al. Effect of preventive supplementation with ready-to-use therapeutic food on the nutritional status, mortality, and morbidity of children aged 6 to 60 months in Niger: a cluster randomized trial. *JAMA* 2009;301:277–85. doi: 10.1001/jama.2008.1018.
 18. Grellety E, Shepherd S, Roederer T, Manzo ML, Doyon S, Ategbo EA, Grais RF. Effect of mass supplementation with ready-to-use supplementary food during an anticipated nutritional emergency. *PLoS One* 2012;7:e44549. doi: 10.1371/journal.pone.0044549.