

Evidence Mapping of Wasting Programs and Their Impact Along the Continuum of Care in Low- and Middle-Income Countries: **A Rapid Review of the Research Evidence**



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Why is this review needed?

Wasting, also known as acute malnutrition, is a major health problem requiring urgent attention in low- and middle-income countries (LMICs). Wasting is defined as low weight-for-height. According to the World Health Organization (WHO), it often indicates a recent and severe weight loss and usually occurs when a person has not had food of adequate quality and/or quantity and/or they have had frequent or prolonged illnesses.

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Addressing wasting is critical as wasted children face an increased risk of disease and death; severely wasted children are, on average, 11 times more likely to die than their healthy counterparts (McDonald et al. 2013). Only 40 out of 194 countries are on course to achieve the World Health Assembly 2025 target of reducing and maintaining levels of wasting below 5 percent (Development Initiatives 2020). The recent COVID-19 pandemic has further contributed to the prevalence of wasted children (Osendorp et al. 2021), making appropriate and timely treatment alongside prevention of wasting among children priorities for action. In terms of the management of wasting, however, evidence remains scant on the intermediary steps between prevention and treatment — that is, diagnosis and referral of children for treatment.

To facilitate evidence-based decision making on wasting by policy makers and those involved in implementation, Transform Nutrition West Africa

(TNWA) undertook a systematic mapping review of the landscape of interventions/programs to provide information on which have been extensively researched and their impact on child wasting documented. The review first assessed both the quantity and quality of existing systematic reviews on interventions and programs in LMICs that address wasting, and second, sought to identify research gaps along the continuum of care for wasting. The output of this rapid review will allow decision-makers to identify where investment is needed as well as supporting the Integrated Research on Acute Malnutrition in the Sahel project (IRAM). IRAM¹ aims to generate evidence on wasting prevention and treatment interventions/programs in four countries: Chad, Mauritania, Mali, and Niger.

¹ IRAM is a multi-country partnership between UNICEF and IFPRI.

Context of wasting in low- and middle-income countries

The latest Joint Child Malnutrition Estimations report that, globally, in 2020, 45.4 million children under the age of five were wasted (a prevalence rate of 6.7 percent), with 13.6 million of those severely wasted (UNICEF 2021). It is estimated that 99 percent of wasted children under five years of age (U5s) live in LMICs, predominantly in Southeast Asia and Africa south of the Sahara (UNICEF 2021).

Systematic reviews on prevention of wasting have studied the impact of food supplementation (Xu et al. 2019), breastfeeding promotion (Giugliani et al. 2015), cash transfers (Pega et al. 2015), and water, sanitation, and hygiene (WASH) interventions/programs (Gera et al. 2018). Reviews documented treatment of wasting through studies of the efficacy of the therapeutic products (Gera et al. 2017) and of the types of case-management: outpatient (Schoonees et al. 2019) or inpatient (Wagnew et al. 2019). Knowledge gaps remain on other aspects of wasting management, such as screening, diagnosis, and the referral of U5s to wasting treatment programs (Becquey et al. 2020; Huybregts et al. 2020; Bliss et al. 2018). Furthermore, access to treatment for wasted children remains low: only an estimated 20 percent (10 million out of 49 million wasted children) received treatment in 2018 (WHO 2019). To address these gaps and ensure the health and survival of newborns and U5s, a continuum of care for the treatment of wasting was introduced.

Key messages

- Although research has been done on prevention and treatment of wasting, knowledge gaps remain regarding strategies to increase screening and referral to wasting treatment programs.
- Lipid-based Nutrient Supplements and food supplementation interventions/programs are effective in the prevention of wasting.
- Specially formulated foods have shown their efficacy in recovery from MAM (CSB++, RUSF or RUTF) and SAM (RUTF).
- In SAM cases, facility-based management using WHO guidelines has proved more effective than any alternative treatment strategy to reduce mortality.
- Prevention of wasting and management of wasting cases in children under six months remain poorly documented.
- The quality of the evidence is low.

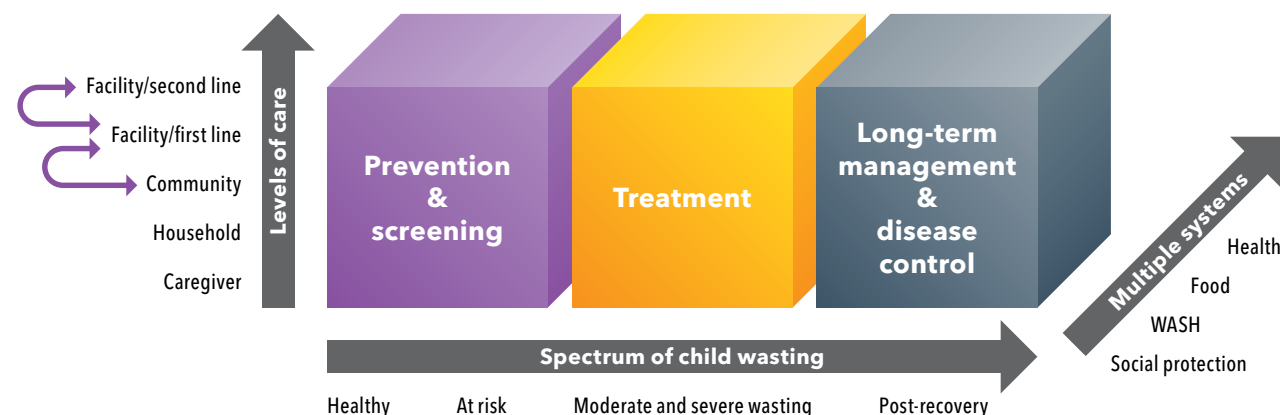
This means that “any child receives appropriate, timely care to enable full recovery wherever they are along the spectrum of acute malnutrition” (Shoham, McGrath 2019).

Approach to capture evidence

This systematic mapping review overviews, catalogues, and identifies gaps in the body of evidence on interventions/programs designed to reduce wasting among U5s in LMICs. A three-step approach was followed: (1) map and document existing evidence (i.e., systematic reviews) on interventions/programs along the wasting continuum of care since 2006; (2) summarize the reported effectiveness of types of interventions/programs as reported by these reviews; and (3) identify gaps in evidence relative to different age groups (children under six months) and contexts (humanitarian crisis).

The systematic literature search and the analysis were guided by a conceptual framework for the continuum of care for wasting extended to include universal prevention and the prevention of post-treatment relapse (Becquey et al. 2020; Huybregts et al. 2020). This framework has three dimensions: (1) the appropriate, timely care offered to prevent, treat, and manage malnutrition to enable full recovery; (2) the level of care—from household and community care to outpatient and outreach services, hospitals, and health facilities, with appropriate referral and follow-up across levels (Kerber et al. 2007); and (3) across multiple systems: food, health, WASH, and social protection (UNICEF 2020).

Figure 1. Extended conceptual framework for the continuum of care for wasting



SOURCE : Becquey et al. 2020 and Huybregts et al. 2020.


NOTE: Arrows represent appropriate referral and counter-referral.

Searches to identify systematic reviews that report on wasting programs in LMICs were undertaken in MEDLINE (biomedical/epidemiological) (<http://www.ncbi.nlm.nih.gov/pubmed>) and Cochrane Library (medicine/healthcare) (<https://www.cochranelibrary.com/>). The PROSPERO (Systematic Review registration) (<https://www.crd.york.ac.uk/prospero/>) registry was hand-searched to establish that no similar mapping review had been conducted previously. The initial search string was developed in MEDLINE by combining the items of the PICOS model: population (mothers and/or children U5s, healthcare workers, fathers, family members); intervention (interventions/programs on wasting); outcome (wasting incidence,

coverage of screening, coverage of referral, wasting treatment, relapse incidence); and setting (LMICs). Further description of the search strategy can be found in the review protocol (Verstraeten et al. 2021).

Table 1 describes the outcomes expected along the continuum of care for wasting (**Table 1**). Throughout this note we will use the second column for disaggregated steps of the continuum of care.

Table 1. Outcomes along the extended framework for the continuum of care for wasting



Continuum of care for wasting	Including	Outcome
Prevention and screening	Prevention Screening	Wasting incidence
Treatment	Referral between screening and diagnosis; Follow-up on referral (caregiver seeks for treatment); Follow-up on no show (health staff follow up on referred children who did not show up for treatment)	Referral of cases
	Diagnosis	Identification of cases
	Treatment of cases	Treatment enrollment, treatment initiation, compliance, completion, recovery, default, fatality cases
Long-term management	Prevention of relapse	Relapse incidence

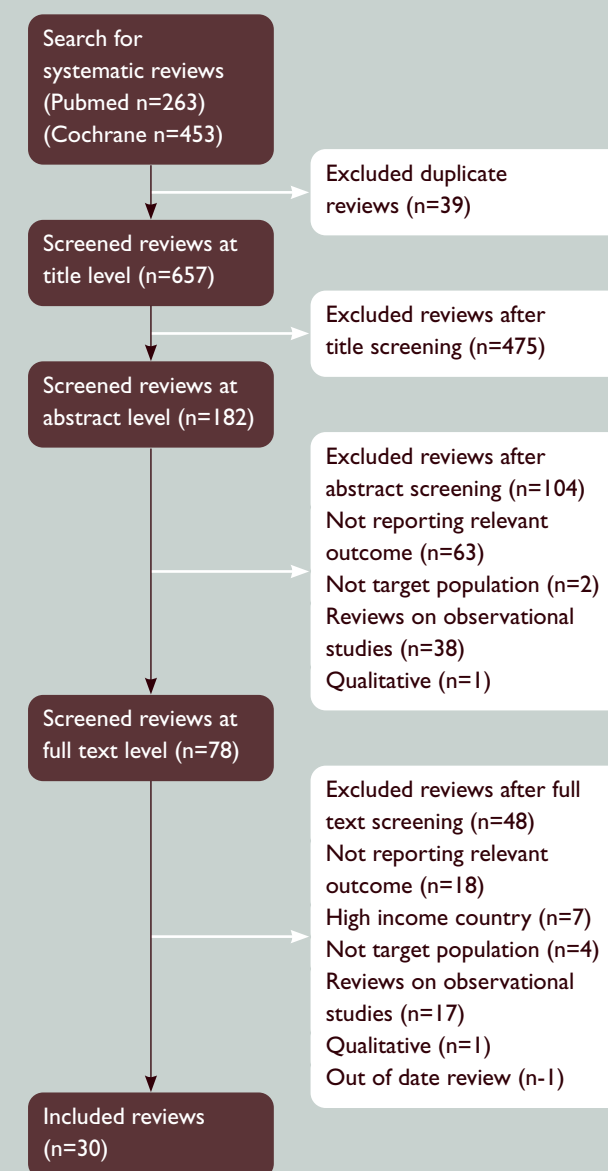
SOURCE: Authors.

Results

Search results and characteristics of the systematic reviews

A total of 30 systematic reviews were included following completion of title, abstract, and full text screening (**Figure 2**). Included systematic reviews were published between 2009 and 2021. Systematic reviews primarily report on interventions/programs targeting children U5 ($n = 22$), with some reviews targeting the specific age group 6–23 months old ($n = 3$). The remaining systematic reviews report on interventions/programs delivered to health workers ($n = 2$), mothers ($n = 2$), women of childbearing age ($n = 1$), child–mother pairs ($n = 1$), and households ($n = 4$). One review (Pradhan et al. 2016) included interventions/programs conducted in humanitarian contexts after a natural disaster. Most systematic reviews ($n = 20$) reported on interventions/programs targeting global wasting without a specific analysis for moderate or severe wasting. Only four reviews presented results for both global wasting and the subgroups of moderate and severe wasting; two reviews focused only on moderate wasting; and four only on severe wasting.

Figure 2. Flowchart of search results

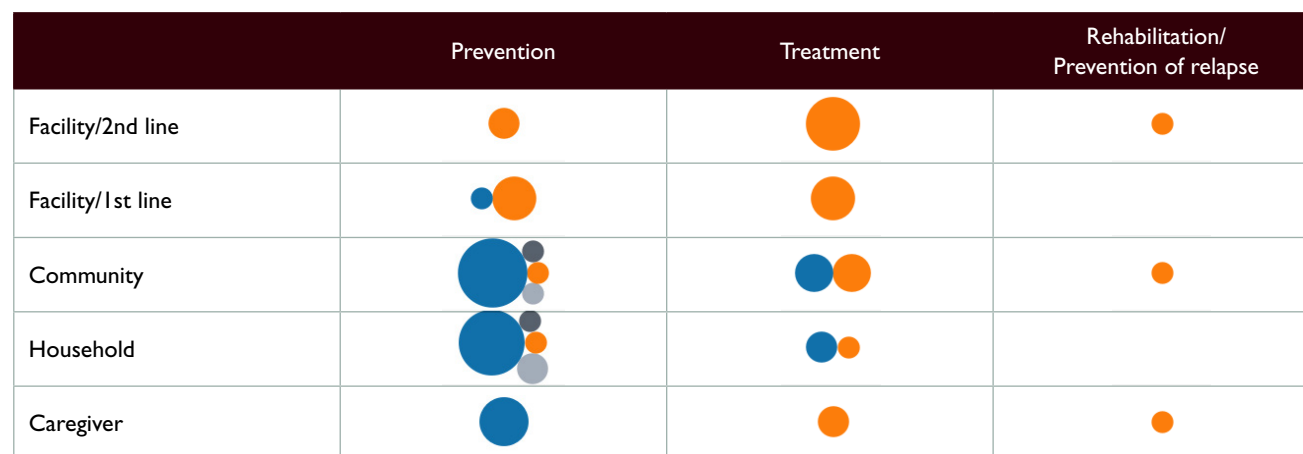


SOURCE: Authors.

Systematic reviews reporting on interventions/programs targeting wasting

Figure 3 summarizes the evidence on systematic reviews of interventions/programs along the continuum of care for wasting in LMICs. Most of the systematic reviews covered the prevention and treatment aspects of the framework, and we identified only two reviews on prevention of relapse. For screening, referral, and diagnosis, we did not retrieve any systematic reviews. While all four systems of our framework (health, food, WASH, social protection) were covered by the included systematic reviews, health and food systems interventions/programs were included in the most reviews, and social protection and WASH interventions/programs were limited to reviews of the prevention of wasting. Most reviews reported on prevention interventions/programs at the community and household levels, while treatment was evenly reviewed at both community and facility levels. A more detailed description of the interventions/programs can be found in the interactive graphic representation available online: https://public.tableau.com/app/profile/tnwa/viz/RapidreviewonwastinginLMICs/Viz_Wasting. A narrative summary along the detailed steps of the extended continuum of care framework, i.e., prevention, diagnosis, referral, treatment, and prevention of relapse, is presented below.

Figure 3. Number of systematic reviews on interventions/programs targeting wasting along the continuum of care for wasting



SOURCE: Authors.

NOTE: The size of the circles represents the number of systematic reviews, the colors represent the system (see legend).

Screening, referral, and diagnosis are not shown because no reviews reported on interventions/programs targeting these steps.

System

- Food
- Health
- Social protection
- WASH

PREVENTION

The systematic reviews reported that interventions/programs targeting prevention of wasting ($n = 24$) were implemented across all levels of care and all systems. Nevertheless, the most salient prevention delivery systems represented across these reviews were the food and health systems, and the most salient platforms were communities and homes. It is worth noting that many reviews ($n = 11$) included interventions/programs across different levels of care.

Preventative interventions/programs delivered only through the food system mainly included nutrition education, complementary or supplementary feeding, food supplementation (with a lipid-based nutrient supplement [LNS] or fortified soybean powder), and food system strengthening (home production, animal-source food consumption). Those delivered only through the health system included health system strengthening (WHO/UNICEF management of childhood illness, performance-based financing of health staff). Reviews on micronutrient fortification (zinc, iron, multiple micronutrient powder [MNP], multiple micronutrient supplementation [MMN]) included interventions/programs implemented through either the food or the health system, with a soft frontier separating the objectives and the platforms used for the promotion of micronutrient consumption (health) and food fortification (food).

Reviews reporting on interventions/programs delivered through the social protection system covered conditional or unconditional cash transfers, income generation, and social support. The only review reporting on interventions/programs that were delivered through the WASH system targeted efforts for the improvement of water quality, supply, sanitation, and hygiene practices at household and community levels.

SCREENING

No review on interventions/programs targeting the screening of wasting was found.

REFERRAL

No review on interventions/programs to improve referral to wasting treatment programs was found.

DIAGNOSIS

No review on interventions/programs targeting the diagnosis of wasting was found.

TREATMENT

The reviews addressing interventions/programs to treat wasting ($n = 9$) included targeted treatment of acute malnutrition and food interventions/programs delivered through the health and food systems only. Reviews reporting on interventions/programs that included provision of therapeutic foods were classified in the health system in the context of treatment of wasting. Interventions/programs targeting wasting treatment included

efficacy studies on different specially formulated and therapeutic foods (Plumpy'Doz, corn-soya blend [CSB, CSB++], ready-to-use supplementary food [RUSF, a medium quantity type of LNS], ready-to-use therapeutic food [RUTF, a large quantity type of LNS]), on different platforms (community, facility), and on type of care (inpatient, ambulatory) for the treatment of moderate acute malnutrition (MAM), severe acute malnutrition (SAM), or/and global acute malnutrition (GAM). In addition, reviews reported on interventions/programs testing the impact of adding antibiotic agents and vitamin A to nutritional therapy in the management of malnutrition cases.

PREVENTION OF RELAPSE

Two reviews targeted the prevention of relapse after a SAM episode using the health system. The interventions/programs consisted of the use of LNS (RUSF or RUTF) for MAM treatment and RUTF for home-based nutrition rehabilitation of SAM.

Effectiveness of interventions/programs reported by reviews targeting wasting

To represent the effectiveness of the interventions/programs in the included reviews, we used a harvest plot (Ogilvie et al. 2008). This graph indicates whether the interventions/programs decreased, had no impact on, or increased the outcome of interest. Only systematic reviews that performed a meta-analysis to measure the impact of the interventions/programs were included. We use the harvest plot to represent the number of primary studies included in the meta-analysis by each review along

the continuum of care and by outcome, including prevention (wasting incidence/proportion, WHZ scores), treatment (recovery rate, default rate, and mortality rate), and prevention of relapse (relapse incidence). For the included reviews, no deterioration in wasting outcomes was reported.

PREVENTION

Ten systematic reviews reported on the impact that interventions/programs had on the incidence or proportion of wasting. Three of these reported a positive impact on preventing wasting (Janmohamed et al. 2020; Pega et al. 2015; Das et al. 2019). The effective interventions/programs included nutrition education, cash transfers, and LNS supplementation combined with complementary feeding. Nutrition education interventions/programs reported in Janmohamed et al. (2020) were effective when they combined home visits with group platforms, while no significant impact was shown when using mother/peer groups only. The cash transfer interventions/programs reported in Pega et al. (2015) showed that unconditional cash transfer programs for assistance in humanitarian disasters had a significant impact on wasting when compared to no interventions/programs. Their impact was not significantly different from the impact of in-kind transfers. The LNS supplementation combined with complementary feeding interventions/programs reported by Das et al. (2019) was effective in preventing of MAM but not SAM.

Figure 4. Effectiveness of interventions/programs in reviews targeting wasting prevention (incidence/ proportion)

Review	Type of Intervention	Details of Intervention	Effects	Number of Primary Studies
Pega et al. 2015	Cash transfer/voucher/income generation/social support	Unconditional transfer (vs in-kind transfer)	No effect	1
Durao et al. 2020		Conditional transfer	No effect	2
Durao et al. 2020		Income generation intervention	No effect	2
Durao et al. 2020		Food voucher	No effect	1
Pega et al. 2015		Unconditional transfer	Positive	1
Lassi et al. 2020	Complementary/Supplementary Feeding Intervention	Complementary feeding education (Food insecure settings)	No effect	6
Lassi et al. 2020		Supplementary feeding interventions	No effect	4
Tam et al. 2020	Fortification/supplementation (Zinc, Iron, MNP, MMN)	Zinc supplementation	No effect	6
Tam et al. 2020		Iron supplementation	No effect	3
Tam et al. 2020		Micronutrient powder supplementation	No effect	7
Gera, Shah, Sachdev 2019		Zinc supplementation	No effect	7
Odigwe et al. 2010		Riboflavin vitamin E, selenium and NAC	No effect	1
Das et al. 2019	LNS supplementation + Complementary/supplementary feeding intervention	LNS + complementary feeding (SAM)	No effect	3
Das et al. 2019		LNS + complementary feeding (MAM)	Positive	8
Lassi et al. 2020	Nutrition education	Breastfeeding education interventions	No effect	2
Lassi et al. 2020		Complementary feeding education (Food secure settings)	No effect	2
Lassi et al. 2020		Complementary feeding education (Food insecure settings)	No effect	1
Janmohamed et al. 2020		Nutrition education (Mother/Peer group platform)	No effect	3
Janmohamed et al. 2020		Nutrition education (Combined Home Visit + Group Platforms)	Positive	4
Xu et al. 2019	Soybean powder supplementation + Nutrition education	Soybean powder supplementation + Nutrition education	No effect	2
Gera et al. 2016	WHO/UNICEF IMCI intervention	WHO/UNICEF IMCI intervention	No effect	2

SOURCE: Authors.

NOTE: If the control intervention/program is not specified, it means there was no intervention/program in the control group.

Treatment

We evaluated the systematic reviews that report on the impact of interventions/programs on treatment for three outcomes: the recovery rate, the default rate, and the mortality rate.

RECOVERY RATE

The reviews on interventions/programs that aimed to improve the recovery rate for wasting compared the effectiveness of different platforms or different food products in treating MAM or SAM. For both MAM and SAM cases, community-based strategies and non-community-based strategies showed no difference in recovery rates (Das et al. 2020). In MAM cases, treatment with specially formulated food (local foods, LNS of all sorts, CSB, other blended foods) were reported to improve recovery rates compared to standard care (counseling and standard medical care without food provision) (Lazzerini, Rubert, Pani 2013). Three systematic reviews compared the impacts of several specially formulated food supplements (Das et al. 2020; Lenters et al. 2013; Lazzerini, Rubert, Pani 2013). These reviews concluded that RUSF interventions/programs have a higher recovery rate than CSB interventions/programs (Das et al. 2020; Lenters et al. 2013), but that there are no significant differences in the recovery rates between standard RUSF and locally or homemade prepared food recipes or between standard RUSF and whey-based RUSF (Das et al. 2020). In a direct comparison with any blended foods, LNS (RUSF, RUTF, Plumpy'Doz)






















PHOTO: UNICEF

supplementation leads to higher recovery rates (Gera et al. 2017; Lazzerini, Rubert, Pani 2013). However, recovery rates were not found to be significantly different between LNS (RUSF or Plumpy'Doz) and CSB++ (Lazzerini, Rubert, Pani 2013). Also, there was no difference between CSB++ and other blended food in the interventions/programs (Lazzerini, Rubert, Pani 2013).

In the treatment of uncomplicated SAM (SAM*)—that is, children affected by SAM who passed a standard appetite test and without fever, clinical infections, or medical complications—facility-based strategies show no improvement of recovery

rates compared with standard care (Das et al. 2020). RUTF is efficient in both community-based and home-based management of SAM (Lenters et al. 2013; Schoonees et al. 2019). RUTF supplementation showed no greater impact on recovery of uncomplicated SAM than non-milk based RUTF, energy-dense/home-prepared food, or high oleic RUTF (Das et al. 2020). Finally, antibiotic administration in addition to the feeding therapy improved the recovery rate for uncomplicated SAM (Das et al. 2020).

Figure 5. Effectiveness of interventions/programs in reviews targeting wasting treatment (recovery rate)

Type	Comparison	Review	Type of Intervention	Effects	Number of Primary Studies
MAM and SAM	Platform	Das et al. 2020	Community-based vs non-community-based strategies	No effect	1 
MAM	Product	Lazzerini, Rubert, Pani 2013	Specially formulated foods vs standard care (counseling+standard medical care without food provision)	Positive	2 
MAM	Product	Das et al. 2020	RUSF vs local or homemade food	No effect	3 
MAM	Product	Das et al. 2020	RUSF vs whey RUSF	No effect	1 
MAM	Product	Das et al. 2020	RUSF vs CSB	Positive	6 
MAM	Product	Lenters et al. 2013	RUSF vs CSB in community-based management	Positive	5 
MAM	Product	Gera et al. 2017	LNS (RUSF or RUTF) vs other specially formulated foods	Positive	8 
MAM	Product	Lazzerini, Rubert, Pani 2013	LNS (RUSF, RUTF, Plumpy'Doz) vs any blended foods (CSB, CSB pre-mix, CSB++, Misola, home foods)	Positive	5 
MAM	Product	Lazzerini, Rubert, Pani 2013	LNS (RUSF or Plumpy'Doz) vs CSB++	No effect	3 
MAM	Product	Lazzerini, Rubert, Pani 2013	CSB++ vs other blended foods (Misola, home foods)	No effect	1 
MAM	Product	Lazzerini, Rubert, Pani 2013	LNS (RUSF) vs CSB pre-mix	Positive	1 
MAM	Product	Lazzerini, Rubert, Pani 2013	LNS (Plumpy'Doz) vs CSB at complementary dose	No effect	1 
SAM*	Platform	Das et al. 2020	Facility-based according WHO protocol vs ambulatory-based	No effect	1 
SAM	Product	Lenters et al. 2013	RUTF vs standard therapy in community-based management	Positive	3 
SAM*	Product	Das et al. 2020	RUTF vs non-milk-based RUTF in community-based outpatient management	No effect	5 
SAM*	Product	Das et al. 2020	RUTF vs energy-dense/home prepared food in community-based outpatient management	No effect	4 
SAM*	Product	Das et al. 2020	RUTF vs high oleic RUTF in community-based outpatient management	No effect	1 
SAM	Product	Schoonees et al. 2019	RUTF in home-based management vs alternative dietary approaches	Positive	6 
SAM*	Product	Das et al. 2020	Use of antibiotics vs no antibiotics	Positive	2 

SOURCE: Authors.

NOTE: SAM* = uncomplicated SAM.

DEFAULT RATE

One systematic review studied the impact of interventions/programs targeting the risk of default during MAM treatment (Lazzerini, Rubert, Pani 2013). Treatment with specially formulated foods decreased the risk of default compared to standard care without food provision. There was no additional benefit of LNS (RUTF, RUSF or Plumpy'Doz) compared to blended foods or CSB++ in reducing the risk of default.

MORTALITY RATE





For both MAM and SAM cases, there were no differences in mortality rates between community-based and non-community-based care nor between outpatient and inpatient care, as reported respectively in Das et al.(2020) and Lenters et al. (2013).

Two reviews reported that there is no impact of LNS (RUSF, RUTF or Plumpy'Doz) on the reduction of mortality rates in MAM cases compared to other blended foods (Gera et al. 2017; Lazzerini, Rubert, Pani 2013).

Facility-based management of SAM cases according to WHO protocol seems to reduce mortality rates compared with standard care in one review (Hossain et al. 2017); however, another review showed no impact on uncomplicated SAM cases (Das et al. 2020). RUTF in community-based or home-based management showed no improvement in mortality rates compared with standard therapy for SAM (Lenters et al. 2013; Schoonees et al. 2019). Also compared to other food products (F100, non-milk based RUTF, energy-dense/home-prepared food,



















high oleic RUTF, and elevated n3 PUFA RUTF), no significant difference from simple RUTF was noted. The administration of antibiotics in addition to the feeding therapy decreased the mortality rate among uncomplicated SAM cases (Das et al. 2020). Finally, no difference in mortality rate was observed between MAM and SAM children who received high doses of vitamin A compared to those who received low doses (Das et al. 2020).

Figure 6. Effectiveness of interventions/programs in reviews targeting wasting treatment (default rate)

Type	Comparison	Review	Type of Intervention	Effects	Number of Primary Studies
MAM	Product	Lazzerini, Rubert, Pani 2013	Specially formulated foods vs standard care (counselling+standard medical care without food provision)	Positive	1 
MAM	Product	Lazzerini, Rubert, Pani 2013	LNS (RUSF, RUTF, Plumpy'Doz) vs any blended foods (CSB, CSB pre-mix, CSB++, Misola, home foods)	No effect	4 
MAM	Product	Lazzerini, Rubert, Pani 2013	LNS (RUSF or Plumpy'Doz) vs CSB++	No effect	2 
MAM	Product	Lazzerini, Rubert, Pani 2013	LNS (RUSF) vs CSB pre-mix	No effect	1 

SOURCE: Authors.

Figure 7. Effectiveness of interventions/programs in reviews targeting wasting treatment (mortality rate)

Type	Comparison	Review	Type of Intervention	Effects	Number of Primary Studies
MAM and SAM	Platform	Das et al. 2020	Community-based vs non-community-based strategies	No effect	1 
MAM and SAM	Platform	Lenters et al. 2013	Inpatient vs ambulatory	No effect	2 
MAM and SAM	Product	Das et al. 2020	High dose vs low dose of vitamin A	No effect	1 
MAM	Product	Gera et al. 2017	LNS (RUSF or RUTF) vs other specially formulated foods	No effect	8 
MAM	Product	Lazzerini, Rubert, Pani 2013	LNS (RUSF, RUTF, Plumpy'Doz) vs any blended foods (CSB, CSB pre-mix, CSB++, Misola, home foods)	No effect	5 
MAM	Product	Lenters et al. 2013	RUSF vs CSB in community-based management	No effect	4 
MAM	Product	Lazzerini, Rubert, Pani 2013	CSB++ vs other blended foods	No effect	1 
MAM	Product	Lazzerini, Rubert, Pani 2013	LNS (Plumpy'Doz) vs CSB at complementary dose	No effect	1 
SAM*	Platform	Das et al. 2020	Facility-based according WHO protocol vs ambulatory-based	No effect	2 
SAM	Platform	Hossain et al. 2017	Facility-based using WHO guideline vs any alternative treatment strategy	Positive	7 
SAM	Product	Lenters et al. 2013	RUTF vs standard therapy in community-based management	No effect	3 
SAM*	Product	Das et al. 2020	RUTF vs F100 in inpatient treatment	No effect	2 
SAM*	Product	Das et al. 2020	RUTF vs non-milk-based RUTF in community-based outpatient management	No effect	5 
SAM*	Product	Das et al. 2020	RUTF vs energy-dense/home prepared food in community-based outpatient management	No effect	2 
SAM*	Product	Das et al. 2020	RUTF vs high oleic RUTF in community-based outpatient management	No effect	1 
SAM*	Product	Das et al. 2020	RUTF vs elevated n3 PUFA RUTF in community-based outpatient management	No effect	1 
SAM	Product	Schoonees et al. 2019	RUTF in home-based management vs alternative dietary approaches	No effect	4 
SAM	Product	Das et al. 2020	Use of antibiotics vs no antibiotics	Positive	3 

SOURCE: Authors.

NOTE: SAM* = uncomplicated SAM.

Prevention of relapse



The impact of specific interventions/programs to prevent post-treatment relapse was evaluated by two systematic reviews (Gera et al. 2017; Schoonees et al. 2019). In both reviews, the intervention/program consisted of administering a food product to treat an acute malnutrition episode; LNS (RUSF or RUTF) for MAM and RUTF (a kind of large quantity LNS) for SAM. In both interventions/programs, there was no significant impact on the risk of relapse.

Quality of studies

The quality of the included systematic reviews was evaluated using the AMSTAR 2 checklist (Shea et al. 2017). The critical domains (items 2, 4, 7, 9, 11, 13 and 15) and the noncritical domains (1, 3, 5, 6, 8, 10, 12, 14, 16) were used to evaluate the quality of the included reviews (<https://amstar.ca/docs/AMSTAR-2.pdf>). The overall quality of the reviews was rated as moderate (n = 1), low (n = 6), and critically low (n = 23). The least respected critical domains were the consideration of risk of bias when interpreting the results of the review (item 13) and the assessment of presence and likely impact of publication bias (item 15).

It must be noted that numbers of primary studies included in most of the reviews was very low (fewer than six); just eight reviews (Das et al. 2020; Lassi et al. 2020; Tam et al. 2020; Schoonees et al. 2019; Hossain et al. 2017; Gera, Shah, Sachdev 2019; Gera et al. 2017; Das et al. 2019) included more primary studies, ranging between six and eight. This limits the generalizability of the results.

Figure 8. Effectiveness of interventions/programs targeting wasting on relapse rate

Type	Comparison	Review	Type of Intervention	Effects	Number of Primary Studies
MAM	Product	Gera et al. 2017	LNS (RUSF or RUTF) vs other specially formulated foods	No effect	2 
SAM	Product	Schoonees et al. 2019	RUTF in home-based management vs alternative dietary approaches	No effect	1 

SOURCE: Authors.

Figure 9. Summary of quality assessment of the included systematic reviews assessed with AMTSAR 2 checklist

Review	AMSTAR 2 Item																Confidence
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Bassey et al. 2020	YES	YES	NO	PARTIAL YES	YES	YES	NO	PARTIAL YES	YES	NO	YES	YES	YES	YES	YES	YES	Low
Dangour et al. 2013	YES	YES	NO	YES	YES	YES	YES	YES	YES	NO	YES	NO	NO	YES	NO	YES	Critically low
Das et al. 2020	YES	PARTIAL YES	NO	YES	YES	YES	NO	NO	YES	NO	YES	NO	NO	NO	NO	YES	Critically low
Das et al. 2019	YES	PARTIAL YES	NO	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	YES	NO	YES	Critically low
Durao et al. 2020	YES	PARTIAL YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	YES	Low
Gera et al. 2016	YES	PARTIAL YES	NO	PARTIAL YES	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO	YES	Critically low
Gera et al. 2017	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	NO	YES	Low
Gera, Shah, Sachdev 2019	YES	NO	NO	YES	YES	YES	NO	PARTIAL YES	YES	NO	NO	NO	NO	NO	YES	YES	Critically low
Goudet et al. 2019	NO	PARTIAL YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	Low
Hossain et al. 2017	YES	NO	NO	PARTIAL YES	YES	YES	NO	NO	PARTIAL YES	NO	YES	NO	YES	NO	NO	YES	Critically low
Janmohamed et al. 2020	NO	PARTIAL YES	NO	YES	YES	YES	NO	NO	YES	NO	YES	YES	NO	NO	NO	YES	Critically low
Kristjansson et al. 2015	YES	PARTIAL YES	NO	PARTIAL YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	YES	NO	YES	Critically low
Lagarde, Haines, Palmer 2009	YES	PARTIAL YES	YES	YES	YES	YES	NO	NO	YES	NO	NA	NA	YES	NO	NO	YES	Critically low
Lassi et al. 2020	YES	PARTIAL YES	NO	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	NO	YES	Low
Lazzerini, Rubert, Pani 2013	YES	PARTIAL YES	NO	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	YES	NO	YES	Critically low
Lenters et al. 2013	YES	NO	NO	YES	YES	YES	NO	NO	PARTIAL YES	NO	YES	NO	NO	NO	NO	YES	Critically low
Li et al. 2019	NO	NO	YES	PARTIAL YES	NO	YES	NO	NO	NA	NO	NO	NO	YES	YES	YES	YES	Critically low
Majamanda et al. 2014	NO	PARTIAL YES	NO	PARTIAL YES	NO	NO	NO	YES	NO	NO	NA	NO	NO	NO	NO	YES	Critically low
Odigwe et al. 2010	YES	PARTIAL YES	NO	YES	YES	YES	NO	YES	YES	YES	YES	NO	NO	YES	NO	YES	Critically low
Panjwani, Heidkamp 2017	NO	NO	NO	PARTIAL YES	NO	NO	NO	NO	PARTIAL YES	NO	YES	NO	NO	NO	NO	NO	Critically low
Pega et al. 2015	YES	PARTIAL YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	NO	NO	YES	Low
Pradhan et al. 2016	YES	YES	NO	PARTIAL YES	YES	YES	NO	YES	NA	NO	NA	NA	NO	YES	NO	YES	Critically low
Schoonees et al. 2019	YES	PARTIAL YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	NO	YES	Critically low
Sguassero et al. 2012	YES	PARTIAL YES	NO	YES	YES	YES	YES	YES	YES	NO	NO	NO	NO	YES	NO	YES	Critically low
Shapiro et al. 2016	YES	YES	NO	PARTIAL YES	YES	NO	NO	PARTIAL YES	PARTIAL YES	NO	NA	NA	NO	NO	NA	YES	Critically low
Sharma et al. 2021	YES	YES	NO	PARTIAL YES	YES	YES	NO	NO	NO	NO	NA	NA	NO	NO	NA	YES	Critically low
Suchdev et al. 2020	YES	PARTIAL YES	NO	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	YES	YES	YES	Critically low
Tam et al. 2020	YES	PARTIAL YES	NO	YES	YES	YES	NO	YES	YES	NO	YES	NO	NO	YES	YES	YES	Critically low
Witter et al. 2012	YES	PARTIAL YES	YES	YES	YES	YES	YES	YES	YES	NO	NA	NA	YES	NO	NA	YES	Moderate
Xu et al. 2019	YES	NO	NO	PARTIAL YES	YES	YES	NO	NO	NO	NO	YES	YES	NO	NO	NO	YES	Critically low

SOURCE: Authors.

■ Yes
 ■ Partial Yes
 ■ No
 ■ NA

Final thoughts

Impact evaluations of interventions/programs that target child wasting in LMICs remains largely focused on the effectiveness of prevention and treatment. While the existing systematic reviews provide useful insights on how to prevent and treat wasting, they are unlikely on their own to identify sufficient solutions for the large burden of child wasting. More experimental studies are urgently needed on how to address the intermediate steps of screening, diagnosis, and referral in the continuum of care of child wasting. Such new evidence needs to be summarized in well-conducted systematic reviews to issue much needed recommendations and guidelines.

Evidence on the prevention of child wasting suggests the following interventions are effective:

- Nutrition education, if delivered through a combination of community health worker/peer-counsellor home visit and mother/peer group platform.
- LNS supplementation combined with complementary feeding.
- Cash transfers in the specific context of humanitarian disasters.

For treatment of wasting, specially formulated foods have shown their efficacy in recovery from MAM (CSB++, RUSF, or RUTF) and SAM (RUTF), and also reduce the risk of default. For the inpatient management of SAM cases, the WHO guideline has proven to effectively reduce the risk of mortality.

In children under six months of age, although exclusive breastfeeding has been shown to be effective in the prevention of malnutrition, a knowledge gap remains on effective interventions/programs for the management of wasting in this specific age group. Similarly, only one review reported on wasting in the context of an emergency (natural disaster).

Overall, given the low quality of the reviews, we cannot rule out possible bias in the findings. Also, for several interventions, the strength of the findings requires strengthening with a larger number of primary studies. Therefore, more high-quality primary studies evaluating the impact of interventions/programs along the continuum of care for wasting are needed to better understand how to effectively tackle child wasting in LMICs. Interventions/programs to improve the missing link of effective screening, diagnosis, and referral need to be evaluated urgently.

Abbreviations

CSB	corn-soya blend
IFPRI	International Food Policy Research Institute
IRAM	Integrated Research on Acute Malnutrition in the Sahel
LMIC	low- or middle- income countries
LNS	lipid-based nutrient supplement
MAM	moderate acute malnutrition
MMN	multiple micronutrient supplementation
MNP	multiple micronutrient powder
N3 PUFA . . .	n-3 polyunsaturated fatty acid
RUSF	ready-to-use supplementary food
RUTF	ready-to-use therapeutic food
SAM.	severe acute malnutrition
WASH	water, sanitation, and hygiene
WHO.	World Health Organization
WHZ	weight-for-height Z-score

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