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# Management of Moderate Wasting Using Local Foods

Documentation of Approaches in Nigeria, Senegal, and Uganda



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Photo Credit: Gloria Nabaasa, consultant for USAID Advancing Nutrition

A child consumes a nutritious *kitoobero* meal made from locally available ingredients in Masaka District, Uganda. This work is supported by Caritas MADDO.

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# Contents

<b>Acknowledgments</b> .....	<b>viii</b>
<b>Acronyms</b> .....	<b>ix</b>
<b>Introduction</b> .....	<b>1</b>
<b>Background and Rationale</b> .....	<b>1</b>
Literature on the Use of Local Foods for Managing Moderate Wasting.....	2
Objectives and Research Questions.....	4
<b>Methodology</b> .....	<b>5</b>
<b>Approach Selection</b> .....	<b>5</b>
Data Collection Methods and Sources.....	6
Site and Key Informant Selection.....	6
Analysis.....	8
Limitations.....	9
Ethical Considerations.....	9
<b>Structure of this Report</b> .....	<b>10</b>
<b>Overview of Selected Case Studies</b> .....	<b>11</b>
<b>Nigeria</b> .....	<b>11</b>
<b>Senegal</b> .....	<b>12</b>
<b>Uganda</b> .....	<b>12</b>
<b>Comparing Local Food-Based Approaches with TSFP</b> .....	<b>14</b>
<b>Program Delivery</b> .....	<b>14</b>
Target Population.....	14
Admission Criteria.....	14
Discharge Criteria.....	15
Length of Stay in the Program.....	15
Ration Type and Feeding Method.....	15
<b>Nutritional Value of Recipes</b> .....	<b>19</b>
Global Standards for Supplement Composition.....	19
Analysis of SFF Composition.....	21
Analysis of Local Food-Based Recipes.....	23
Fortification of Local Food-Based Recipes.....	23
<b>Program Outcomes</b> .....	<b>24</b>
<b>Synthesis of Findings</b> .....	<b>27</b>
<b>Program Design</b> .....	<b>27</b>

Impact of Program Duration and Mix of Interventions on Outcomes .....	27
Ration Types.....	29
<b>Assessing and Interpreting the Nutritional Value of Recipes .....</b>	<b>31</b>
Limitations of Assessment Using NutVal.....	31
Inconsistent Global Guidance on Nutritional Needs of Moderately Wasted Children.....	31
<b>Contextual Considerations .....</b>	<b>32</b>
Food Security and Market Availability.....	32
Availability and Coverage of TSFP.....	32
Referrals to Treatment for Severe Wasting.....	33
Community-Based Nature of the Program Designs.....	33
<b>Discussion and Way Forward.....</b>	<b>34</b>
<b>Apply More Rigorous Monitoring of Program Outcomes.....</b>	<b>34</b>
<b>Develop Clearer Guidance on the Minimum Nutrition Composition of Recipes that use Local Foods to Manage Moderate Wasting.....</b>	<b>35</b>
<b>Undertake More Non-Inferiority Studies to Compare the Effectiveness of Local Foods with Commercially Prepared SFFs.....</b>	<b>35</b>
<b>Study the Benefits of Complementary Activities .....</b>	<b>36</b>
<b>Conduct Costing Studies to Better Understand Tradeoffs Between Program Duration, Outcomes, and Cost .....</b>	<b>36</b>
<b>Convene a Global Consultation on Local Food-Based Approaches for Managing Moderate Wasting .....</b>	<b>37</b>
<b>Update the NutVal Tool.....</b>	<b>37</b>
<b>References.....</b>	<b>38</b>
<b>Annex I: Tom Brown, Nigeria.....</b>	<b>42</b>
<b>Program Design.....</b>	<b>42</b>
Local Food-Based Recipe and Ration .....	43
At-Home Preparation and Feeding.....	44
Sourcing and Storing the Local Foods .....	45
Fortification .....	46
Program Enrollment and Discharge Criteria.....	46
Program Duration.....	47
Procedures for Non-Responders.....	47
<b>Implementation Challenges .....</b>	<b>49</b>
Household Sharing of Take-Home Ration .....	49
Quality of Program Inputs.....	49



Time to Produce the Tom Brown Flour .....	49
Security and Seasonal Access .....	50
<b>Additional Benefits and Facilitating Factors.....</b>	<b>50</b>
<b>Contextual Considerations .....</b>	<b>50</b>
Availability of Existing Wasting Treatment Services.....	50
Population Density and Moderate Wasting Prevalence.....	50
Functional Local Markets and Availability of Other Key Infrastructure.....	50
<b>Annex 2: Porridge Mum, Nigeria.....</b>	<b>52</b>
<b>Program Design.....</b>	<b>52</b>
Local Food-Based Recipe and Ration .....	53
Preparation and Feeding.....	54
Sourcing and Storing the Local Foods .....	54
Program Enrollment and Discharge Criteria .....	54
Program Duration.....	55
Procedures for Non-Responders.....	55
<b>Implementation Challenges .....</b>	<b>55</b>
Ongoing Access to Kitchens .....	55
Cash and Voucher Transfers.....	55
Population Movement and Insecurity .....	55
Food Sharing.....	56
Barriers to Behavior Change.....	56
<b>Additional Benefits and Facilitating Factors.....</b>	<b>56</b>
<b>Contextual Considerations .....</b>	<b>56</b>
Presence of an Existing FSL or Cash/Voucher Transfer Mechanism .....	56
Kitchen Construction.....	57
<b>Annex 3: Local Flour Production, Senegal .....</b>	<b>58</b>
<b>Program Design.....</b>	<b>58</b>
USAID/Neema .....	58
Feed the Future Kawolor .....	58
Projet de Renforcement de la Nutrition .....	58
Local Food-Based Recipe and Ration .....	59
Preparation and Feeding.....	59
Sourcing and Storing the Local Foods .....	60
Program Enrollment and Discharge Criteria.....	60

Program Duration.....	60
Procedures for Non-Responders.....	60
<b>Implementation Challenges .....</b>	<b>60</b>
Financing of Flour Production .....	60
Ensuring Minimum Production Standards Are Met.....	61
<b>Additional Benefits and Facilitating Factors.....</b>	<b>61</b>
<b>Contextual Considerations .....</b>	<b>61</b>
Integrated Programming to Facilitate Flour Production .....	61
Strong Community Networks .....	62
<b>Annex 4: METU-1, Uganda.....</b>	<b>63</b>
<b>Program Design.....</b>	<b>63</b>
Local Food-Based Recipe and Ration .....	64
Preparation and Feeding.....	64
Sourcing and Storing the Local Foods .....	65
Program Enrollment and Discharge Criteria .....	65
Program Duration.....	65
Procedures for Non-Responders.....	65
<b>Implementation Challenges .....</b>	<b>66</b>
Enrollment and Retention .....	66
Access to Raw Materials.....	66
<b>Additional Benefits and Facilitating Factors.....</b>	<b>66</b>
<b>Contextual Considerations .....</b>	<b>67</b>
Availability of Food Items .....	67
<b>Annex 5: Multi-Nutrient Dense Mix (Kitoobero), Caritas MADDO .....</b>	<b>68</b>
<b>Program Design.....</b>	<b>68</b>
Local Food-Based Recipe and Ration .....	69
Preparation and Feeding.....	69
Sourcing and Storing the Local Foods .....	70
Program Enrollment and Discharge Criteria .....	70
Program Duration.....	70
Procedures for Non-Responders.....	70
<b>Implementation Challenges .....</b>	<b>71</b>
Educating Community Members on the Causes of Wasting .....	71
Compensation and Motivation of VHTs.....	71

<b>Additional Benefits and Facilitating Factors</b> .....	<b>71</b>
<b>Contextual Considerations</b> .....	<b>72</b>
Household Food Security.....	72
Strong Network of Community-Based Volunteers .....	72
<b>Annex 6: Nutrition Education Centers, Iowa State University Uganda Program</b> .....	<b>73</b>
<b>Program Design</b> .....	<b>73</b>
Local Food-Based Recipe and Ration .....	74
Preparation and Feeding.....	74
Sourcing and Storing the Local Foods .....	75
Program Enrollment and Discharge Criteria .....	75
Program Duration.....	76
Procedures for Non-Responders.....	76
<b>Implementation Challenges</b> .....	<b>76</b>
Poor Access to Safe Water .....	76
Unreliable Referral Services .....	76
Stigma Associated with Going to the NEC.....	76
<b>Additional Benefits and Facilitating Factors</b> .....	<b>77</b>
<b>Contextual Considerations</b> .....	<b>77</b>
Integration with Agriculture and Livelihoods Programming.....	77
Availability of Local Food Inputs.....	77
<b>Annex 7: Full Nutrition Analyses, by Country</b> .....	<b>78</b>
<b>Annex 8: Recipes and Rations</b> .....	<b>84</b>
<b>Nigeria</b> .....	<b>84</b>
<b>Senegal</b> .....	<b>86</b>
<b>Uganda</b> .....	<b>87</b>

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## Implementing organizations:

### In Nigeria:

- Action Against Hunger
- Catholic Relief Services
- Premiere Urgence Internationale
- Save the Children

### In Senegal:

- ChildFund
- Conseil National de Développement de la Nutrition (CNDN)
- Helen Keller International
- JSI Research & Training Institute, Inc. (JSI)
- National Cooperative Business Association CLUSA International (NCBA CLUSA)
- Plan International
- Union Nationale des Femmes Restauratrices du Sénégal (UNAFRES)

### In Uganda:

- Andre Foods International
- Caritas MADDO
- Iowa State University Uganda Program (ISU-UP)



# Acronyms

AAH	Action Against Hunger
AFI	Andre Foods International
BHA	Bureau for Humanitarian Assistance
BMI	body mass index
Caritas MADDO	Caritas Masaka Diocesan Development Organization
CMAM	community-based management of acute malnutrition
CNDN	Conseil National de Développement de la Nutrition (National Nutrition Development Council)
CNM	community nutrition mobilizer
CRS	Catholic Relief Services
CSB	corn-soya blend
CSRL	Center for Sustainable Livelihoods
FBF	fortified blended foods
FCT	Federal Capital Territory
FSL	food security and livelihoods
g	gram
GAM	global acute malnutrition
GIE	groupement d'intérêt économique (economic interest group)
GREENCODE	Green Concern for Development
IMAM	integrated management of acute malnutrition
IPC	Integrated Food Security Phase Classification
ISU-UP	Iowa State University Uganda Program
IYCF	infant and young child feeding
JSI	JSI Research & Training Institute, Inc.
kg	kilogram
KII	key informant interview
km	kilometer
LGA	local government area
LIBS	local ingredients-based supplement
MAM	moderate acute malnutrition
METU-I	Malnutrition Eradication Therapy in Uganda-I
mg	milligram

mm	millimeter
MNP	micronutrient powder
MOH	Ministry of Health
MSAS	Ministère de la Santé et de l'Action Sociale
MUAC	mid-upper arm circumference
NCBA CLUSA	National Cooperative Business Association CLUSA International
NEC	Nutrition Education Center
NGN	Nigerian Naira
NGO	nongovernmental organization
PHC	primary health care
PLW	pregnant and lactating women
PRN	Programme de Renforcement de la Nutrition (Nutrition Strengthening Program)
PUI	Premiere Urgence Internationale
RUSF	ready-to-use supplementary food
RUTF	ready-to-use therapeutic food
SFFs	specially formulated foods
SMILE	Sustainable Mechanisms for Improving Livelihoods and Household Empowerment
SPB	sorghum peanut blend
TFC	therapeutic feeding center
TSFP	targeted supplementary feeding program
UNICEF	United Nations Children's Fund
UREN-C	Unité de Réhabilitation et d'Education Nutritionnelle – Communautaire (Nutritional Rehabilitation and Education Unit - Community)
USAID	U.S. Agency for International Development
VHT	village health team
WASH	water, sanitation, and hygiene
WFH	weight-for-height
WFL	weight-for-length
WFP	World Food Programme
WHO	World Health Organization
WHZ	weight-for-height z-score

# Introduction

Undernutrition contributes to an estimated 45 percent of deaths of children under 5 years of age. As much as 12.6 percent of those deaths are caused by wasting, an acute form of malnutrition (Black et al. 2013). In the past, much of the global attention to wasting was focused on its severe form because these children are at a higher risk of death. However, the number of children with moderate wasting is significantly higher and managing it effectively is an important way to prevent moderate wasting from turning into severe wasting and corresponding mortality. According to the 2023 Joint Child Malnutrition Estimates, globally, 45 million (6.8 percent) children under 5 experience wasting. Of this number, 31.3 million children have moderate wasting, representing 70 percent of all wasted children (UNICEF, WHO, World Bank Group 2023). Due to the economic and food security impacts caused by the ongoing COVID-19 pandemic, the number of wasted children is estimated to increase to 60 million (Osendarp et al. 2021). With the conflict in Ukraine further exacerbating economic and food security issues, more children will continue to be at risk of wasting.

## Background and Rationale

Until the release of the *World Health Organization (WHO) guideline on the prevention and management of wasting and nutritional oedema (acute malnutrition) in infants and children under 5 years* in June 2023, there was no global guidance to address moderate wasting. Countries either included moderate wasting programming in their national guidelines or referenced the *Moderate Acute Malnutrition (MAM): A Decision Tool For Emergencies* (MAM Decision Tool), which was developed in 2012 (updated in 2017) by the Global Nutrition Cluster MAM Task Force to help guide practitioners on program design, modality selection (e.g., cash/voucher, food supplement, or behavior change intervention), and targeting in emergency settings (GNC 2017). The MAM Decision Tool recommends the use of specially formulated foods (SFFs) including ready-to-use supplementary food (RUSF) and fortified blended food (FBF), such as SuperCereal Plus or SuperCereal blended with oil and sugar (Global Nutrition Cluster 2017) for addressing moderate wasting. Although this tool is meant to be used primarily in emergency settings, it remains one of the few comprehensive guidance documents available to inform moderate wasting programming.

Much of the experience addressing moderate wasting has been in food insecure or emergency settings and has, therefore, used commercially produced and typically imported SFFs rather than local foods to manage cases, as previously recommended by WHO for these types of settings. Services to address moderate wasting are one component of the community-based management of acute malnutrition (CMAM) approach. As part of CMAM, children with severe wasting and no medical complications are treated at home using ready-to-use therapeutic food (RUTF), children with severe wasting and medical complications receive inpatient care using therapeutic milk, and moderately wasted children are managed through targeted supplementary feeding programs (TSFP) (WHO 2020). TSFP uses SFFs such as RUSF and FBFs. However, due to the high need for services coupled with limited capacity and funding, in many places TSFP is not available or SFF supply availability may be intermittent or unreliable.

Guidance remains limited on what to do should none of these specialized products be readily available in food insecure settings and on the use of locally available foods to address moderate wasting. In the absence of global guidance, practitioners have developed many innovative approaches to address moderate wasting using locally available foods in the permanent or temporary absence of standard TSFP programs and SFFs. However, there is a lack of minimum standards to establish parameters for non-inferiority for these approaches, insufficient global guidance on how these approaches should be designed and implemented, and if and how they should be used alongside TSFP that uses commercially produced SFFs.

## Literature on the Use of Local Foods for Managing Moderate Wasting

There is little peer-reviewed literature that discusses addressing moderate wasting in a TSFP setting and even less on the use of local foods for moderate wasting management. A recent systematic review and meta-analysis looked at studies comparing the effectiveness of counseling versus food-based approaches to manage moderate wasting and found that the available evidence focused on a comparison of commercially available SFFs. Neither review included articles that measured the effectiveness of locally available foods for managing moderate wasting (Gluning et al. 2021; Lelijveld et al. 2019). We conducted a literature review using Google Scholar to identify additional peer reviewed literature describing the use of locally available foods to address moderate wasting. We found papers describing seven different approaches in seven countries, summarized in table 1. We only included papers where it was clear that the local foods being used were prepared at the community level and not commercially. The articles are primarily focused on the development and nutrient composition of recipes, acceptability, and effectiveness or non-inferiority of the recipes. We identified one costing study. Overall, information on the programmatic application of these local food-based approaches to manage moderate wasting is limited.

### Defining Treatment with Locally Available Foods

For the purposes of the literature review and the selection of the case study approaches, we defined management of moderate wasting with locally available foods as any approach that uses a recipe that is made from locally sourced ingredients either in a group setting in the community or at household level. We did not include local commercially produced products such as a locally produced FBF or RUSF because they are not readily available in communities and often still rely on imported ingredients (such as micronutrient powder [MNP] or milk powder).

**Table 1. Peer Reviewed Articles on Use of Locally Available Foods for Management of Moderate Wasting**

Country and Reference(s)	Approach	Study Type(s)	Result(s)
Benin Nago, E et al., 2020	Fortification of sorghum-based porridge with moringa leaf powder and baobab fruit pulp.	Effect of fortified food on nutritional status.	No significant effect on weight gain between intervention and control groups.
Cameroon Teta, I et al., 2023	Bi-weekly provision of locally available foods using food vouchers.	Prospective study.	Recovery rate of moderately wasted children in the voucher program met Sphere minimum standards (78.3 percent cured).
Ethiopia Nane, D et al., 2020 and 2021	Local ingredients-based supplement (LIBS) made from pumpkin seed, peanut, amaranth grain, flaxseed, emmer wheat, and cane sugar. Provided with oil.	Documentation of development of LIBS.  Randomized non-inferiority trial.	LIBS was found to be non-inferior to corn-soya blend plus (CSB+) with oil.

Country and Reference(s)	Approach	Study Type(s)	Result(s)
<p>Indonesia Purwestri, RC et al., 2012 Fetriyuna F et al., 2021</p>	<p>Locally produced ready-to-use biscuits (RUF-Nias). Biscuits are produced at the community level at nutrition centers.</p>	<p>Cost analysis of daily versus weekly program design.</p> <p>Nutritional analysis and sensory evaluation of different biscuit recipes.</p>	<p>Institutional costs were similar for both programs. Recovery rates were higher (78.6 percent versus 65.4 percent) for the daily program, but community members preferred the weekly model.</p> <p>There was a high level of acceptance of the biscuits and their macronutrient composition met standards for moderately wasted children. However, the study recommended the biscuits be fortified with micronutrient premix.</p>
<p>Iraq Marzoog, AS et al., 2020</p> <p>Tanzania Marchini, M et al., 2020.</p>	<p>Locally prepared homemade foods (four different recipes) with micronutrient supplementation.</p> <p>Pappa di Parma, energy-dense meals using locally available foods and basic technologies.</p>	<p>Cross-sectional study.</p> <p>Nutritional analysis, assessment of quality characterization, rheological properties, shelf-stability under different storage conditions, and cultural acceptance and economical sustainability. Assessed against RUTF energy requirements although the target population was moderately wasted children.</p>	<p>Overall recovery rate of 86.8 percent. Includes both children with severe and moderate acute malnutrition.</p> <p>One formula met RUTF requirements, two were close. Meals were found to be culturally accepted and economically sustainable.</p>

Country and Reference(s)	Approach	Study Type(s)	Result(s)
Uganda Amegouv, A 2013, 2014a, and 2014b	Sorghum peanut blend (SPB), using ghee and honey.	Development of SPB recipe and nutritional analysis.  Sensory acceptability study.  Cluster randomized controlled efficacy trial.	Found to be non-inferior to CSB+. Recovery rates were not significantly different (82.3 percent for SPB and 76.8 percent for CSB+). SPB was found to be acceptable with quantities consumed above 75 percent and allergic and intolerance cases below 10 percent.

### Objectives and Research Questions

Practitioners and donors need to better understand the variety of local food-based approaches in use to manage moderate wasting. The objective of these case studies is to document how approaches using locally available foods to manage moderate wasting are implemented in different contexts and to understand the results of those efforts as a contribution to ongoing global efforts to develop programmatic guidance to better address moderate wasting. These case studies examined the following questions:

1. What are the contextual factors (e.g., availability of and access to local foods) that influence the success or appropriateness of the approach in different settings?
2. How do local food-based program structures differ from TSFP that follow the generic moderate wasting management protocol in terms of core program components, admission and discharge criteria, referral and follow-up procedures, and reporting on outcomes (e.g., percent of children cured, died, defaulted)?
3. What types of locally available foods are used to manage children with moderate wasting and how does the nutritional value of the ration/recipe compare to the SFF standards set by the World Food Programme (WFP)?



Children consume porridge made with flour produced by a Debbo Galle group. These groups were supported by the Feed the Future Kawolor project and continue at many of the project's former implementation sites with support from other actors.

Photo Credit: Clement Tardif, Feed the Future



# Methodology

## Approach Selection

To select the approaches for the case studies, we undertook a mapping exercise and desk review to better understand the range of programming approaches that use local foods to manage moderate wasting.

First, we developed an online, Google Forms-based survey that was disseminated through five global nutrition listservs/websites and directly shared with 11 individuals from nongovernmental organizations (NGOs) and donor organizations with experience in wasting management programming for further dissemination through their personal and professional networks. The mapping survey questions are presented in Annex 1.

The survey was open from January 19–February 1, 2022, and available in English, French, and Spanish. We received a total of 196 responses (159 English, 27 French, 10 Spanish). Responses were then screened and removed if the responses indicated that they did not use locally available foods for moderate wasting management (e.g., it was a prevention program or used a commercially available product such as RUSF), the program had not been implemented since before 2016, or the response did not provide enough information for us to confirm its relevance.

After this screening we were left with 64 responses that were reviewed in greater detail, including online searches for additional information. We also received documentation of four additional approaches via email that were included in this in-depth review stage.

The final selection of the case studies was based on ensuring geographic and contextual diversity (e.g., emergency and development contexts) and in consultation with the USAID Bureau for Humanitarian Assistance (BHA), based on anticipated future emergency nutrition needs. The selection of the two of the case study approaches in Nigeria was made during the activity design phase, prior to the mapping survey. Table 2 summarizes the selected case examples.

**Table 2. Selected Countries, Approaches, and Implementing Organizations**

Country	Project/Approach	Implementing Organizations
Nigeria	Tom Brown	Catholic Relief Services (CRS), Save the Children, Première Urgence Internationale (PUI)
	Porridge Mum	Action Against Hunger (AAH)
Senegal	Programme de Renforcement pour la Nutrition (Strengthening Nutrition Program [PRN]), locally produced flour	USAID/Neema, Helen Keller International <sup>1</sup> Feed the Future Kawolor, National Cooperative Business Association CLUSA International (NCBA CLUSA) and Helen Keller International
Uganda	Multi-nutrient dense mix ( <i>kitoobero</i> )	Caritas Masaka Diocesan Development Organization (Caritas MADDO)

<sup>1</sup> The USAID/Neema and Feed the Future Kawolor projects were no longer operating at the time of data collection. However, we consulted with the former implementing organizations to select past project sites to see the continuity of programming in the absence of organizational support. Support to these sites is now provided by either community-based organizations as part of the PRN program or by NGOs. NGO-supported sites in our sample were supported by ChildFund and Plan International.

Country	Project/Approach	Implementing Organizations
	Malnutrition Eradication Therapy in Uganda-I (METU-I)	Andre Foods International (AFI)
	Nutrition Education Centers	Iowa State University Uganda Program (ISU-UP)

### Data Collection Methods and Sources

We used a mix of primary and secondary data sources to produce the case studies. First, a team of locally recruited consultants completed a desk review of available documentation provided by the selected implementing organizations, including guidance documents and/or protocols, job aids, data collection and reporting tools, reports, and evaluations. Primary data collection consisted of qualitative key informant interviews (KIIs) with staff from the implementing organizations, including, if possible, those who supported the original design of the approach. We designed generic KII guides that were contextualized for each approach, based on the information gathered during the desk review.

The consultants visited a convenience sample of service delivery sites for each selected approach and completed an observation checklist documenting the services provided and other program considerations, such as observance of food safety and hygiene practices and, in cases where on-site feeding was done, noting approximately how much of the provided portion was consumed by the children. We did not conduct KIIs or focus group discussions with the caregivers of enrolled children.

### Site and Key Informant Selection

We used convenience sampling for site selection, taking into consideration the ease of access and security situation of the implementation areas. We targeted three program sites per implementing organization; however, in some cases we were unable to reach this target based on the number of active sites in the implementation areas. Across the three countries, the consultants visited a total of 18 sites. Although we used convenience sampling, whenever possible, we selected sites that would capture the geographic diversity of the program coverage area (e.g., different administrative zones, livelihood zones, or variations in context). Table 3 summarizes the sites selected in each country, by approach. We used convenience and snowball sampling to identify key informants in each of the categories noted in table 4. For each approach, we spoke with the implementing organization and/or government staff responsible for implementing and/or overseeing the approaches at the site level. Whenever possible we also spoke to organization staff that played a role in the original design of the approaches to better understand how the approaches have evolved over time and the original needs they were trying to address. Lastly, if scheduling allowed, we also spoke with WFP and/or national-level Ministry of Health staff to better understand the approach to moderate wasting management and the use of local foods in each country.

**Table 3. Site Selection**

Country	Approach, Organization	Region	State/District	Total Sites Visited
Nigeria	Tom Brown, CRS	North East Region	Borno State, Magumeri local government area (LGA)	3
	Tom Brown, PUI		Borno State, Jere LGA	0 <sup>2</sup>
	Tom Brown, Save the Children		Borno State, Jere LGA	2
	Porridge Mum, AAH		Borno State, Maiduguri and Monguno LGAs	0 <sup>3</sup>
	Total sites in Nigeria			5
Senegal	Locally produced flour, <sup>4</sup> PRN	Saint-Louis	Pété	1
			Richard Toll	1
			Saint-Louis	1
		Ziguinchor	Bignona	2
	Locally produced flour, ChildFund	Sédhiou	Goudomp	1
	Total sites in Senegal			6
Uganda	METU-I, AFI	Karamoja Region	Kotido district	1
			Nabiatuk district	1
	Nutrition Education Centers, ISU-UP	Eastern Region	Kamuli district	3
	Multi-nutrient dense mix (kitoobero), Caritas MADDO	Central Region	Bukomansimbi district	1
			Masaka district	1
	Total sites in Uganda			7
<b>Total sites</b>				<b>18</b>

<sup>2</sup> The consultant traveled to Jere LGA and met with program staff. However, at the time of the visit we were informed that active Tom Brown sites in this LGA had been closed due to funding limitations.

<sup>3</sup> We attempted to visit AAH Porridge Mum sites in Maiduguri and Monguno LGAs but were unable to complete the site visits as programming had ended before the visits took place.

<sup>4</sup> Five of the six sites were under the PRN program. PRN sites in Saint-Louis were supported by Plan International. One site in Bignona operates without partner support and reports to PRN. Although not part of PRN, ChildFund still transmits reports from its sites to PRN.

**Table 4. Key Informant Interview Sampling**

Country	Approach, Organization	Implementing Organization Staff	Ministry of Health	WFP	Other	Total
Nigeria	Tom Brown, CRS	2	2	0 <sup>5</sup>	n/a	10
	Tom Brown, PUI	2				
	Tom Brown, Save the Children	2				
	Porridge Mum, AAH	2				
Senegal	USAID/Neema, Helen Keller International	2	1	1	1 (private sector)	6
	PRN, Plan International	1				
	PRN, ChildFund	1				
Uganda	METU-1, AFI	3	5	1	n/a	17
	Nutrition Education Centers, ISU-UP	6				
	Multi-nutrient dense mix (kitoobero), Caritas MADDO	2				
<b>Total KIIs</b>						<b>33</b>

## Analysis

The audio recorded KIIs were transcribed using an external transcription service. Interviews were transcribed in their original languages (English and French). Notes taken during the interviews were used in addition to the transcripts. Consultants reviewed and compiled information from the desk review and KIIs to provide detailed descriptions of the approach design, implementation, and context-specific information, challenges, and opportunities relevant to the replication or scale-up of the approaches.

We used several approaches to compare the local food-based approaches with standard TSFP. We used the 2018 Training Guide for CMAM as the standard of care for moderate wasting against which we compared the selected locally based food approaches (FANTA 2018). This document was selected over other generic guidelines, which have not been as recently updated and, therefore, do not consider the most recent available evidence on moderate wasting management.<sup>6</sup> Where appropriate, we also noted if the implementation of the selected approaches deviated from the countries' national CMAM protocols, including if the local food-based recipes and rations were included in any of the countries' national guidelines.

<sup>5</sup> We consulted with WFP and Nutrition Cluster staff as part of the protocol refinement process for Nigeria but we did not hold formal interviews with WFP or other UN staff as part of data collection.

<sup>6</sup> At the time of the case study design the 2023 WHO guidance update had not yet been released. The training materials from 2018 take into account the 2013 WHO guidance updates, which at the time of design were the most recent.

We also assessed the nutritional adequacy of the recipes used and compared them to the 2023 WHO guidance on total daily energy requirements for anthropometric recovery from moderate wasting. Additionally, we looked at the specific daily nutrient requirements for moderately wasted children, as presented in the 2012 WHO *Technical note: Supplementary foods for the management of moderate acute malnutrition in infants and children 6–59 months of age*, which is the guidance still referenced in the updated 2023 WHO guidelines. We assessed the nutritional value of the recipes using NutVal software. For food items not included in the NutVal database, we manually entered the items using values from the food composition tables appropriate to the country, including the West Africa Food Composition Table (Vincent et al. 2020) and Kenya’s Food Composition Table (Food and Agriculture Organization of the United Nations; Ministry of Health, Republic of Kenya; and Ministry of Agriculture and Irrigation, Republic of Kenya 2018). We also included the nutrition composition of the following SFFs, using published product standards from either WFP or USAID (standards used are cited next to each product): RUSF (WFP 2021); CSB+ with oil (USAID n.d. [a]; USAID n.d. [b]); and SuperCereal+ (WFP 2014).

Lastly, if program outcome information was collected by the implementing organizations, we compared data on cured, died, and defaulted rates against Sphere standards for moderate wasting management (Sphere Association 2018): cured: >75 percent; died: <3 percent; and defaulted: <15 percent. Information on length of stay, deterioration, and referral for severe wasting treatment during enrolment and relapse was also reviewed, if available, but not compared against a global benchmark, as these indicators can vary greatly depending on context.

## Limitations

We were unable to visit implementation sites for two of the implementing organizations, PUI and AAH, in Nigeria due to closure of the sites prior to our scheduled visits. These site visits were delayed due to security precautions ahead of the 2023 elections. We did not speak to the caregivers of children under 5 enrolled in any of the selected programs/approaches. We therefore were not able to include their perspectives on the quality of the services as part of our case studies.

NutVal does not include all the key nutrients included in the WHO guidance on proposed nutrient composition of supplementary foods for use in the management of moderate wasting in children. Missing nutrients include vitamin B7 (biotin), iodine, potassium, phosphorus, or sodium. Additionally, this guidance and NutVal exclude some key nutrients such as carbohydrates, fiber, and sugar. Therefore, these items are not included in our analysis despite their importance in understanding the composition of the recipes used. Additionally, NutVal does not include all local foods in its database. In these circumstances we had to find and manually add values for some local foods using food composition tables.

Not all the implementing organizations collect routine information on program outcomes. We were therefore unable to compare this information against Sphere standards for all the selected approaches. In some cases, only old data was available but was still used for comparison purposes.

Given that this study used qualitative methods and purposive sampling, the results are not necessarily representative or generalizable. However, the findings provide deep insights into programmatic challenges of relevance to other stakeholders implementing similar programs and approaches.

## Ethical Considerations

Because this activity involved primary data collection, we submitted it to JSI’s Institutional Review Board for review and received an exemption. We developed informed consent scripts in English that were also translated into French, for use in Senegal. Verbal informed consent was obtained before each KII and before completing the observation checklists.



Further ethical review and approval was not required in Nigeria. However, we shared the study protocol with the Nigeria Nutrition Cluster for their inputs before proceeding with data collection. In Senegal, this study was approved by the National Health Research Ethics Committee (Comité National d’Ethique pour la Recherche en Santé). In Uganda, this study was approved by Makerere School of Public Health Research Ethics Committee and was registered (reg no. HS2663ES) with the Uganda National Council of Science and Technology as per national guidelines for conducting research in Uganda.

## Structure of this Report

In this report, we first present an overview of the implementation contexts in Nigeria, Senegal, and Uganda and selected approaches in each country. Full descriptions of each approach, including the basic program design, challenges, and implementation considerations identified through document review or shared by key informants are presented in Annexes 1–6. In the “Program Performance” section, we compare the documented approaches with a typical TSFP program. Lastly, we discuss broader lessons learned, programming implications, and areas for additional documentation and research in the “Discussion” section.



The finished Tom Brown flour is packed into airtight containers before being distributed to group members in Borno State.  
Photo Credit: Halima Haruna, consultant for USAID Advancing Nutrition.



# Overview of Selected Case Studies

The selected case studies were implemented in very different contexts, ranging from emergency and food insecure, to more stable contexts with better food security. Below, we provide a brief overview of the implementation contexts in each country and the selected approaches.

## Nigeria

In Nigeria, 6.8 percent of children aged 6–59 months are wasted (NPC and ICF 2019). However, the burden of wasting is not evenly distributed throughout the country, with some of the highest needs found in the north due to insecurity and climate change.

The North East region of Nigeria remains one of the world’s largest humanitarian crises, with 8.3 million people estimated to need assistance in 2023 (United Nations 2023). According to the most recent Integrated Food Security Phase Classification (IPC) Acute Malnutrition projections, there are an estimated 2 million wasted children living in the three most affected states of Adamawa, Borno, and Yobe, of which 1.3 million were moderately wasted (IPC 2022).

The 2023 Nigeria Humanitarian Response Plan projects that 2 million children in the North East will be wasted in 2023 and 4.4 million households will face food insecurity during the lean season. This represents an 18 percent increase in the burden of wasting, compared to 2022 (OCHA 2023b). The number of cases of severe wasting is projected to more than double from 300,000 cases in 2022 to 697,000 cases in 2023 (OCHA 2023a). The most recent estimates of wasting from the Round 12 of the North East Nigeria Nutrition & Food Security Surveillance survey, inclusive of cases identified using mid-upper arm circumference (MUAC), weight-for-height (WFH), and edema, show a wasting prevalence of 8.6 percent in Adamawa, 14.3 percent in Borno, and 13.1 percent in Yobe. Prevalence reaches as high as 18.1 percent in some areas of Borno state (Nigeria National Bureau of Statistics 2022).

Despite the high level of need for services to manage moderate wasting, service availability remains low throughout Nigeria, including in the North East. In response to these service gaps, numerous implementing organizations have started implementing local food-based approaches. We have documented two of these approaches: Porridge Mum, implemented by AAH, and Tom Brown, which was first developed by CRS and is now implemented by several organizations in North East Nigeria. We have documented Tom Brown programming as implemented by three different organizations: CRS, Save the Children, and PUI. All visited program sites were located in Borno state (figure 1).

In the Tom Brown approach, mothers of moderately wasted children come together on a weekly basis to prepare a flour made from locally-sourced ingredients. The standard recipe uses a 6:3:1 ratio of cereals (maize, millet, and/or sorghum), soya, and groundnuts. Each child receives a weekly ration of the flour which is prepared at home as a porridge. Porridge Mum also brings together groups of women at a communal kitchen, constructed by AAH, where they learn how to make nutritious recipes during cooking demonstration sessions. Both the Porridge Mum groups and the group members receive cash and/r voucher transfers to locally purchase the necessary ingredients for the recipes so that they can be

**Figure 1. Selected Approach Implementation Area, Nigeria**



reproduced at home. The full case studies for Tom Brown and Porridge Mums can be found in Annexes 1 and 2.

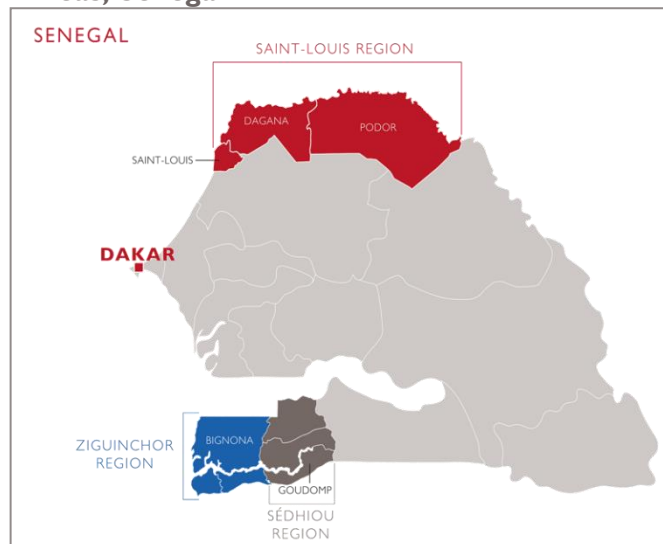
## Senegal

Nationally, 8.2 percent of children 0–59 months in Senegal are wasted. Of this number, 6.1 percent are moderately wasted. However, this national average hides regional disparities, with some areas in the northern part of the country reaching an overall wasting prevalence of over 11 percent (SECNSA 2019).

In Senegal, children with moderate wasting are managed in the community at a Nutritional Rehabilitation and Education Unit (Unité de Réhabilitation et d'Éducation Nutritionnelle – Communautaire) (UREN-C), using a range of approved products including imported RUSF, imported fortified flours such as CSB+ or CSB++, locally made flours, or products from the private sector. The type of product used depends on available financing and external support available in the implementation area. A UREN-C is set up only under certain conditions, including in contexts classified as emergencies, areas with seasonal increases in malnutrition, or in areas where levels of moderate wasting remain high despite the presence of other supportive interventions (e.g., cash transfers, microcredit, income generating activities), then long-term moderate wasting management programs may be established. Management for moderate wasting can be administered by a community health worker or volunteer (Ministère de la Santé et de l'Action Sociale [MSAS] 2013).

For these case studies, we visited former implementation sites for the USAID-funded Neema and Feed the Future Kawolor projects where locally produced flours were either made or distributed. The visited sites were located in the regions indicated in figure 2.

Figure 2. Selected Approach Implementation Areas, Senegal



In Senegal, a variety of different community-based groups, including women’s groups known as *Debbo Galle* groups and economic interest groups, use a range of different recipes to produce flour blends. These flour blends are then used for management of moderate wasting alongside RUSF or fortified flour blends as part of the national nutrition program (PRN). The case study on local production of flour in Senegal can be found in Annex 3.

## Uganda

National wasting prevalence is quite low in Uganda, at 3.6 percent of which 1.3 percent are severely wasted. However, this low national figure hides an uneven burden of wasting. Karamoja and West Nile subregions are home to historically marginalized and refugee/asylum-seeking populations, respectively, and have a wasting prevalence of 10 percent and 10.4 percent (Uganda Bureau of Statistics and ICF 2018).

While treatment for severe wasting is part of an integrated package of health services for children under 5 years of age, management of moderate wasting through TSFP is limited to only a few parts of the country, which are chronically food insecure or considered to be sites of humanitarian emergencies. For other “normal” areas, support to moderately wasted children is provided as part of routine medical services. Children receive routine medication and a biweekly clinical assessment until recovery. They are

not, however, routinely provided with a take-home ration. Instead, mothers are encouraged to be involved in the child’s care, receive counseling on health and nutrition education for improved feeding and care practices, and health and psychosocial support for themselves. A normal or acceptable situation not requiring TSFP or other population-level food-based intervention is defined by having a global acute malnutrition (GAM) rate of below 10 percent with no aggravating factors, which are defined as—

- food availability at the household level is less than the mean energy requirement of 2,100 kilocalories per person per day
- a crude mortality rate above 1/10,000/day
- presence of measles or other emerging epidemics
- a high prevalence of respiratory or diarrheal diseases
- poor sanitation (MOH 2020).

According to the Ministry of Health (MOH) and WFP, management of moderate wasting through TSFP where a take-home ration is provided is only available in Karamoja, due to long-term insecurity, and in West Nile and South West subregions due to the refugee populations coming from South Sudan and the Democratic Republic of the Congo.

According to the 2022 report, The Situation of Food Security and Nutrition in Karamoja, 57.6 percent of the population were found to be food insecure. The region remains highly dependent on food rations provided by development partners and United Nations agencies. GAM rates in Karamoja were 13.6 percent with Moroto district having a GAM rate of nearly 21 percent using WFH (WFP and UBOS 2022).

We documented three different programs with very different approaches to treating children with moderate wasting using locally available foods. We visited sites in Karamoja where METU-1 is produced. We also visited two organizations, Caritas MADDO and ISU-UP, that are working in more food secure settings in Central and Eastern Uganda. The visited districts are highlighted in figure 3.

**Figure 3. Selected Approach Implementation Areas, Uganda**



METU-1 is an RUSF-type product that can be produced locally using sorghum, peanuts, ghee, and honey. The approaches implemented in the more food secure contexts include education to communities provided by village health teams on the production of multi-nutrient dense mixes, known locally as kitoobero, which was originally introduced by Caritas MADDO. The last approach, ISU-UP’s Nutrition Education Centers (NEC), involves on-site feeding for moderately wasted children using an amaranth-based porridge. Feeding happens alongside a comprehensive training program for caregivers on health, nutrition, livelihoods, and other topics. In addition, caregivers are given seeds so they can grow the ingredients for the porridge mix at home after children are discharged from the NEC. The full case studies for METU-1, multi-nutrient dense mix (kitoobero), and the NECs can be found in Annexes 4–6.

# Comparing Local Food-Based Approaches with TSFP

In this section, we will describe variation across the different approaches and draw comparisons between program delivery approaches, nutritional value of the recipes used, and program performance of the local food-based approaches to address moderate wasting. We will take into consideration tradeoffs between resources, sustainability, and contextual appropriateness. This comparison is not meant to determine if local food-based approaches are non-inferior to TSFPs using commercially produced SFFs.

## Program Delivery

Each of the selected local food-based approaches follow some elements of a typical TSFP model. Table 5 provides an overview of some of the basic program design features alongside the TSFP standard. We discuss these features in more detail in the sections that follow.

### Target Population

All the documented approaches, with the exception of Porridge Mum, targeted children between 6 and 59 months of age. Porridge Mum targets mothers with children between 6 and 24 months of age and selects them from an already refined target group of women who are part of existing FSL programming. The deviation from the TSFP targeting standard is not surprising considering that the program designers explained that Porridge Mum was not designed to manage moderate wasting. However, the approach still captures the most vulnerable segment of the standard moderate wasting management program population. A recent review shows that wasting prevalence is higher among children under 2 (14 percent) compared to children aged 2–4 years (9 percent) (Karlsson et al. 2022).

Two approaches in Uganda also target slightly older, school-age children with METU-I enrolling children 5–10 years of age and the former Caritas MADDO program promoting kitoobero for children 6–10 years of age. Uganda’s National IMAM Guidelines provide guidance for the screening and referral of older children between 5 and 19 years of age for wasting treatment services (MOH 2020).

### Admission Criteria

All approaches, except for Porridge Mum, use MUAC as the main admission criteria. They all follow either internationally recommended cutoffs for moderate wasting ( $MUAC \geq 115\text{mm}$  to  $< 125\text{mm}$ ) or, in the case of Senegal, national guidance which has expanded admission criteria for moderate wasting to  $120\text{mm}$  to  $< 130\text{mm}$  as a result of the COVID-19 pandemic (MSAS nd).<sup>7</sup>

In Uganda, the National IMAM Guidelines include admission guidance for older children using BMI-for-age; however, this requires the availability of reliable scales and stadiometers (height boards), which is not always feasible in a community setting. Therefore, the use of MUAC for admission is logical even though it does not strictly adhere to national guidelines. Both programs use the same lower admission cutoff of  $MUAC \geq 135\text{mm}$ . The Caritas MADDO program had a slightly higher upper limit of  $145\text{mm}$  compared to the METU-I upper limit of  $140\text{mm}$ . Key informants did not explain how they selected these MUAC cutoffs. While there is no internationally agreed standard for MUAC cutoffs for older children, the cutoffs used in Uganda do align with what other countries have used for this age group. The most common range for children 5 to 9 years of age to classify moderate wasting is a MUAC of  $\geq 135\text{mm}$  to  $< 145\text{mm}$  (Cashin and Oot 2018).

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<sup>7</sup> The admission criteria for severely wasted children has also been expanded to  $MUAC < 120\text{ mm}$  rather than the usual  $< 115\text{ mm}$ .

Admission criteria for Porridge Mum depends on the inclusion of the pregnant or lactating women's vulnerability status and her inclusion in AAH's other FSL activities. Nutritional status is not part of the program's admission criteria, although women and their children receive monthly MUAC screening throughout the program.

### **Discharge Criteria**

Discharge criteria was one of the program design elements that differed dramatically from the typical TSFP model. In a typical TSFP, children are retained in the program until they have reached the upper MUAC of WFH/weight-for-length (WFL) threshold for 2 consecutive weeks (either  $MUAC \geq 125\text{mm}$  or  $WFH/WFL \geq -2$ , depending on which anthropometric measurement was used for admission). In contrast, although all of the food-based approaches track MUAC on either a weekly or monthly basis, only in Senegal are children discharged once the child reaches a healthy MUAC. For the other approaches, all children remain in the program until the full program cycle has been completed (see "Length of Stay in the Program" section below for more details). For Porridge Mum, discharge from the Porridge Mum group also depends on the pregnancy or lactation status of the mother and the age of the child.

### **Length of Stay in the Program**

For TSFP, the maximum amount of time recommended that a moderately wasted child be retained in the program is 4 months. If, after this amount of time, the child still has not reached the discharge criteria, he or she is discharged as a non-responder. For children who are not ultimately discharged as non-responders, the length of stay in the program can vary greatly, depending on context. Senegal's PRN follows similar guidance in terms of the maximum length of stay before a child is discharged as a non-responder. In Uganda, both the clinical trial and current school-based programming that used METU-I retained children in the program for a maximum of 3 months.

For the other local food-based approaches, the program duration ranged from 8 weeks (Tom Brown as implemented by CRS and PUI) to 8 months (Porridge Mum). The 8–10 weeks of supplementary feeding as delivered through Tom Brown is likely to be similar to a typical length of stay for a child in a TSFP. With the exception of Caritas MADDO's kitoobero programming, which lasted for 3 months, Porridge Mum in Nigeria and NECs in Uganda far exceed the typical 4-month cutoff of typical TSFP programs, at 8 and 6 months, respectively. Unfortunately, detailed information on relapse rates was not available from the programs so it is not possible to assess the additional benefits that the longer feeding duration may provide.

### **Ration Type and Feeding Method**

The ration type and feeding method used by the local food-based approaches also varied greatly. Four of the six approaches (Tom Brown, PRN, METU-I, and NECs) provide food directly, either in the form of a take-home ration or on-site feeding. Porridge Mum provides some food, through the meals consumed following monthly cooking demonstrations, but most of the food is purchased by the households using money provided through monthly restricted electronic food vouchers. The use of kitoobero in Uganda provides the least amount of food support. At present, only education on the preparation of kitoobero is provided - no food or cash/voucher support is provided to the households to replicate the recipes. During Caritas MADDO's support to the program, some meals were provided during cooking demonstrations, but otherwise direct support was similarly limited.

At present, only the Uganda programs use on-site feeding models. This includes the current school-based implementation of the use of METU-I (in the clinical trial it was provided as a take-home ration) and the default format for the NECs (although in some cases take-home rations are provided instead). All other programs rely on the caregivers to correctly prepare recipes that are learned during group sessions and feed children the correct amount of food at home.

**Table 5. Program Delivery Comparison**

	TSFP*	Nigeria		Senegal	Uganda		
		Tom Brown	Porridge Mum	PRN	METU-1 <sup>8</sup>	Nutrient Dense Multi-Mixes (kitoobero)	Nutrition Education Centers
Target population(s)	Children 6–59 months, PLW	Children 6–59 months	PLW and their children 6–24 months	Children 6–59 months	Children 6–59 months  Children 5–10 years	Children 6–59 months  Children 6–10 years	Children 6–59 months; PLW (in special circumstances)
Admission criteria	MUAC $\geq 115$ mm to $< 125$ mm or WFH/WFL $\geq -3$ to $< -2$ , no medical complications	MUAC $\geq 115$ mm to $< 125$ mm	Must be on FSL beneficiary list. Anthropometric assessment is not part of the admission criteria.	MUAC $\geq 120$ mm to $< 130$ mm	MUAC $\geq 115$ mm to $< 125$ mm; confirmed using WHZ $\geq -3$ to $< -2$ , without edema  MUAC $\geq 135$ mm to $< 140$ mm	MUAC $\geq 115$ mm to $< 125$ mm  MUAC $\geq 135$ mm to $< 145$ mm	MUAC $\geq 115$ mm to $< 125$ mm
Discharge criteria	If MUAC admission: MUAC $\geq 125$ mm for two consecutive sessions;	MUAC $\geq 125$ mm by end of program cycle	Loss of pregnancy, death of child or mother, graduation from the FSL	Not clearly defined. Assumed MUAC $\geq 130$ mm <sup>9</sup>	WHZ $\geq -2$  Considered cured when MUAC $\geq 145$ mm;	MUAC $\geq 125$ mm  MUAC $\geq 145$ mm	Completion of caregiver training, inclusive of first harvest and

<sup>8</sup> Criteria for children 6–59 months taken from the RCT design. Criteria for older children are being used for program implementation.

<sup>9</sup> Discharge criteria not specified in the revised COVID-19 treatment guidelines. National IMAM guidelines state that moderately wasted children can be discharged with MUAC of  $\geq 125$  mm. In practice children continue to receive rations for two months, regardless of if they reach a MUAC  $\geq 130$  mm before the two months is completed.



	TSFP*	Nigeria		Senegal	Uganda		
		Tom Brown	Porridge Mum	PRN	METU-I <sup>8</sup>	Nutrient Dense Multi-Mixes (kitoobero)	Nutrition Education Centers
	If WFH/WFL admission: WFH/WFL $\geq$ -2 z-score for two consecutive sessions		program, or aging out of the child. Anthropometric measurement is not part of the discharge criteria.		but not discharged once MUAC is reached		child has MUAC $\geq$ 137mm
Length of stay in program	Until discharge criteria reached or defined as non-recovered (does not reach discharge criteria after 4 months - medical investigation previously done)	8–10 weeks	8 months	Until discharge criteria reached or defined as non-recovered (No or little weight gain after 4 weeks in the program; weight loss after 2 weeks in the program; weight loss of more than 5 percent of body weight at any one time; failure to meet discharge criteria after 3 months in the program)	Until discharge criteria reached; maximum of 3 months (children 6-59 months)  3 months (school-based program for older children)	3 months	6 months

	TSFP*	Nigeria		Senegal	Uganda		
		Tom Brown	Porridge Mum	PRN	METU-I <sup>8</sup>	Nutrient Dense Multi-Mixes (kitoobero)	Nutrition Education Centers
Ration type and feeding approach (e.g., take-home, on-site, recipe replication)	Take-home ration (RUSF or FBF, such as SuperCereal with oil and sugar or SuperCereal+)	Take-home ration of Tom Brown flour	There is no specific ration for children with moderate wasting. Women receive a monthly restricted electronic food voucher (NGN 5,000) to purchase ingredients to replicate Porridge Mum recipes at home.	Take-home ration of local flour mix (recipes vary; only given when RUSF or imported fortified flours are unavailable)	Take-home ration  Ration prepared and consumed on site.	Feeding at home using available household foods to replicate recipes.	Either on-site feeding at the NEC or a take-home ration of pre-mixed flour to be prepared at home

\*TSFP programming parameters are taken from the September 2018 Training Guide for Community-based Management of Acute Malnutrition (CMAM) Handouts (FANTA 2018). Information on ration type for TSFP is taken from the MAM Decision Tool (GNC 2017)

## Nutritional Value of Recipes

To understand how the nutritional value of local food-based recipes compare to specialized products that are distributed through TSFP, we used NutVal software to conduct a nutrition analysis of recipes provided by key informants or outlined in the program documentation. For programs such as Porridge Mum, PRN, and kitoobero recipes promoted by Caritas MADDO that have multiple recipes or can be varied at the household level based on available foods, we selected a subset of the recipes to illustrate some of the variation in the foods provided or promoted for moderate wasting treatment. The NutVal analyses were compared to standards published by either USAID or WFP for CSB+ with fortified vegetable oil, SuperCereal+, and RUSF.

## Global Standards for Supplement Composition

While WFP and USAID publish supplementary feeding product specifications and standards for SFFs like RUSF, CSBs, and SuperCereals, there is limited guidance on the caloric and nutritional requirements of moderately wasted children. The recently updated *WHO Guideline on the Prevention and Management of Wasting and Nutritional Oedema (Acute Malnutrition) in Infants and Children Under 5 Years* still uses WHO guidance from 2012 on the proposed nutrient composition of supplementary foods for use in the management of moderate wasting in children (WHO 2023). The 2012 guidance is based on 1,000 kcals per day and can be consumed either through regular foods or supplementary foods. The newly revised WHO guidance estimates that moderately wasted children have a total daily energy requirement of 100–130kcal/kg/day in order to achieve anthropometric recovery, and it is recommended that 40–60 percent of this need is met using SFFs (WHO 2023). Table 6 summarizes the original 2012 guidance, based on the nutrient composition of a supplementary food equaling 1,000 kcals per day compared to adjusted values reflecting the revised range of kcals/kg/day as outlined in the 2023 guidance.

**Table 6. WHO Guidance on Proposed Nutrient Composition of Supplementary Foods for Use in the Management of Moderate Wasting in Children**

Nutrient	WHO 2012		WHO 2023					
	Min	Max	Min	Max	Min	Max	Min	Max
Energy maximum, kcal	1,000 per day		100 per kg/day		120 per kg/day		130 per kg/day	
Protein, g	20	43	2	4.3	2.4	5.2	.6	5.6
Fat, g	25	65	2.5	6.5	3	7.8	3.3	8.5
Vitamins								
Vitamin A (retinol), µg	2,000	3,000	200	300	240	360	260	390
Vitamin B1 (thiamine), milligram (mg)	1	--	0.1	--	0.1	--	0.1	--
Vitamin B2 (riboflavin), mg	4	--	0.4	--	0.5	--	0.5	--
Vitamin B3 (niacin), mg	25	--	2.5	--	3.0	--	3.3	--
Vitamin B5 (pantothenic acid), mg	5	--	0.5	--	0.6	--	0.7	--

Nutrient	WHO 2012		WHO 2023					
	Min	Max	Min	Max	Min	Max	Min	Max
Vitamin B6 (pyridoxine), mg	2	--	0.2	--	0.2	--	0.3	--
Vitamin B7 (biotin), µg	20	--	2	--	2.4	--	2.6	--
Vitamin B9 (folate), µg	400 <sup>10</sup>	--	40	--	48.0	--	52	--
Vitamin B12 (cobalamin), µg	5	--	0.5	--	0.6	--	0.7	--
Vitamin C (ascorbate), mg	150	--	15	--	18	--	19.5	--
Vitamin D (cholecalciferol), µg	20	60	2	6	2.4	7.2	2.6	7.8
Vitamin E, mg	30	--	3	--	3.6	--	3.9	--
Vitamin K (phytomenadione), µg	50	--	5	--	6.0	--	6.5	--
Minerals								
Sodium, mg	--	500	--	50	--	60	--	65
Iron, mg	18	30	1.8	3	2.2	3.6	2.34	3.9
Zinc, mg	20	35	2	3.5	2.4	4.2	2.6	4.6
Iodine, µg	150	350	15	25	18	30	19.5	32.5
Potassium, mg	1,500	2,200	150	220	180	264	195	286
Phosphorus, mg	850	1,400	85	140	102	168	110.5	182
Calcium, mg	1,000	1,400	100	140	120	168	130	182
Copper, mg	1	3.5	0.1	0.35	0.1	0.42	0.13	0.46
Magnesium, mg	280	420	28	42	33.6	50.4	36.4	54.6
Selenium, µg	35	90	3.5	9	4.2	10.8	4.6	11.7
Manganese, mg	1	2	0.1	0.2	0.1	0.2	0.1	0.3

<sup>10</sup> or 240µg of folic acid.

## Analysis of SFF Composition

We found that the SFFs that are typically used by TSFP programs do not have standardized nutritional compositions nor do they meet the standards proposed in the globally available guidance. The recommended nutritional composition of three selected products, as per WFP or USAID published standards, are presented in table 7, alongside the nutritional requirements for moderately wasted children recommended by WHO (WHO 2012; WHO 2023).

To compare the specialized products more directly with the WHO-recommended nutrient values for supplementary foods, we adjusted the actual SFF ration sizes so that they were equivalent to the median value of the recommended range of kcals/kg/day as recommended in the 2023 WHO guidance, which is equal to 120 kcals. We further prorated that amount to be equal to 60 percent of these daily caloric needs, in line with the upper range of a child's diet that should come from SFFs (60 percent). For comparison, we use the minimum values for each nutrient included in the 2012 WHO guidance, also proportional to 60 percent of the recommended value.

The published formulations for the selected SFFs generally comply with the WHO guidance on the proposed nutrient composition for supplementary foods. CSB+ with fortified vegetable oil meets the fewest of these requirements (14/24) followed by SuperCereal+ (22/24). However, according to the 2023 WHO guidance, lipid-based nutrient supplements, such as RUSF, are the preferred choice for the management of moderate wasting. RUSF meets all the WHO nutrient composition recommendations.

**Table 7. Recommended Nutritional Composition of Selected SFFs**

Nutrient	WHO Guidance 60% of 120/kcal/kg/day	CSB+ with fortified Vegetable Oil	SuperCereal+	RUSF
Energy maximum, kcal/kg/day	72	72	72	72
Ration size, g/kg/day	n/a	15	18	14.1
Protein, g	1.4	1.6	2.9	1.6
Carbohydrate, g	--*	7.7	--	--
Fiber, g	--	0.6	--	--
Fat, g	1.8	3.3	1.6	3.7
Vitamins				
Vitamin A (retinol), µg	144	614.8	144	98.8
Vitamin B1 (thiamine), mg	0.1	0.1	0.1	0.1
Vitamin B2 (riboflavin), mg	0.3	0.2	0.3	0.3
Vitamin B3 (niacin), mg	1.8	0.0	1.8	1.8
Vitamin B5 (pantothenic acid), mg	0.4	0.0	0.4	0.6

Nutrient	WHO Guidance 60% of 120/kcal/kg/day	CSB+ with fortified Vegetable Oil	SuperCereal+	RUSF
Vitamin B6 (pyridoxine), mg	0.1	0.2	0.1	0.3
Vitamin B7 (biotin), µg	1.4	1.0	1.4	8.5
Vitamin B9 (folate), µg	28.8	0.0	28.8	46.6
Vitamin B12 (cobalamin), µg	0.4	0.2	0.4	0.4
Vitamin C (ascorbate), mg	10.8	10.9	10.8	11.3
Vitamin D (cholecalciferol), µg	1.4	100.8	1.4	2.1
Vitamin E, mg	2.2	1.3	1.4	2.3
Vitamin K (phytomenadione), µg	3.6	10.1	3.6	3.8
Minerals				
Iron, mg	1.3	0.3	1.6	1.4
Zinc, mg	1.4	0.9	1.4	1.6
Iodine, µg	10.8	4.8	10.8	14.1
Potassium, mg	108.0	86.7	117	112.9
Phosphorus, mg	61.2	71.4	72	63.5
Calcium, mg	72.0	61.3	75.6	75.5
Copper, mg	0.1	--	--	0.2
Magnesium, mg	20.2	--	--	21.2
Selenium, µg	2.5	--	--	2.8

\* -- indicates that the values are not included in the published standards.



## Analysis of Local Food-Based Recipes

We applied the same analysis approach as used for the SFFs to the local food-based recipes. When we compared the local food-based recipes with the recommended WHO nutrient composition standards for supplementary foods we found that none of the recipes met the recommended standards. Detailed analyses of these recipes are found in Annex 7 and the recipes used for the analysis are presented in Annex 8. NutVal does not include vitamin B7 (biotin), iodine, potassium, phosphorus, or sodium in its calculations. Therefore, although WHO has recommended standards for these nutrients, they are excluded from the tables in Annex 7.

## Fortification of Local Food-Based Recipes

It is unsurprising that local foods are unable to meet all recommended nutrient requirements without additional fortification. Only partners using Tom Brown flour mentioned that they encourage additional fortification of the flour as part of its preparation. To see if fortification would help the flour to meet more of the recommended nutrient requirements, we added the additional nutrient values from 1 packet of MNP to the adjusted kcal/kg/day Tom Brown flour ration. Table 8 presents the nutrient composition of MNP, the WHO nutrient recommendations for supplementary foods, and the unfortified and fortified values of these nutrients in the adjusted kcal/kg/day Tom Brown flour ration. Unfortified Tom Brown flour fails to meet 11 of the 15 nutrient values without fortification. If MNP is added, all standards are met, even without adjusting the kcal/kg/day values for a weight greater than 1kg. Although adding MNP to local food-based recipes means that caregivers must be provided with or be able to purchase the necessary MNP to add to their home cooked foods, expanding the availability of MNP is likely more feasible and cost effective than trying to make SFFs more readily available within communities.

**Table 8. Comparison of Unfortified and Fortified Tom Brown Flour, 1,000 kcal Equivalent**

Nutrient, Unit	Amount Provided in One Sachet of MNP	WHO Guidance	Unfortified Tom Brown Flour	Fortified Tom Brown Flour
		Adjusted to 60% of 120/kcal/kg/day		
Vitamin A (retinol), µg	400	144	0.3	400.3
Vitamin B1 (thiamine), mg	0.5	0.1	0.1	0.6
Vitamin B2 (riboflavin), mg	0.5	0.3	0.1	0.6
Vitamin B3 (niacin), mg	6	1.8	0.9	6.9
Vitamin B6 (pyridoxine), mg	0.5	0.1	0.1	0.6
Vitamin B9 (folate) or folic acid, µg <sup>11</sup>	90	28.8	26.4	90 folic acid 26.4 folate 116.4 total

<sup>11</sup> Folate is the form of vitamin B9 found naturally in foods, whereas Folic Acid is its synthetic form. Folic Acid is provided through MNP whereas Folate is found in the local foods used in the Tom Brown flour recipe.

Nutrient, Unit	Amount Provided in One Sachet of MNP	WHO Guidance	Unfortified Tom Brown Flour	Fortified Tom Brown Flour
		Adjusted to 60% of 120/kcal/kg/day		
Vitamin B12 (cobalamin), µg	0.9	0.4	0.0	0.9
Vitamin C (ascorbate), mg	30	10.8	0.0	30
Vitamin D (cholecalciferol), µg	5	1.4	0.0	5
Vitamin E, mg	5	2.2	0.3	5.3
Iron, mg	10	1.3	0.7	10.7
Zinc, mg	4.1	1.4	0.5	4.6
Iodine, µg	90	10.8	--*	90
Copper, mg	0.6	0.1	0.2	0.8
Selenium, µg	17	2.5	1.6	18.6

\*Iodine is not calculated by NutVal and therefore cannot be estimated.

## Program Outcomes

Although all local food-based approaches, except for Porridge Mum, adhered to standard enrollment guidance, the tracking of program outcomes was inconsistent. Table 9 provides a summary of available program outcome data, including cured, died, defaulted, and non-respondent. Because the data is not from the same time period or geographic area, the approaches should not be directly compared against each other.

For programs with outcome data available, all met Sphere standards for cured, died, and defaulted rates apart from Caritas MADDO, which exceeded the maximum death rate by one percent. In addition, two Tom Brown implementing partners provided information on children who deteriorated into severe wasting and/or were referred for severe wasting treatment. PUI reported 1 child out of 1,644 deteriorated into severe wasting and Save the Children provided medical referrals<sup>12</sup> for 53 of 2,614 children.

Although Porridge Mum collects MUAC measurements for both PLW and children monthly, program outcomes are not reported in terms of cured, died, or defaulted. However, based on information from an external evaluation the number of children with a MUAC < 125mm was found to decrease over the 8-month period assessed from 12 percent to 2 percent. However, the reason for the decline could not be established as the necessary data to assess the effectiveness of the approach in preventing wasting in children 6 to 59 months were not available at the time of the evaluation. The evaluation posited that the

<sup>12</sup> Based on the available data it is not clear from the reporting if these are general medical referrals or referrals for children who deteriorated to severe wasting during the program implementation period.

reduction in moderately wasted children could be due to the enrollment of children in treatment programs for severe wasting during the lean season, which preceded the start of Porridge Mum activities or it could be because caregivers learned new skills as part of program enrollment (AAH 2021). We also analyzed data from two sites for a 3-month period (August–October 2022) and found that of the 141 children who were moderately wasted at the time of enrolment, 75 percent either maintained or improved their MUAC status or reached a cured status (MUAC  $\geq$  125mm). Nine percent of moderately wasted children either deteriorated or did not respond during the 3-month period.

Similarly, ISU-UP also routinely takes MUAC measurements of children enrolled at their NECs, but they only report on numbers reached, not on outcome. Children are measured a final time upon graduation from the program, but these data are not analyzed in terms of if the children have reached a cured MUAC status.

In Senegal, PRN provided data from one site, Aéré Lao, which show a 100 percent cure rate. However, we cannot be certain if local flours were used for the management of all these children, as RUSF and fortified flours are sometimes used when available. The USAID/Neema final project report noted that its project data showed an 80 percent cure rate for children managed with local flours (Helen Keller International 2021).



Women attend a nutrition education session at a NEC in Kamuli district, Uganda. Photo Credit: Gloria Nabaasa, consultant for USAID Advancing Nutrition

**Table 9. Program Performance Compared to Sphere Standards for Moderate Wasting Treatment of Children 6–59 Months**

	Sphere Standard*	Nigeria				Senegal	Uganda				
		Tom Brown			Porridge Mum	USAID/Neema and PRN	METU-1 <sup>13</sup>		Multi-Nutrient Dense Mix (kitoobero) <sup>14</sup>	NECs	
		CRS <sup>15</sup>	PUI <sup>16</sup>	Save the Children <sup>17</sup>			6–59m	5–10y			
Cured	>75%	98%	95%	92%	Data collected but outcome not analyzed	Detailed site and historic project data were not available.	91.4%	94%	96%	Data collected but outcomes not analyzed.	
Died	<3%	0% <sup>18</sup>	0%	0% <sup>19</sup>			0%	0%	4% <sup>20</sup>		
Defaulted	<15%	0%	0%	0% <sup>21</sup>			15% <sup>22</sup>	not reported <sup>23</sup>			0%
Non-respondent	not defined	not reported	5%	3%			Not reported	7.7%	6%		0%

\*Sphere 2018

<sup>13</sup> Data for children 6–59 months taken from efficacy trial results. Data for children 5–10 years are from 3 sites with complete data from the October to December 2022 programming cycle.

<sup>14</sup> The most recent available data are from a 2013 evaluation report, conducted during the PHC project. Program outcomes are not routinely tracked.

<sup>15</sup> Data taken from semi-annual report, April 2022.

<sup>16</sup> Performance from four different program cohorts. Data from October 2021–April 2022.

<sup>17</sup> Data from January–August 2022

<sup>18</sup> Only percentages reported. Estimated to be 1 child out of 2,417 enrolled.

<sup>19</sup> 6 children out of 2,614 enrolled died while enrolled in the program.

<sup>20</sup> Only percentages reported. Estimated to be 13 children out of 326 enrolled.

<sup>21</sup> 12 children out of 2,014 enrolled defaulted from the program.

<sup>22</sup> Based on data from two sites from August–September 2022.

<sup>23</sup> 22 children were lost to follow up during the trial. 17 moved away, 4 withdrew consent. No defaulters reported for older children.

# Synthesis of Findings

## Program Design

The design of the documented approaches varied greatly. However, the duration of the overall program and feeding, the mix of complementary interventions, and the ration type, along with related feeding considerations, emerged as some of the key considerations for using local foods for the management of moderate wasting.

### Impact of Program Duration and Mix of Interventions on Outcomes

The documented approaches had a range of program durations and packages of additional interventions provided to the caregivers or households alongside support for the wasted child. A longer feeding period and more complementary interventions likely means a higher total cost per child. When determining what elements are essential to achieve and maintain a good program outcome, it is important to be able to consider tradeoffs between overall costs and outcomes. Table 10 provides a recap of the different program durations, additional interventions, and available cure rates for the documented approaches. Cure rates provided are illustrative and cannot be directly compared due to differences in context, time periods, and small data sets. However, they are still useful to see how well a program is performing, even at a small sample of sites.

**Table 10. Summary of Approach Durations, Interventions, and Cure Rates**

Approach, Country, Partner(s)	Duration	Additional Interventions	Cure Rate
Tom Brown, Nigeria, CRS, PUI	8 weeks	IYCF counseling	98%–95%
Tom Brown, Nigeria, Save the Children	10 weeks	IYCF counseling	92%
Porridge Mum, Nigeria, AAH	8–12 months	Monthly nutrition and health education sessions.	Not available
PRN, Senegal, range of partners	Until discharge criteria reached, maximum 3 months	Sometimes linked with women’s groups or income generating activities. Not consistent.	Not available
METU-I, Uganda, AFI	3 months	Nutrition education and counseling for caregivers, Vitamin A supplementation, deworming, and malaria treatment.	94% (school aged children)
Nutrient-dense Multi Mixes, Uganda, Caritas MADDO	3 months	Under Caritas MADDO included health, nutrition, and agricultural education sessions. At present, no additional activities.	96%



Approach, Country, Partner(s)	Duration	Additional Interventions	Cure Rate
NEC, Uganda, ISU-UP	6 months	6-month training program including nutrition, health, WASH, and crop production. Other agriculture and livelihoods programs are available, depending on the needs of the individual. Seeds for future production provided.	Not available

Several of the programs had much longer enrollment periods than a typical TSFP, even when the suggested maximum length of stay of 4 months in a TSFP is considered. Of the programs with a management objective, the NECs in Uganda had the longest program and feeding duration at 6 months. This approach was also combined with a wide range of other interventions, including a training program to build skills and capacity of caregivers in good feeding, health, and hygiene practices as well as agriculture and other livelihood skills. Although not defined as a program to manage moderate wasting by its designers, Porridge Mum does seem to have an impact on reducing moderate wasting in the communities where it operates and also has the longest program duration (8–12 months) of all the documented approaches. And although we did not document the scope of the FSL activities that AAH also implements in these areas, enrolled mothers are also likely benefitting from other services and interventions as they are selected from AAH’s FSL beneficiary registers.

All the programs with available outcome data had high cure rates that met Sphere minimum standards. However, based on the available data, we were unable to determine how much overall cure rates improved with the increased duration of the program. Although key informants from CRS explained that cure rates improved when the duration of the Tom Brown program was increased from 4 to 6 to eventually 8 weeks, they did not provide data to illustrate by how much cure rates improved. It also was not shared if cure rates for the 4-week program were below Sphere standards, hence necessitating an increased program duration. Similarly, Save the Children informants explained that their cure rates also improved when they increased the Tom Brown program duration from 8 to 10 weeks. But again, we were not provided with data to understand how much of an improvement was seen after an additional 2 weeks of enrollment in the program.

Unfortunately, none of the documented programs kept detailed records on relapse rates. Had this information been available, more insight could have been gained into whether longer program durations are necessary to not only improve cure rates but also to prevent relapse, and therefore reduce moderate wasting caseloads. Additionally, information is not collected to determine if complementary activities, when provided, are having a preventative effect - for example, if fewer children within the same household become wasted after the caregiver or household has taken part in these other activities.

More data and analysis are needed to better understand the tradeoffs between longer program durations, the benefit of adding additional interventions that target caregivers and/or households, potentially improved program outcomes - inclusive of cure rates, reduced relapse, and possible prevention effects - and overall program costs. It would also be useful to document when most children receive a healthy MUAC and how far into the program duration this typically occurs. If other positive outcomes, such as reduced relapse, are not observed, then it may not be worthwhile to invest in longer feeding periods.



## Ration Types

Unlike standard TSFPs that always provide take-home rations, the approaches we documented provided a range of different types of rations, including take-home rations, on-site feeding, and in one case no food ration of any kind. Along with the type of ration comes considerations about how much of the food will be consumed and the risk of sharing. Table II summarizes the ration types provided by the various approaches.

**Table II. Summary of Ration Types, Frequency, and Portion Size**

Approach	Ration Type	Frequency	Portion Size
Tom Brown	Take-home flour	Weekly distributions	1.5kg per week. 214g daily given in 2–3 servings, prepared at home.
Porridge Mum	On-site feeding on cooking demonstration days; voucher to purchase foods for home preparation	On-site feeding approximately twice a month, during cooking sessions  Monthly voucher transfer to replicate meals at home	One of the recipes should be prepared daily.  Portion sizes vary based on recipe.
PRN	Take-home flour	Distributions monthly or every 2 weeks	1.5kg at each distribution (some partners provide more flour over the enrolment period).  90g daily servings given in two portions prepared at home.
METU-I	On-site feeding at schools	On-site feeding twice a day on school days	Two 500ml portions.
Nutrient-dense Multi Mixes	No ration - only education sessions (previously on-site feeding during group cooking demonstrations, followed by home preparation)	N/A	Meals to be prepared daily at least four times a week and served in two portions. Portion sizes vary based on recipe and age of child.
NEC	Primarily on-site feeding, occasionally take-home flour	On-site feeding: 5 days a week  Take-home: weekly distribution	On-site feeding: one portion consumed on site. Sent home with two additional portions to consume the same day.  Take-home: 1kg of flour to be prepared at home daily as porridge and given in three portions.

Two approaches, Tom Brown and PRN, provided only take-home rations in the form of flours. However, the total amount of flour provided and the frequency of distribution varied. Tom Brown provides more flour (the daily ration size is also larger - 214g compared to 90g under PRN) on a more frequent basis than PRN, which provides either monthly or bi-weekly distributions. When NECs use take-home rations, they also provide them weekly. With take-home rations, there is always a risk of the ration being shared. For Tom Brown, key informants mentioned that ration size had not been adjusted for sharing and that this posed a challenge. For PRN, the very small daily ration is more likely to be insufficient if sharing is occurring.

On-site feeding reduces or eliminates the potential for ration sharing. However, it places a greater burden on the caregiver as they are required to travel to the program site so their children can receive the ration. Only two programs, METU-I for school-aged children and NECs, use on-site feeding as their primary feeding method. In the case of METU-I, because rations are being provided at schools, there is no additional burden on the household to ensure children receive the necessary ration as the children should be traveling to school anyway. For the NECs, additional activities for the caregivers are conducted at the same time as the feeding. Unfortunately, neither approach reported on default rates so we are unable to determine if or how the on-site feeding format may have impacted defaulting.

Two programs, Porridge Mum and the Caritas MADDO-supported version of the kitoobero training, provided on-site feeding following cooking demonstrations. However, outside of these sessions, the programs rely on the caregivers to procure the necessary foods and correctly prepare and feed the meals to their children at home. While Porridge Mum provides restricted vouchers to encourage caregivers to procure the necessary foods, households that are taught to prepare kitoobero are not given any additional support to procure the required foods. Limited program outcome data were available for these two programs. Data from Caritas MADDO reported a high cure rate (96 percent) and zero defaulters, but it had a death rate (4 percent) that exceeded Sphere standards (< 3 percent). Porridge Mum only reported defaulter rates, which were 15 percent. However, at least some of this rate, if not most, is likely attributable to population movements due to insecurity within the program implementation area.

Based on available data, we are unable to make any clear determinations about the ration type (or lack of any in-kind food support) and accompanying assumptions and risks related to the feeding methods. Much has changed in terms of technological advances in products, coverage monitoring, and program delivery since the time when therapeutic feeding centers (TFCs) that provided on-site rations were the norm for wasting treatment. Therefore, it is difficult to compare previous studies on TFCs with present on-site feeding or take-home ration models. One of the main arguments for the transition from TFCs to what is now known as CMAM programming was the potential to increase coverage (Collins 2004). While coverage of wasting management through CMAM has realized a tenfold increase in coverage over the past decade, only about 25 percent of severely wasted children are able to access treatment (ENN 2020; ENN 2021). It is estimated that the proportion of moderately wasted children accessing support is even lower (ENN 2020). Therefore, based on coverage improvements alone, it is difficult to discount the value of current on-site feeding methods that seek to fill this gap in coverage for moderately wasted children. More research into the overall performance of these programs is needed before clearer conclusions can be drawn and appropriate guidance developed that takes contextual considerations into account. Better coordination and clarity about reporting expectations for local food-based approaches would help improve the quality and scope of data and provide more insight into the numbers of children reached and the outcomes.

## Assessing and Interpreting the Nutritional Value of Recipes

We encountered several barriers to assessing and interpreting the nutritional value of the local food-based recipes.

### Limitations of Assessment Using NutVal

Because NutVal is free and relatively easy to use, it is often the go-to tool for implementers trying to assess the nutritional value of rations provided as part of food assistance programs. We even received NutVal-generated nutritional information on Porridge Mum recipes from a key informant, even though the software is not designed to be used for recipe development for the management of moderately wasted children. Despite its accessibility and ease of use, we did encounter several limitations when using to interpret the nutritional value and composition of the recipes used by our selected approaches.

NutVal does not include all the suggested micronutrients in WHO's guidance on the nutritional composition of supplementary foods. Among the various nutrients for which global standards are provided, NutVal does not calculate chromium, fatty acids, iodine, manganese, molybdenum, phosphorus, potassium, sodium, sulfur, or vitamin B7 (biotin). While NutVal does cover what can be considered essential micronutrients, if MNP composition is used as a guide, the omission of sodium, along with macronutrients including carbohydrates and fiber, are important gaps. Understanding these elements, along with total protein and fat which are provided, is essential for understanding the overall composition of the supplementary diet provided. For example, it is important to know the amount of fiber in a recipe to avoid providing high amounts, as too much fiber can reduce nutrient and energy digestibility, which may cause potential harm to moderately wasted children (Golden 2009). High fiber diets may also be too filling and reduce the ability of the child to consume sufficient energy (Webb et al 2011).

Lastly, NutVal has a limited food database, which is less suited to calculating recipes that are based on local foods. Different varieties of foods can contain different nutrient compositions and some regionally specific foods, such as sorrel, ginger, turmeric, and Maggi bouillon, are not included in the NutVal database. Although regional food composition tables are available, it requires extra time and effort to add these foods manually to the NutVal database. This is particularly challenging since the food composition tables are reported in 100g quantities but must be entered into NutVal in the quantity listed in the recipe, requiring users to self-calculate each nutrient based on the serving size. Depending on the skill level of the implementer, he or she may not necessarily know where to find or be able to access local food composition information or be able to accurately add it to the tool.

### Inconsistent Global Guidance on Nutritional Needs of Moderately Wasted Children

Prior to the recent update of WHO's guidance on the management of wasting, there was a great deal of inconsistency among available literature on the recommended nutrients for moderately wasted children. The 2023 guidance update references the 2012 WHO recommendations on the proposed nutrient composition of supplementary foods for use in the management of moderate wasting in children, and the recommendations are noted as being conditional due to the "very low certainty evidence" (WHO 2023). Additionally, these recommendations focus primarily on standards for SFFs, which are commercially produced and centrally fortified. Therefore, it is difficult to set standards for local food-based recipes. The earliest example of guidance from 2009 that we reviewed states that moderately wasted children need to have nutrient requirements that allow for "catch-up growth in weight and height, prevent their death from nutritional disease, strengthen their resistance to infection, allow for convalescence from prior illness, and promote normal mental, physical, and metabolic development" (Golden 2009). This guidance provides two sets of recommendations: one for local food items and one for specialized foods and notes that the proposed requirements are unlikely to be met through local foods without some level of fortification. The provided analysis is detailed and complex to ensure a

balanced set of requirements that meet the multiple needs described above and that the levels of suggested nutrients do not result in negative interactions between the nutrients.

Since 2009, there have been ongoing efforts to reach further consensus on the nutritional needs of moderately wasted children. However, these efforts have largely focused on applying these requirements to specialized food products, such as the harmonization of micronutrient premixes used in RUSF and FBF (Annan, Webb, and Brown 2014). Despite the detail of these efforts, we found little additional guidance beyond what was originally developed in 2009 that was applicable to local foods and nothing in a format that would be easily accessible and user-friendly to practitioners who are trying to develop local food-based recipes for their programs.

## Contextual Considerations

The available data limit our ability to propose which types of local food-based approaches are generally the most effective and cost effective to manage moderate wasting. However, we present several contextual factors that should be taken into consideration when determining what type of local food-based alternative to TSFP is most appropriate for a given implementation context.

### Food Security and Market Availability

To implement a program to manage moderate wasting using locally available foods, an adequate and reliable supply of the necessary foods must be available either within the communities or local markets, or within a transportable distance from the implementation site. For circumstances that require transport of foods to the implementation site, tradeoffs between the cost of transportation, transportation reliability, and potential degradation of food quality due to increased transport and storage requirements should be considered.

Furthermore, the food security status of households with moderately wasted children must also be taken into account when determining what type of ration to provide. For example, Caritas MADDO was operating in a reasonably food secure environment in Uganda where communities could easily access or grow their own local foods to cook kitoobero recipes at home. Therefore, no in-kind food ration or cash/voucher was provided to these households. This approach would likely be inappropriate in a context such as North East Nigeria where households face significant food insecurity. In contrast, the Tom Brown and Porridge Mum programs implemented in this context provided either the local foods required to make the rations or a voucher to support caregivers to purchase the required foods to reproduce the recipes.

### Availability and Coverage of TSFP

Although the approaches that use local foods to manage moderate wasting do so in the absence of TSFP services in the implementation area, only two approaches - the nutrient-dense multi-mixes (kitoobero) and NECs - operate in areas where there is no WFP presence.

For the other approaches, the mix of traditional WFP-supported TSFP and local food-based approaches has posed some challenges. This has been most acutely felt in North East Nigeria, where several key informants mentioned difficulties that were faced when conducting geographic targeting alongside WFP. We were told by these informants that WFP has tried to start TSFP in areas where Tom Brown services are already operating, despite there being other parts of the region that have no moderate wasting services at all. In the Karamoja region of Uganda, despite having invested in a number of trials and analyses to determine the suitability of METU-I, AFI has not been able to provide it to its original target population of children 6–59 months due to new WFP-supported TSFP that were implemented after METU-I was developed and tested. Similarly, in Senegal, support from WFP and a preference for specialized treatment products has hindered the maintenance and expansion of local flour production.

While TSFP may be appropriate for some settings, particularly those experiencing acute crises resulting in a spike in moderate wasting cases, they are ultimately much less sustainable and unable to reach all children in need of support. Therefore, there is a need for open dialogue between donors, practitioners, and WFP on when these types of local food-based approaches are considered acceptable alternatives to TSFP.

### **Referrals to Treatment for Severe Wasting**

Referral of severely wasted children to inpatient or outpatient treatment was a component of all the documented approaches, even if these services were not readily available close to the communities. Implementing partners often provided direct support to the provision of severe wasting treatment services or provided support to households to access these services if they were located far from treatment sites. Interestingly, informants did not mention referrals of children discharged from severe wasting treatment programs to the local food-based approaches for continued recovery. We did not interview providers of severe wasting treatment services to determine if children are discharged from these programs as fully cured, referred to a TSFP, or how else their continued recovery is supported.

Ensuring that children identified as having severe wasting and children who deteriorate from moderate wasting have access to the necessary treatment services is not only an ethical imperative, but it is also essential for ensuring that communities have confidence in the guidance and services provided. Although an argument can be made that managing moderate wasting is better than nothing, all reasonable efforts should be made to provide a continuum of care that includes life-saving severe wasting treatment services as well.

### **Community-Based Nature of the Program Designs**

The “C” in CMAM, which stands for community-based, can often spark debate among practitioners. While there are some community-based elements, such as active case finding, screening, and referral, which are truly community-based, treatment and management components, including TSFP, are still closely linked to health centers. This means that not every community can easily access wasting management support, depending on its proximity to the closest health facility with the appropriate wasting management services. In contrast, all the local food-based approaches that we documented are very clearly embedded within or very close to the communities they are intended to serve. Even the PRN program, which follows a much more traditional TSFP model, uses community-anchored elements such as *groupements d'intérêt économique* ([GIE]; economic interest groups) or Debbo Galle groups (women's groups) to support local flour production. Because these approaches are so closely linked to communities, several things should be considered when planning for their implementation.

First, these approaches require community buy-in to work effectively. Examples from Porridge Mum programs for which land for communal kitchens was “donated” and then reclaimed illustrate the need for careful sensitization prior to the start of programming. Also, for effective interventions, populations need to be somewhat stable. For example, communities should not be at risk of frequent insecurity or violence that would cause them to flee. Additionally, communities should not disappear at certain times of year due to pastoralist or nomadic lifestyles.

Additionally, we do not have enough information to know if setting up these approaches in each community may be more costly than setting up a TSFP that serves multiple communities. The population density and prevalence of moderate wasting may impact the cost efficiency of the community-based approaches when compared to TSFP and should be carefully considered when contextualizing the approach to the implementation context. However, there may also be additional benefits to these community-specific approaches, including the creation of peer support groups that benefit caregivers as well as benefitting the individual children who are being managed, which could outweigh the additional cost.

## Discussion and Way Forward

There are already a wide range of approaches that use local foods to address moderate wasting. It is likely that the existing approaches will be scaled up and new approaches will be developed given the high level of need and barriers in terms of lack of funding, capacity, and SFFs to address all moderate wasting through traditional TSFPs. Additionally, the updated 2023 WHO guidance emphasizes the use of nutrient-dense foods, inclusive of locally available foods that are typically consumed by households, to support their recovery. The guidance has highlighted a set of risk factors<sup>24</sup> that indicate when a moderately wasted child should be prioritized to be managed with SFFs rather than local foods. The decision on which risk factors to apply at a population level will be reflected in revised national guidelines in consultation with WHO and UNICEF. Moderately wasted children without one or more additional risk factors do not need to receive a specific SFF according to the WHO guideline, and, therefore, there is great potential to identify and scale up local approaches such as those outlined in this analysis to increase coverage and ensure local market promotion and caregiver empowerment in addressing moderate wasting. Our documentation of a small selection of these programs shows that they are promising, but due to gaps in available programmatic data, our ability to draw clear conclusions about their effectiveness is limited. Additionally, clear guidance and standards for how to design and monitor these programs to ensure they meet the nutritional needs of the children served and ensure they are cured are lacking. There is also a need to build the evidence base on the effectiveness and cost effectiveness of these programs in different contexts to reach consensus, including with WFP, on when local food-based approaches are considered acceptable alternatives, or components of traditional TSFP. We recommend the following actions to help strengthen existing programs and to set clearer standards for future innovation and scale-up.

### Apply More Rigorous Monitoring of Program Outcomes

All the programs we documented that had a primary objective of managing moderate wasting applied similar program admission standards as TSFP. Children were screened and often re-screened before enrollment into the programs. However, this rigor broke down significantly when it came to tracking program outcomes. This is likely because many of the approaches do not discharge children from programs once they reach a healthy MUAC status. Instead, they are retained in the program for the full program period. However, if programs using local foods are designed to manage moderate wasting and support children with recovery, then it is critically important to know if children are actually achieving 'normal' nutritional status and if these programs are meeting Sphere minimum standards and/or country-specific performance standards. Therefore, all local food-based approaches that characterize themselves as managing moderate wasting should collect and analyze data on outcomes that align with Sphere guidance and ensure their approaches meet Sphere minimum standards. Additionally, nutrition clusters globally should include these local food-based approaches to managing moderate wasting as a part of their caseload planning for moderate wasting supplementation and require the same reporting, coordination, and referral standards of these partners as are required of TSFP partners. As national guidelines are revised to integrate updated WHO guidance on wasting management, there is an opportunity to ensure that all moderate wasting management programs, regardless of if they use SFFs or local foods, adhere to and report on the same outcome indicators.

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<sup>24</sup> Risk factors include: MUAC 115–119mm, WAZ <-3 SD, Age <24 months, Failing to recover from moderate wasting after receiving other interventions (e.g. counselling alone), Having relapsed to moderate wasting, History of severe wasting, Co-morbidity (serious or chronic), such as HIV, TB, or a physical or mental disabilities, Illness within 12 weeks before admission into outpatient care, Severe personal circumstances, such as mother died or poor maternal health and well-being, or severe personal circumstances, such as mother died or poor maternal health and well-being (WHO 2023)



## **Develop Clearer Guidance on the Minimum Nutrition Composition of Recipes that use Local Foods to Manage Moderate Wasting**

Current global guidance on the nutritional needs of moderately wasted children remains limited, despite the updates provided in the new 2023 WHO guidance. This is especially true when looking at standards for non-fortified local foods that can be used to support recovery from moderate wasting. The updated guidance recognizes that not all moderately wasted children need SFF to recover. Instead, the guidance emphasizes the use of local foods for recovery and prioritizes SFFs for high-risk cases. The guideline also highlights the need for more research to better understand the nutrient requirements for children with moderate wasting, including the efficacy of the use of home foods. Given the limited level of guidance on nutrient requirements for moderately wasted children and the scientific rather than operational format in which this information is currently available, it is understandable that the nutritional composition of local food-based recipes provide a wide range of different nutrients in different quantities. As recommended in the WHO guidance, the global community should invest in the necessary research and debate to strengthen the evidence base and reach consensus on this important topic. According to the available program data, children enrolled in local food-based approaches to manage moderate wasting appear to be recovering, at least anthropometrically. More detailed guidance is needed to delineate which nutrients, and at what levels, are critical for using local foods to manage moderate wasting versus what should be included in an SFF that targets high-risk children.

Additionally, user-friendly, operational guidance that includes minimum standards for local food-based recipes and guidance on their formulation needs to be developed for use by practitioners. This guidance should also emphasize the need to adjust recipe portions based on a child's weight, as per the revised WHO guidance, and explain how to appropriately select the kcal per kg amount that is appropriate to the implementation context. At present, all portion sizes-including those for SFFs-have a single daily portion size that is not appropriate for children of all ages. Furthermore, guidance on how to adjust ration and portion sizes to account for household sharing and strategies to minimize sharing, such as providing a complementary household ration, should also be developed. This guidance should be accompanied by the tools to conduct the necessary calculations (see "Update the NutVal Tool").

## **Undertake More Non-Inferiority Studies to Compare the Effectiveness of Local Foods with Commercially Prepared SFFs**

All of the documented approaches, with the exception of Caritas MADDO's kitoobero recipes, conducted some kind of nutritional analysis to understand the nutrient composition of their recipes. However, only one partner (AFI) conducted a non-inferiority study to determine if the program outcomes following the provision of the product (METU-1) were non-inferior to specialized food products (Amegovu et al. 2014a). Globally, there is a lack of research on the non-inferiority of local food-based recipes. In our non-systematic literature review, we found only one other non-inferiority trial that took place in Ethiopia for a flour-type product that was mixed with oil and served as a porridge (Nane, Hatløy, and Lindtjorn 2021). We did not identify any non-inferiority trials focused on recipes prepared at home that more closely resembled family meals (e.g., the kitoobero recipes). More research needs to be done to determine if certain types of recipes made from local foods (e.g., a flour blend for a porridge or a meal based on local recipes) are more or less effective or potentially more appropriate for different contexts. Learning from this type of research may also help inform better guidance on nutrient requirements and prioritization of nutrients.

## Study the Benefits of Complementary Activities

The updated WHO guidance emphasizes that although dietary management is necessary for recovery from moderate wasting, it is usually not sufficient. The guidance states that children with moderate wasting should also be comprehensively assessed and treated wherever possible for medical and psychosocial problems leading to or exacerbating the episode of wasting (WHO 2023). Many of the approaches we documented, particularly those with longer durations, provide a range of complementary activities that benefit the caregiver and/or household in addition to addressing moderate wasting in a particular child. However, available data did not allow us to understand the additional benefits that these complementary activities may have for recovery, relapse, or prevention of other cases of moderate wasting in the household. Additionally, the approaches we documented focus primarily on educational aspects and do not necessarily co-locate or directly provide additional health services at their implementation sites, although referrals may be made. Only the NECs in Uganda mention hosting clinic days at the NEC sites. The only program that mentioned psychosocial benefits was Porridge Mum but these focused more on the benefits the mothers found in having a “safe space” to come together during the program and did not include professional support for the women or their children. More research is needed to understand which complementary activities may support additional benefits beyond just anthropometric recovery and the contextual factors that may influence their effectiveness.

## Conduct Costing Studies to Better Understand Tradeoffs Between Program Duration, Outcomes, and Cost

The long duration of some of the approaches that we documented - as long as 8–12 months - implies higher costs when compared to programs of shorter durations, particularly if those programs are also providing the food, cash, or vouchers as part of the program. However, it is important to understand if these longer programs lead to better overall outcomes for the children, not just in terms of cure rates but also looking at other indicators such as the number of relapsed cases and a possible reduction in wasting overall within supported households - especially for programs that provide additional support beyond just the management of a moderately wasted child. Depending on the mix of interventions, it may also be appropriate to consider outcomes related to the overall quality of nurturing care and social and emotional support for caregivers. If additional beneficial outcomes beyond cure rates can be identified, the longer and more costly program may actually be more cost effective. Very little research has been done on this topic and more information is needed to help practitioners determine the optimal duration and mix of interventions to include in these more expansive, community-based programs. Costing studies should be designed to consider differences in cost effectiveness in programs that also provide complementary interventions and may have multiple desired outcomes. Additionally, advocacy with implementers designing these programs to include more specific metrics around the perceived benefits of the approach would go far in promoting healthy evidence generation.

Furthermore, costing studies contribute to the documentation of these approaches by outlining the necessary components for implementation and societal costs to participation. This type of information is important for decision-makers when considering the feasibility and appropriateness of scale-up and when considering what factors may contribute to or detract from future program sustainability. Flexible financing approaches that allow for fluid implementation periods and do not have fixed implementation sites, such as the type used by the NECs in Uganda, may also be worth investigating as part of the contextual factors that contribute to differences in cost-efficiency or effectiveness of different approaches.

## Convene a Global Consultation on Local Food-Based Approaches for Managing Moderate Wasting

In our discussions with implementing partners, several mentioned tensions between partners, ministries of health, and WFP about if, when, how, and where local food-based approaches should be implemented. This was particularly true in areas where WFP-supported TSFP were also present but unable to provide full coverage. Following the release of the updated 2023 WHO guidance and as a follow up to the findings of this report, a global convening of partners, governments, donors, and WFP would be a useful next step to begin to provide clearer operational guidance for both implementing partners and WFP on when local food-based approaches should be considered acceptable alternatives to TSFP for addressing moderate wasting.

## Update the NutVal Tool

Many practitioners are already familiar with NutVal. Rather than creating a new tool to support the development of local food-based recipes to manage moderate wasting, we recommend that the NutVal tool be updated to include a broader range of local foods and to include more nutrients. The tool is currently undergoing an update; however, more discussion and consensus on the essential nutrient requirements and composition of recipes to manage moderately wasted children is required before some of these updates can be made. At a minimum, carbohydrates, fiber, and sodium should be added to the tool now.



Women prepare locally produced flour for moderately wasted children. Photo Credit: Franck Boyer, NCBA CLUSA

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## Annex I: Tom Brown, Nigeria

The Tom Brown approach was developed by CRS. In this approach, women gather in groups to produce a flour called Tom Brown that is then prepared as a porridge and fed to children 6–59 months of age with moderate wasting. Originally, Tom Brown flour was used as a supplemental product to support the organization’s broader work with orphans and vulnerable children as part of the USAID-funded Sustainable Mechanisms for Improving Livelihoods and Household Empowerment (SMILE) project and the multi-sectoral Feed the Future Nigeria Livelihoods Project. Both projects were implemented from 2013–2018. SMILE was implemented in North Central and South South regions and the Federal Capital Territory (FCT) whereas the Feed the Future project was implemented in the North West and North East Regions, and FCT. In 2018, CRS started implementing the Tom Brown approach in a humanitarian context in the northeast of Nigeria in Adamawa, Borno, and Yobe states (CRS 2021). The approach was introduced after observing gaps in treatment coverage for moderately wasted children and prolonged shortages of RUSF. Since its introduction, the approach has been adopted by several organizations working in the North East. The name “Tom Brown” is thought to come from the instructions given during the preparation of the flour to “turn brown,” likely in reference to the roasting of the ingredients.



Women prepare Tom Brown flour to treat moderately wasted children in Borno State, Nigeria. Photo Credit: Halima Haruna, consultant for USAID Advancing Nutrition

### Program Design

Tom Brown is a community-based approach that builds on the Positive Deviance/Hearth model<sup>25</sup> with adaptations for food insecure environments. A key adaptation for this setting is that the implementing organization provides the food items required to produce the Tom Brown flour, whereas the Positive Deviance/Hearth model typically relies on food contributions from the participating households (CRS 2021). All the organizations use the same basic four-step approach, illustrated in figure 4, with some variations in the standard timeline.

Figure 4. Tom Brown Implementation Steps and Timing



Prior to the start of the implementation process detailed above, several preparatory selection and training processes take place. Implementing organization staff select and train community nutrition mobilizers (CNM) who provide site-level oversight and support. Then, the CNMs, with support from

<sup>25</sup> For more information on this model see: Nutrition Working Group, Child Survival Collaborations and Resources Group (CORE), Positive Deviance / Hearth: A Resource Guide for Sustainably Rehabilitating Malnourished Children, Washington, D.C: December 2002.

project staff, support the selection of lead mothers by the community and provide training on the Tom Brown approach. The lead mother’s home becomes the program site where the majority of the activities take place. The lead mother is provided with training on the Tom Brown flour preparation, infant and young child feeding (IYCF), good hygiene, and is given all the necessary cooking utensils to teach the enrolled caregivers how to prepare the Tom Brown flour. In addition to the preparation of the Tom Brown flour, which is described in more detail below, the Tom Brown groups receive weekly counseling on IYCF from the CNMs.

All organizations use a similar set of personnel to implement the Tom Brown program. The main roles and their responsibilities for the site-level implementation are detailed in table 12. In addition to these site-level roles, monitoring and evaluation, logistics, procurement, and overall management and administration personnel are also required to support broader program functions.

**Table 12. Tom Brown Staffing Roles and Responsibilities**

Role	Responsibilities
Implementing organization staff (e.g., nutrition officer) 1 per 25–30 CNMs	<ul style="list-style-type: none"> <li>• Identify program sites</li> <li>• Select and train CNMs</li> <li>• Supervise and support CNMs</li> </ul>
CNMs 1 per 3 lead mother	<ul style="list-style-type: none"> <li>• Select and train lead mothers (with support from the implementing organization)</li> <li>• Initial MUAC screening, enrollment and referrals; train mothers on MUAC assessment</li> <li>• Prepare for and support weekly Tom Brown sessions, including IYCF counseling</li> <li>• Conduct household follow-up visits</li> </ul>
Lead mothers 1 per 12 (average) caregivers	<ul style="list-style-type: none"> <li>• Provide meeting site for Tom Brown group</li> <li>• Train caregivers on flour and porridge preparation (with support from CNM)</li> <li>• Host and lead weekly sessions</li> </ul>

### Local Food-Based Recipe and Ration

All organizations use the same basic Tom Brown recipe as presented in the CRS Tom Brown Implementation Guide. The recipe is prepared in peer groups by the Tom Brown group members in large batches - enough to ensure each caregiver can receive a weekly take-home ration of 1.5 kilograms (kg) of prepared flour - using a 6:3:1 ratio of cereals (maize, millet, and/or sorghum), soya, and groundnuts. As per the Tom Brown Implementation Guide, the flour is prepared over a 3-day period. This 3-day timeline is used by CRS and PUI whereas Save the Children instructs the groups to prepare flour over a 4-day period. During our site visits, we observed the groups preparing the flour and found that the recipe was respected. Groups across sites also followed appropriate hygiene protocols, such as handwashing and cleaning of cooking utensils before use. All sites use electric grinding mills that are already available in the communities; the mills are not provided by the implementing organizations. The steps and timeline for flour preparation used by each organization are outlined in table 13.

**Table 13. Tom Brown Flour Preparation Steps and Timeline**

CRS and PUI	Save the Children
Day 1: Soak cereals (2 hours) and soya (12–24 hours).	Day 1: Grain provision and washing
Day 2: Remove cereals and soya from soaking liquid and rinse. Husk soya beans. Place in shaded area for drying.	Day 2: Roast the cereals and groundnuts, soaking and husking of soya beans
Day 3: Roast all ingredients, mix, and grind into flour. Portion and distribute weekly ration.	Day 3: Roast remaining ingredients (soya)
	Day 4: Grind ingredients, porridge preparation, flour distribution

### At-Home Preparation and Feeding

All organizations provide the same weekly 1.5kg ration and the moderately wasted child is to consume approximately 214 grams (g) of the flour prepared as a porridge per day, in two to three servings, in addition to their usual meals. PUI mentioned that occasionally they provide bi-weekly rations. The CRS Tom Brown Implementation Guide explains that this can be done as a response to security challenges, which, although not explicitly mentioned by PUI informants, is likely why this strategy is used by PUI.

Informants did not describe the at-home preparation process used to turn the Tom Brown flour into a porridge. The CRS Tom Brown Implementation Guide states that the “preferred quantity of powder” should be mixed with clean water to form a paste. Then the paste should be poured into a pot of clean, boiling water at a quantity about three times the amount of the paste. This should be stirred and cooked for 5–15 minutes, depending on the quantity, until it thickens (CRS 2021). Guidance on how to store extra porridge, if more than one portion is prepared at a time, is not provided in the guide.

According to the information presented in the Tom Brown Implementation Guideline, it seems that a child must consume the full 214g of flour daily for it to be comparable to other SFFs.

Potential sharing of the ration is not mentioned, and the weekly ration size has not been adjusted to account for potential household sharing, which was highlighted by informants as a challenge (see “Implementation Challenges”). We were able to observe the preparation of the flour at both the CRS



Women in Borno State wash the ingredients for the Tom Brown flour before laying them out to dry. Once dry, the ingredients are ground into flour. Photo Credit: Halima Haruna, consultant for USAID Advancing Nutrition

and Save the Children sites. We were able to observe the cooking demonstration and on-site consumption of the porridge by children at all three of the visited CRS sites, as our visit coincided with the first week of the program feeding period when the cooking demonstration was done. Among children observed consuming the porridge we estimated that, on average, the children ate about half of the portion given to them. We did not observe cooking and feeding at the Save the Children sites, as this activity is typically only part of the training/cooking demonstration process that takes place in week one of the program.

### Sourcing and Storing the Local Foods

The way the cereals, soya, and groundnuts were sourced and provided to the Tom Brown groups varied across the organizations.

CRS buys grains in bulk, according to the number and size of the active Tom Brown groups and delivers the grains to CRS warehouses in three deliveries on a schedule of between 2–4 weeks, depending on the availability of the foods. The maximum amount of time the foods stay in the CRS warehouse before distribution to the sites is 4 weeks. CRS delivers the required flour ingredients to the lead mothers on a weekly basis where it is stored until the first day of preparation of the next weekly batch of flour.

PUI conducts a competitive bidding process to identify local vendors to supply the grains. However, due to limited production in Monguno caused by insecurity and frequent armed attacks, the grains are purchased in Maiduguri and then transported to Monguno. This is approximately a 2-hour journey (130–170 kilometers [km]) journey, depending on the route taken and the condition of the roads. The grains are stored in PUI's central warehouse in Monguno and delivered to the sites on a weekly basis. The supply requests must first be validated by the PUI logistics team to help ensure accountability and limit misuse.

Save the Children works with a local partner, Green Concern for Development (GREENCODE), to procure and deliver the grains to the sites on a weekly basis. This same partner also procures and delivers the required cooking utensils to the groups.

Save the Children and CRS also train the CNMs and lead mothers on how to identify bad or spoiled grains and have visual aids to help with this process. PUI informants or documentation did not indicate if PUI provides similar training.

Support for safe household-level storage of the Tom Brown flour also varied. CRS encourages caregivers to safely store the Tom Brown flour at home, which, according to the Tom Brown Guideline, means in an airtight container that is free from moisture. However, informants did not state that any kind of suitable storage container was provided to caregivers to help facilitate proper storage. When kept under ideal conditions, the Tom Brown Guideline states that the flour can last up to 6 months but does not encourage consumption after 2 months due to the likelihood of improper storage at the household level (CRS 2021).

PUI provides reusable airtight containers for the groups to use to package and distribute the Tom Brown flour. These same containers are returned and refilled each week. Caregivers also receive guidance on how to properly use and store the flour.

Save the Children has the most extensive process to ensure proper household storage and use of the prepared flour. Save the Children provides caregivers with an airtight, covered container to store the powder and caregivers receive training on its use and proper storage of the Tom Brown flour. They also provide a specific spoon to aid with the measurement of 1 day's ration of the flour that can be prepared all at once to avoid frequent reopening of the container.



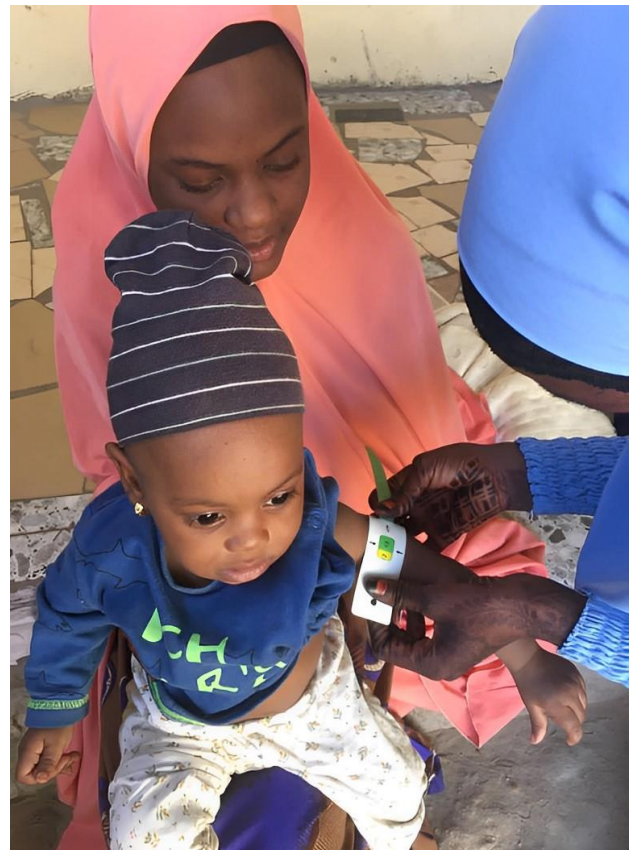
## Fortification

The CRS Tom Brown Guidelines state that Tom Brown flour is not an FBF (such as CSB or SuperCereal) as the addition of micronutrients using MNP is not part of the standard recipe. However, to further improve the nutritional status of the children consuming the Tom Brown flour, CRS and Save the Children<sup>26</sup> have started to advise and encourage the use of MNP to fortify the Tom Brown flour in order to increase its vitamin and mineral content. Caregivers are instructed to fortify the porridge before consumption. Children should consume 1 sachet per day, when adequate supplies are available, or at least 3–5 sachets per week.

Fortification of prepared Tom Brown flour was not observed in any of the sites visited. However, informants confirmed that MNP is being used. At the time of data collection, implementing partners receive MNP from the United Nations Children’s Fund (UNICEF) via the outpatient treatment centers for severe wasting, although Save the Children mentioned it does have additional budget to supply MNP to its Tom Brown groups. Informants mentioned that regular availability of MNP has been a problem. According to national guidance, use of MNP is first prioritized for children 6–23 months and is provided to children up to 59 months only when adequate MNP supplies are available.

## Program Enrollment and Discharge Criteria

All organizations use the same MUAC-only enrollment and discharge criteria. However, the programs differ on Tom Brown group size and the period during which children can be enrolled into a Tom Brown program. CRS and PUI do not enroll children on an ongoing basis. A set number of Tom Brown groups are established as part of the initial mass screening and enrollment process. CRS enrolls all children identified during the initial screening in a Tom Brown group, establishing as many groups as required to cover all identified children. If new cases of moderate wasting are identified during the program cycle, CNMs at both the CRS and PUI sites provide caregivers with IYCF counseling until a new program cycle begins. PUI conducts mass MUAC screening and establishes new Tom Brown groups every 2 months whereas CRS does this every 3 months. In contrast, Save the Children allows new children to be added to existing Tom Brown groups up until the second week of feeding in an existing program group or creates new groups for children identified after the existing groups have been running for more than 2 weeks. A key informant who is familiar with the initial design of Tom Brown explained that ongoing enrollment is typically not done because initial screening informs the planning for the groups, including the number of groups to be established and the amount of food inputs required to produce enough flour.



Children are screened on a weekly basis by the CNMs. Here, a child in Borno State is screened using MUAC. Photo Credit: Halima Haruna, consultant for USAID Advancing Nutrition.

<sup>26</sup> AAH also uses Tom Brown flour as one of the recipes in its Porridge Mum approach and encourages fortification with MNP.

All organizations refer children with severe wasting (MUAC < 115 millimeters [mm]) to the nearest outpatient or inpatient treatment site and moderately wasted children (MUAC  $\geq$  115 mm to < 125mm) are enrolled in the Tom Brown program. Caregivers with non-wasted children (MUAC  $\geq$  125mm) are encouraged by the CNMs to continue with nutritious feeding. Informants from PUI also mentioned providing IYCF and hygiene counseling to caregivers of healthy children.

Once enrolled, children's MUAC is taken by the CNMs on a weekly basis. Children are considered to have recuperated from moderate wasting when their MUAC measurement reaches 125mm or greater by the end of the program feeding period (either 8 or 10 weeks, depending on the organization). Although some children may reach a MUAC of 125mm or greater before the end of the feeding period, these children are still retained in the program. At the time of our data collection, none of the organizations were requiring children to have two consecutive MUAC measurements of 125mm or greater before being considered recovered, as is the case for TSFP discharge criteria, but CRS noted that they were considering making this change for future programming.

### **Program Duration**

The standard Tom Brown program duration, according to the CRS Tom Brown Implementation Guide, lasts for up to 13 weeks, inclusive of the 2–4 week screening and referral process, 1 week of enrollment, 8 weeks of feeding, IYCF counseling, and weekly MUAC monitoring (CRS 2021). CRS and PUI both use 8 weeks of feeding as part of their current Tom Brown implementation. Informants from CRS explained that the suggested 8-week feeding period was developed through trial and error. Originally the program ran for 4 weeks, then it was increased to 6 weeks, finally settling on 8 weeks based on improved program outcomes for more children as the feeding period was expanded. In contrast, Save the Children currently conducts its Tom Brown feeding for 10 weeks. This change was originally made during the COVID-19 pandemic when Save the Children staff noticed an increase in the non-recovery rate of children enrolled in the Tom Brown program. Save the Children maintained the 10-week feeding period even after the peak of the pandemic subsided as informants stated that they noticed improvements in the recovery rates with the longer feeding period.

### **Procedures for Non-Responders**

For children who have not recovered by the end of the 8-week feeding period, CRS and PUI assess other possible underlying issues, such as health conditions, sanitation and hygiene practices, and household food security and refer households for additional support as appropriate. Non-responsive children will be re-enrolled in the next Tom Brown cycle and followed up more closely.

Save the Children has CNMs conduct a home visit for enrolled children whose MUAC is not improving or remains the same by week 5 of the feeding period (halfway through the 10-week feeding period). If children still have not recovered by the end of the 10 weeks, a more detailed assessment is completed before re-enrolling them in the next program cycle.

All organizations refer children who have deteriorated into severe wasting or have other medical complications to the appropriate treatment services.

Table 14 provides a summary of the Tom Brown implementation variations across the three organizations.



**Table 14. Overview of Tom Brown Approach Implementation Variations Across Organizations**

Organization	Admission Criteria	Discharge Criteria	Enrollment Process	Tom Brown Group Size	Feeding Duration	Flour Preparation Timeline	Non-Responder Follow-Up	Promoting Use of MNP
CRS	MUAC ≥115mm to <125mm	MUAC ≥ 125mm at the end of the program period, re-enrolled in next cycle if still <125mm following completion of an assessment	fixed enrollment period	10–15 women  Base recipe for flour is for 13 people (assumed average of 12 members, plus the lead mother)	8 weeks	3 days	At end of program cycle	Yes
PUI			fixed enrollment period	10–12 women	8 weeks	3 days	At end of program cycle	No
Save the Children			ongoing enrollment in new groups until second week of feeding; new groups established on an as-needed basis after week 2	Minimum of 6–8 children	10 weeks	4 days	At 5 weeks for children whose MUAC is not improving and at end of program cycle	Yes

## Implementation Challenges

Below are the implementation challenges identified through our desk review and mentioned by key informants.

### Household Sharing of Take-Home Ration

All organizations mentioned that sharing of the take-home ration is a challenge. A post-distribution monitoring survey completed by CRS found that 26 percent of caregivers said that the Tom Brown flour was shared with someone else in the household, mostly with other children (CRS 2022b). CRS also conducted focus group discussions with Tom Brown participants in 2022 to gather opinions, feedback, and perceptions of the program. As part of these discussions, program participants explained that culturally it is unacceptable to feed one child in the household and not the others and therefore the porridge is shared amongst the children as it is often the only available food. Mothers recognized that the sharing of the Tom Brown porridge could delay the recovery time of their children and suggested that they be provided with additional household food assistance or other snacks, such as biscuits, that could be given to other children in the household instead of the porridge (CRS 2022a).

An informant from another implementing organization mentioned that fathers have insisted on consuming or tasting the porridge. The same organization also mentioned that some mothers have been known to force their children into moderate wasting (e.g., by causing diarrhea using traditional products) in order to be enrolled in the program and receive the ration. An informant from a different organization mentioned that only enrolling moderately wasted children under 5 is a challenge and that they would prefer to be able to enroll all children under 5, making the program more of a preventative blanket feeding program rather than just a targeted program for the management of moderate wasting.

Ration-sharing is of particular concern, as the weekly ration has not been adjusted to account for this. Therefore, the child may receive less than what is required for recovery, potentially prolonging the recovery period. Two partners, PUI and Save the Children, reported non-response rates of 3 percent and 5 percent respectively but still had cure rates of over 90 percent. Although MUAC measurements are taken weekly to monitor progress, the partners did not have data readily available that shows how long it typically takes a child to reach a healthy MUAC.

### Quality of Program Inputs

Participants in CRS's focus group discussions raised issues with the quality of program inputs, including both the cooking utensils and the local food inputs (CRS 2022a). We were told that CRS has a process whereby the lead mothers can contact a member of staff (the feedback officer) to report poor quality grains, and the organization does quality checks with vendors. However, poor quality grains still seem to be reaching the program sites. CNMs are also trained to detect poor quality grains and train the mothers to do the same. This issue was not mentioned by other implementing organizations. However, because we did not speak directly with program participants, we do not know if other women may have raised similar concerns.

### Time to Produce the Tom Brown Flour

The CRS focus group discussions also revealed that at some sites within Magumeri, LGA participants needed to walk long distances to access a grinding mill to prepare the flour, therefore adding a significant time burden to participate in the program. Access to clean water was also mentioned as a challenge. The report does not provide additional detail as to why these challenges were faced in this particular LGA (CRS 2022a). An informant from another implementing organization also mentioned issues with the time required to prepare the flour, specifically that fathers sometimes complain about the time it takes to prepare the flour, as it is a multi-day process.

## **Security and Seasonal Access**

One implementing organization informant mentioned security and seasonal access issues in their implementation area. Population displacement due to insecurity and attacks is common and disrupts program participation. Additionally, seasonally poor roads make it a challenge to transport grains at certain times of year.

## **Additional Benefits and Facilitating Factors**

The implementing organizations select geographic areas where WFP-supported TSFP services are not available, thereby filling a service delivery gap for moderately wasted children. Information gathered by CRS in 2022 shows that nearly all participants (over 99 percent) felt their child had gained weight during the program. The same proportion indicated that they felt their child enjoyed eating the Tom Brown porridge (CRS 2022b). Women also expressed additional benefits to being in a Tom Brown group as it provides a place to meet, share life experiences, and that the counseling sessions are “emotional therapy” for women facing family challenges (CRS 2022a). The post-distribution monitoring survey also reports that women felt their children ate more food and reported consuming foods from more diverse food groups than before enrollment in the Tom Brown program (CRS 2022b). Lastly, the Tom Brown recipe card has been included in the most recent version of the Nigeria Integrated Management of Acute Malnutrition (IMAM) Guidelines, which may be a facilitating factor for future scale-up of the approach (FMOH 2022).

## **Contextual Considerations**

The Tom Brown Implementation Guide highlights the following considerations when determining if the approach is appropriate for the implementation context.

### **Availability of Existing Wasting Treatment Services**

Tom Brown should be targeted to geographic areas where no other moderate wasting management services are present. Additionally, services for the treatment of severe wasting should be located nearby so that severely wasted children identified during Tom Brown enrollment can be referred to the appropriate treatment services. In areas where severe wasting treatment is not easily accessible, the implementing organization should consider providing support to the caregiver (e.g., provide transportation or give a transportation stipend) to access the service. The Tom Brown Implementation Guideline also suggests that Tom Brown be implemented in areas where the total wasting prevalence exceeds 15 percent (CRS 2021). This guidance differs from the MAM Decision Tool, which suggests moderate wasting supplementation be provided when total wasting prevalence is greater than or equal to 10 percent, regardless of the level of other risk factors (GNC 2017).

### **Population Density and Moderate Wasting Prevalence**

Because Tom Brown activities are done in a group, a minimum number of participants, ranging from 6 to 10 across the implementing organizations, is required to make the program viable. Too few children make the program potentially too expensive per child. Therefore, Tom Brown should be implemented in areas with a dense enough population or a high enough prevalence of moderate wasting to be reasonably sure enough children will be able to be enrolled in the program. The Implementation Guide notes that participants should not need to walk more than 15–30 minutes to take part in a group.

### **Functional Local Markets and Availability of Other Key Infrastructure**

Access to a functional local market from which to procure the local foods is ideal. Although PUI has been able to implement the approach by transporting the food from another local government area (a lower-level administrative unit within a state), this has introduced additional costs and some logistical constraints. The amount of food, proximity to the implementation sites, and seasonal availability are all important considerations before deciding to implement this approach.

In addition, other key infrastructure should be considered and assessed. Access to a grinding mill and a local source of power to operate the mill are required as are adequate amounts of safe water and fuel for preparing the porridge. Adequate warehousing infrastructure should also be considered when buying the grains in bulk and storing them before distribution to the implementation sites.



Women in Borno State receive counseling on IYCF practices following the packaging and distribution of the Tom Brown flour.  
Photo Credit: Halima Haruna, consultant for USAID Advancing Nutrition

## Annex 2: Porridge Mum, Nigeria

Porridge Mum is an 8-month program designed to prevent moderate wasting in pregnant and lactating women and their young children who are also beneficiaries of AAH's food security and livelihoods (FSL) programming. It is based on a modified Care Group model to provide mother-to-mother support in emergency settings (Yakowenko and Pietzsch 2017). The approach was designed following a needs assessment carried out in March 2015. The needs assessment identified very low dietary diversity among children under 5 years of age as a key contributor to undernutrition levels amongst internally displaced persons and host communities. Additional identified drivers included a lack of access to food at the household level, hygiene behavior and facilities, knowledge and practices around complementary feeding, and the impact of psycho-social trauma on caregiving practices. To address these challenges, AAH developed the Porridge Mum approach and conducted the first pilot from February to August 2016 in Borno state (AAH 2017b). The model was refined based on learning from the pilot and has been implemented in the form described below since 2017.

### Program Design

Porridge Mum is designed to be implemented alongside other food and cash distribution programming. It is not designed specifically as a moderate wasting management approach, but rather provides support to pregnant and lactating women or another caregiver with children under the age of 2.<sup>27</sup> Porridge Mum groups are made up of 12–15 women, with two leadership roles: a secretary and a treasurer. These individuals are responsible for managing the group's smart card, through which electronic vouchers are received, and documenting food purchases and group participation.

Before Porridge Mum groups can be established, AAH constructs a communal kitchen. These sites are used for monthly education and cooking demonstration sessions. The kitchen sites are designed large to allow for cooking large amounts of food and to provide enough shaded space for gathering. AAH did a review of different cook stove designs and settled on a locally adapted version of the Lorena stove. Lorena stoves are typically made of sand and clay and are designed to be fuel efficient and produce minimal smoke. AAH has local contractors who produce these stoves for the Porridge Mum sites.

Once the kitchens are ready, groups are established, and the secretary and treasurer are identified and trained. After training is complete, monthly electronic vouchers transfers begin and typically continue for 8 months, although key informants did mention that there could be some variation in the length of the transfer component, depending on available funding. The general steps and timeline of the approach, once these initial setup steps are completed, are presented in figure 5.

**Figure 5. Porridge Mum Implementation Steps and Timing**  
8 MONTHS TOTAL



<sup>27</sup> AAH documentation from the pilot sites states that the program covers children up to the age of 5. However, key informants explained that in practice the program only covers children up to the age of 2.



Transfers are made both to the Porridge Mum group treasurer for group-related expenses and to each enrolled woman. The group treasurer receives two transfers that total Nigerian Naira (NGN) 50,000 (a little over \$100; NGN 40,000 in food vouchers and NGN 10,000 in cash) to purchase food and firewood for the group cooking demonstrations. During COVID-19, the transfer was adjusted to NGN 35,000 in vouchers and NGN 15,000 in cash because of fuel and firewood price increases. Each Porridge Mum group member also receives a monthly electronic transfer of NGN 5,000 (around \$10) for the purchase of fuel, food, and transportation to the Porridge Mum site. Each woman is also expected to contribute an equivalent of NGN 1,000 (around \$2) of food items to the group cooking demonstrations. Electronic transfers are done through a partner organization, Red Rose, which specializes in humanitarian sector services including e-vouchers, cash transfers, and beneficiary data management.

Group cooking sessions take place each time a new recipe is introduced, typically monthly. However, during COVID-19, the cooking schedule was adapted. Porridge Mum groups were divided into groups of no more than five members to aid with social distancing requirements and reduce the risk of spreading the virus. These smaller groups used the kitchens on a rotational basis. On this schedule it is possible to hold two cooking sessions a month.

During cooking sessions, nutrition education sessions are also conducted, covering topics such as maternal nutrition during pregnancy, complementary feeding from 6 months, general hygiene practices, family planning, COVID-19 transmission and preventive measures, child immunization, and the importance of food and water hygiene. Monthly MUAC screening is completed for all participants by the program staff during the nutrition education sessions. Women are also trained on how to use MUAC tapes so they can also screen their children and each other at home on a more frequent basis. Women are also taught how to check children for edema. This is intended to support ongoing case finding so that children with wasting can be referred for management or treatment and so that women can see the improvement in their own children’s nutritional status while enrolled in a Porridge Mum group. Staffing requirements and roles for field level implementation are summarized in table 15.

**Table 15. Porridge Mum Staffing Roles and Responsibilities**

Role	Responsibilities
AAH staff	<ul style="list-style-type: none"> <li>• Selection of kitchen site, in consultation with local leaders</li> <li>• Group enrollment</li> <li>• Training of Porridge Mum secretary and treasurer</li> </ul>
Red Rose	<ul style="list-style-type: none"> <li>• Electronic cash and voucher disbursements</li> </ul>
Nutrition Assistants	<ul style="list-style-type: none"> <li>• Conduct monthly education sessions</li> </ul>
Porridge Mum group secretary and treasurer	<ul style="list-style-type: none"> <li>• Manage group’s electronic vouchers</li> <li>• Track purchases and meals received</li> </ul>

### Local Food-Based Recipe and Ration

The original set of Porridge Mum recipes were derived from the Working to Improve Nutrition in Northern Nigeria programme Food Demonstration Manual, which uses local foods common to northern Nigeria (Yakowenko and Pietzsch 2017). The current set of recipes includes bean porridge, *tuwo* (maize flour) with okra soup, potato porridge, yam porridge, rice and spinach, jollof rice with beans, *moi moi*, and *tuwo* with vegetables. In addition, women are also taught to make Tom Brown flour so that Tom Brown porridge can be consumed by women and children with moderate wasting. Each



recipe has suggested portion sizes for children 6–23 months and for women based on lactation status. Each Porridge Mum member is encouraged to have one of the recipes as a daily meal. None of the recipes include animal-source foods, due to challenges with storage. Women are encouraged to use part of their individual monthly transfer to purchase these foods. However, based on our desk review, it does not appear that the accessibility of these foods, given the value of the monthly voucher and required contributions to the Porridge Mum cooking demonstrations, has been assessed.

No specific guidance on additional feeding for moderately wasted children, beyond the use of the Tom Brown flour, is provided as Porridge Mum is not designed as a wasting management program. Key informants did not provide additional details about how Tom Brown has been incorporated into Porridge Mum. For example, it was not explained if or when women gather to produce the flour or how they obtain the necessary ingredients to do so. It was mentioned, however, that AAH staff encourage the women to fortify the Tom Brown flour with MNP, but the source of the MNP and its availability was not mentioned.

### Preparation and Feeding

During cooking demonstrations, women come together at the communal kitchen to learn the new recipe. At these sessions, the food prepared is consumed by the women in the group and any children they have that are under the age of 2. No other community members are allowed to consume the prepared food. Women are then encouraged to use their personal vouchers to purchase the ingredients to replicate the meals at home. The choice of recipes is based on the seasonal availability of the ingredients, and many of the recipes build upon already culturally accepted foods and meals. Women usually cook together twice per month, when cooking demonstrations of new recipes take place.

### Sourcing and Storing the Local Foods

Foods are purchased locally using the electronic vouchers. AAH has approved food vendors who are selected using a competitive procurement process. Because women and the groups can use the vouchers at any time, foods can be purchased fresh or close to the cooking time, limiting the need for storage and reducing the chance of spoilage.

### Program Enrollment and Discharge Criteria

Nutritional status is not part of the enrollment criteria for the Porridge Mum program. Porridge Mum participants must be beneficiaries of AAH's FSL programming. Pregnant and lactating women are identified from the FSL registry based on a set of vulnerability criteria. Criteria used by AAH monitoring and evaluation staff to determine eligibility include: characteristics of the head of household, dependency ratio (six and above), household workforce (less than or equal to two per household), proportion of income spent on food on an average a month, debt level, reduced Coping Strategy Index, Food Consumption Score, Minimum Dietary Diversity for Children, incidence of diseases in the household, and access to water. Once the status of the identified women is confirmed, they are registered and placed in a Porridge Mum group. Any children under 24 months of age whose mothers or caregivers are enrolled in Porridge Mum are also enrolled. Typically, there are equal numbers of women and children in the group, with the occasional woman having more than one child within the eligible age range. Informants from AAH noted that they are looking at ways to expand the admission criteria, including once again covering children up to the age of 5, but that the main constraint to doing so is funding. AAH will create enough Porridge Mum groups so that all eligible women in the implementation area can be enrolled in a group, meaning more than one group may share a community kitchen.

Pregnant and lactating women are discharged under the following circumstances: loss of pregnancy, death of the enrolled child or mother/caregiver, graduation from the broader FSL program, mothers are no longer lactating, or the child ages out of the program (older than 24 months). When a woman exits the program, a new woman that meets the eligibility criteria is enrolled to maintain the group's numbers.

## Program Duration

The typical Porridge Mum program runs for 8–12 months and is embedded within a 12-month FSL program. The program duration varies according to the budget available for that Porridge Mum programming cycle. FSL programming usually includes unconditional cash and/or voucher transfers for households that meet the vulnerability criteria.

## Procedures for Non-Responders

Moderate wasting management services are typically not available in the areas where the Porridge Mum approach is implemented. Therefore, if a child within the group is identified as moderately wasted, the caregiver is encouraged to practice good feeding practices. There was no mention in the documentation or by key informants of additional cash or voucher support being provided to support the purchase of food for additional feeding of the moderately wasted child. Children in the group who deteriorate and become severely wasted are referred to nearby treatment services. AAH typically also supports the treatment of severe wasting in its intervention areas. The available documentation and key informants did not mention what happens to children who remain moderately wasted upon the completion of the 8-month program, however, the evaluation report includes data indicating that there were still low numbers of moderately wasted children in the Porridge Mum groups at the conclusion of activities. The report estimated that around two percent of enrolled children were still moderately wasted, which is much lower than the expected prevalence of moderate wasting in the North East. Similar benefits to changes in the nutritional status of the enrolled women were not seen, with the number of pregnant and lactating women (PLW) with a MUAC below 230mm remaining stable at 16 percent throughout the examined period (AAH 2021).

## Implementation Challenges

An external evaluation of the Porridge Mum approach identified several implementation challenges (AAH 2021).

### Ongoing Access to Kitchens

Porridge Mum kitchens were built on land owned by community members, showing community engagement in the program activities. However, some landowners later claimed their land back, compromising future activities. Although AAH engaged with community leaders to select the initial kitchen sites, having an enhanced community stakeholder engagement process at the start of the project has been suggested to help avoid this type of problem for future sites.

### Cash and Voucher Transfers

The approach has also faced some challenges with the voucher component of the program. Examples highlighted in a past evaluation include issues with defective smart cards (which are used to receive the electronic vouchers), smart cards being damaged or lost, and unstable network connection, which has caused data synchronization problems. In some cases, PLW did not come for disbursements due to competing priorities/activities. The inadequate quality of food items provided by vendors was another documented challenge.

### Population Movement and Insecurity

Insecurity and the resulting displacement of program participants has disrupted activities. In some instances, staff have had to shift to remove interventions due to inability to access the sites. AAH has also made use of contingency funds to enroll additional participants who are internally displaced persons who have fled from more insecure parts of the North East.

In addition to the above-mentioned challenges, several other issues emerged from our desk review and key informant interviews.

## Food Sharing

AAH has noted that there is evidence of sharing of the food prepared during the Porridge Mum group cooking demonstrations, even though this food is only supposed to be consumed by group members. Sharing happens with spouses, elderly women, and other children and family members, although the degree of sharing varies from group to group, and there is no indication that it is shared widely or broadly within communities (AAH 2017b; Yakowenko and Pietzsch 2017). Lessons learned from early iterations of the program indicate that food sharing may be more common in areas where there are many women who meet the targeting criteria but are not enrolled in a Porridge Mum group (Yakowenko and Pietzsch 2017). Participation by non-group (non-PLW and their children under 2) was tracked and evaluated as part of the external evaluation, and it was found that non-group member participation generally decreased over the implementation period. However, a spike in male participation was noted around the time that the Porridge Mum groups were used to share information about COVID-19 transmission and prevention (AAH 2021). While it makes sense to use Porridge Mum as a platform for these other activities, it may also be contributing to food sharing.

## Barriers to Behavior Change

Key informants noted cultural barriers in adopting health services and challenges with the uptake of complementary feeding as some examples of behavior change challenges. However, husbands and other community members have not been involved in the sensitization process around IYCF, despite their cultural roles influencing decision-making regarding mothers' practices. Furthermore, the term "Porridge Mum" may make it difficult for men to participate in related activities. AAH has noted the need to take a more gender-sensitive approach to its Porridge Mum programming and has started piloting a "Porridge Dad" component in Monguno called "*Baba Mai Kulawa*" which translates to "Father that cares."

## Additional Benefits and Facilitating Factors

Despite not being designed as a management program, Porridge Mum groups do seem to have a positive impact on the nutrition status of enrolled children although similar enefits were not seen for enrolled PLWs (AAH 2021). Women participating in Porridge Mum groups have remarked on the improvement in their children's health, with one woman noting that the group also provides a space for the women to come together, share their experiences, and support one another (AAH 2017a). Women also shared that they enjoyed learning the new recipes and have cooked them at home for their families. They also mentioned discussing and sharing information they learned during education sessions with other members of the community who were not part of the group (AAH 2017b).

## Contextual Considerations

Key informants and existing documentation highlighted several important contextual considerations that may influence Porridge Mum outcomes.

### Presence of an Existing FSL or Cash/Voucher Transfer Mechanism

Porridge Mum has always been implemented by AAH as part of an FSL program with a pre-existing beneficiary list and an electronic transfer system in place. These systems are complex and can be resource-intensive to put into place. In contexts where this type of programming does not already exist, it will need to be planned as part of the set-up for the Porridge Mum approach, at least in a food insecure or emergency setting where participants do not have the means to provide food inputs themselves.

Appropriate vendors with adequate food stocks also need to be available and equipped with the necessary skills and equipment for cash and voucher transfer redemption.

## **Kitchen Construction**

Porridge Mum activities center around the communal kitchen. As highlighted earlier, finding an appropriate place in the community for construction has posed a challenge in the past. Kitchen construction also requires lead time and an upfront investment in the development of the required infrastructure before group enrollment and activities can begin. In highly insecure settings, there is a risk that populations may be displaced and communities abandoned, rendering these investments unusable, even if only temporarily. The number of households or nearby communities to the kitchen site should also be considered to ensure that there will be enough women to continue to establish Porridge Mum groups for several rounds of programming.

## Annex 3: Local Flour Production, Senegal

The local production of flours used for supplemental feeding is widespread in Senegal. These products are used both for prevention and treatment of moderate wasting and are produced commercially by the private sector and at the community level. At present, the majority of management sites for moderately wasted children are under PRN, coordinated by the Conseil National de Développement de la Nutrition ([CNDN]; National Nutrition Development Council). The PRN receives support from a range of local implementing partners and donors to complete its work. When selecting Senegal for this case study, we looked at the work of the USAID/Neema and Feed the Future Kawolor projects, both of which contributed to the production of locally produced flours for the management of moderate wasting. Since the closure of these projects, many of their former sites have been taken over by PRN or other implementing organizations.

### Program Design

We have detailed the approaches to local flour production used by the now-closed USAID/Neema and Feed the Future Kawolor projects as well as the currently operating PRN sites.

#### USAID/Neema

The USAID/Neema project was implemented from 2016–2021 and broadly focused on reinforcing the provision of integrated health services and promoting healthy behaviors. The project's nutrition component, which was supported by Helen Keller International, included training of health care providers and community actors on essential nutrition and health actions, vitamin A supplementation, and support for the management of severe and moderate wasting.

For the management of moderate wasting, the project supported women's groups to increase the availability of a local blended flour for the management of moderate wasting among children 6–59 months and pregnant and lactating women with MUAC < 230mm. Moderate wasting management interventions followed the national IMAM guidelines and were very similar to the current PRN program.

#### Feed the Future Kawolor

The Feed the Future Kawolor project was implemented from 2017–2022. Its goal was to improve the consumption of diverse, healthy, and nutritious foods by women of reproductive age and children under 5 years of age. The project undertook a range of agriculture and nutrition-related activities. To support the uptake of improved food and nutrition practices, the project formed women's groups, called *Debbo Galle* (Empowered Women) groups. These groups were made up of women of reproductive age between 15–49 years and grandmothers to engage in nutrition and livelihood activities, including the production of flour. In some locations, these groups also engaged in savings and loan activities. These groups partnered with treatment sites so the flour could be used for the management of moderate wasting. The flour was also promoted for use in complementary feeding for children under 2. This project did not engage directly in the management of children, but rather focused on the sustainable, community-level production of the flours that can be used for moderate wasting management.

#### Projet de Renforcement de la Nutrition

PRN is a national program managed by the CNDN. It seeks to institutionalize nutrition through the promotion of integration of nutrition objectives within national sectoral plans and to implement intervention focused on pregnant and lactating women and children under age 5. PRN is implemented with support from community-based organizations. PRN's activities include management for moderate wasting and treatment for severe wasting. Its interventions currently cover 70 percent of local authorities (e.g., departments and communes) across 14 regions and work with 12,000 community

workers. In areas where there is not currently PRN coverage, NGOs provide support for wasting treatment in accordance with national guidelines.

Although local production of flours is common in Senegal, they are still not the first choice of product for moderate wasting management according to the country's national IMAM guidelines. Children are ideally managed with RUSF. Therefore, the purchase of locally produced flours is also not a high priority for PRN, primarily because of budget considerations. RUSF and fortified flours, such as CSB+ or SuperCereal, are provided in-kind by WFP and, therefore, have no cost to the program. Local flours are purchased from local production groups, and, therefore, have a cost, making them a product of last resort to fill gaps when there are shortfalls of imported products. Due to the wide range of ways that local flour is produced, we have not provided a breakdown of staffing requirements for the approaches in Senegal. Descriptions of the various approaches are provided in the sections below.

### Local Food-Based Recipe and Ration

Key informants explained that there are hundreds of recipes for locally produced flours in Senegal. While we did find variation in the recipes at the sites we visited, they tend to follow some common guidelines and include three measures of a cereal (either a single type or a mix of cereals such as millet, maize, rice, or sorghum), one measure of a legume - usually cowpea (*niébé*), and one measure of an oilseed - typically ground peanuts or a peanut paste. In some instances, other items like unrefined red palm oil, moringa, baobab fruit (*pain de singe*), or carrot were also added to the standard recipe.

The foods selected for the site-specific recipes are chosen based on their year-round availability, nutritional content, and price. Although prices for some foods will fluctuate throughout the year, the most price accessible foods are selected.

### Preparation and Feeding

Under USAID/Neema, locally produced flour was used both for prevention and management and targeted both children 6–59 months and PLW. The project provided the inputs required to produce the flour as well as training for volunteer community health workers and health care providers on the production of the flour as well as wasting screening and management.

Under the Kawolor project, Debbo Galle groups were responsible for flour production. In some locations, these groups also run a “children’s granary” where a portion of harvested staple ingredients, such as millet, sugar, maize, rice, cowpeas, groundnuts, sorghum, along with other harvested and fishery products, were stored for the use of the production of the flour. In some cases, when grain banks ran out of stores, Debbo Galle groups were able to mobilize funding from the community (e.g., from heads of household or the marabout) to purchase the items needed to produce the flour. In some instances, the flour was also sold to help raise additional funds. ChildFund has continued the Debbo Galle group approach, including the flour production, in the sites it supports. Kawolor worked closely with PRN to transition the Debbo Galle group approach to the nationally led project, and we noted this collaboration at one of the PRN sites we visited.

In other areas that are currently using locally produced flour for moderate wasting management, flour is made by *groupements d'intérêt économique* ([GIE]; economic interest groups). In Senegal, GIEs are registered groups of people who engage in a similar economic activity, in this instance flour production. Informants explained that, in some places, community health workers support GIEs to produce the flour and finance their start-up using funding from other income-generating activities. This enables the sites to have access to the flour even when external funding is unavailable.

Each child receives a take-home ration of locally produced flour equivalent to 3kg per month over a period of 2 months. PRN-supported sites provide this ration in one distribution to cover the whole period. ChildFund provides more flour, giving 1.5kg of flour every 2 weeks. The general guidance is that the child should consume a total daily ration of porridge made from 45g of flour, served in two portions.



## Sourcing and Storing the Local Foods

The process for securing the local foods required for the local flour production varies. As noted above, for sites with Debbo Galle groups, some use stores from a children's granary to support local flour production. Village assemblies are organized, either for the initial stocking or on an ongoing basis, to mobilize the ingredients for the granaries. In some instances, both Debbo Galle group and GIEs use funds raised from other income generating activities to purchase the necessary inputs. Key informants told us that sometimes the community health workers also purchase the necessary inputs. Key informants also mentioned instances where inputs have been purchased for the GIE but reimbursements from PRN are still pending. It was not clear from the interview if it was a community health worker or the GIE that is waiting for reimbursement.

## Program Enrollment and Discharge Criteria

Children are screened and enrolled in moderate wasting management as per the standard in Senegal's National IMAM Guidelines. The 2019 guidelines follow standard TSFP admission criteria of weight-for-height z-score between  $\geq -3$  and  $< -2$  or MUAC between  $\geq 115$ mm and  $< 125$ mm (MSAS 2013). However, admission criteria were revised during the COVID-19 pandemic to be based on MUAC only, with children now enrolled for moderate wasting management if they have a MUAC between  $\geq 120$ mm and  $< 130$ mm (MSAS nd). Active screening is conducted by community volunteers on a quarterly basis.

Children are discharged from the program after 2 months if they have reached a MUAC of  $\geq 130$ mm by the end of this period.

## Program Duration

Children remain enrolled in the program for 2 months. If they have not yet reached a MUAC of  $\geq 130$ mm at the end of the program, they are retained for up to 1 more month and are then defined as a non-responder if they have still not reached the required MUAC threshold (see below).

## Procedures for Non-Responders

As per the national IMAM guidelines, children are defined as non-responders if any of the following criteria are met:

- No or little weight gain after 4 weeks in the program
- Weight loss after 2 weeks in the program
- Weight loss of more than five percent of body weight at any one time
- Failure to meet discharge criteria after three months in the program.

The national guidelines provide detailed guidance for the follow-up of non-responders. The guidelines note that if a non-responder has been receiving a flour as the ration, the child should be given a more nutrient-dense ration of RUSF (or in some circumstances even RUTF) to promote rapid weight gain (MSAS 2013).

## Implementation Challenges

Two main implementation challenges emerged through our desk review and key informant interviews.

## Financing of Flour Production

At the time of our site visits, either the PRN (via financing to a community-based organization) or an NGO partner continues to finance the production of local flour. This enables the flour to be available through the community health worker (or management site) for free. Following the end of USAID/Neema, key informants mentioned there was a gap between when children were screened and the subsequent availability of locally produced flour. This was because the local GIE was awaiting

financing from PRN, which took over the site, to finance the flour production. Key informants mentioned that delays can last for up to 2 months while GIEs or community-based organizations wait for financing to be released by the PRN.

In situations where PRN, WFP, or NGO financing for the provision of rations is not available, caregivers of moderately wasted children may be required to pay for the flour, despite the fact that management of moderate wasting is among the child health services that should be free of charge in Senegal. In some instances, GIEs sell their flour to the health facilities, which in turn sell it to caregivers with moderately wasted children. This can lead to circumstances where the caregiver may not be able to buy enough flour to ensure that the child received the full ration required for recovery, thus prolonging recovery period or resulting in deterioration into severe wasting. While women are able to buy small amounts of flour more frequently, based on what they can afford at the time, there is a much higher risk of missing rations. In some instances, women can get loans from village savings and loan associations or income generating groups, but this varies by location.

### **Ensuring Minimum Production Standards Are Met**

Although GIEs and community-based organizations have been quite inventive in finding ways to continue to finance local flour production, not all groups have managed to meet minimum production standards to enable their flour to be purchased by PRN. Some sites do not have dedicated production facilities/sites, and instead the flour is produced at the homes of the community health workers, which is not considered acceptable for purchase by PRN.

### **Additional Benefits and Facilitating Factors**

During the overlapping implementation period of the USAID/Neema and Feed the Future Kawolor projects, some synergies in programming were documented. In some sites, USAID/Neema trained health workers on the production of the local flour while Kawolor provided training on the cultivation of improved varieties of the key ingredients (e.g., tannin-free sorghum, *obatanpa* maize, and biofortified millet).

Training approaches used by the projects seem to have been sustainable. Through key informant interviews we learned of an example where PRN had an open call for the provision of local flour in one of the sites in Richard Toll. The call was awarded to a local organization that had received training on local flour production from community health workers originally trained by USAID/Neema. This organization is now producing and selling the flour to PRN to address moderate wasting at the site. Likewise, the Debbo Galle groups have continued to be replicated following the closure of Kawolor.

### **Contextual Considerations**

We have identified key contextual considerations for the use of this approach in other settings, based on learning from the USAID/Neema and Feed the Future Kawolor projects and insights provided by key informants during our site visits.

### **Integrated Programming to Facilitate Flour Production**

Taking examples from the USAID/Neema and Feed the Future Kawolor projects, it seems that an integrated approach is required to ensure local flour production is continuous and sustainable. Community health workers and community members did not just receive training to produce flour. Instead, this training was part of a broader set of agriculture and livelihoods activities that helped to increase production of more nutrient-dense versions of the staple items used for flour production and to support income generation that could be used to help finance either the flour production or enable individuals to buy the flour if free products were not available through community health workers or service delivery sites.

### **Strong Community Networks**

Local flour production by Debbo Galle groups and the stocking of children's granaries are both approaches that require strong community networks to ensure success. Furthermore, examples given by key informants of community health workers taking initiative to finance and set up local flour production shows a strong commitment to the health and nutrition status of the communities in which they work.

## Annex 4: METU-I, Uganda

AFI works in partnership with WFP to implement community-based nutrition activities. In 2013, AFI developed a food supplement, METU-I, with support from WFP in an effort to develop a more sustainable alternative to imported products such as RUTF and CSB+. This supplement was made from locally available ingredients such as sorghum, peanut, ghee, and honey (Amegovu et al. 2013).

Although METU-I was originally developed to support the management of children with moderate wasting aged 6–59 months and results from efficacy trials showed METU-I to be non-inferior to CSB+, which is also used for the management of moderately wasted children in Uganda, it has not been used for the management of moderate wasting of children under 5 in a non-study setting. It is currently being used for the management of wasting in older children, ages 5–10 years and as a complementary food for children 6–59 months. This is because METU-I is not yet included among the products for management of moderate wasting in the Uganda national IMAM guidelines due to pending questions about its micronutrient composition. The Ugandan MOH currently recommends the preparation of METU-I at the household level as a complementary food. The MOH is generally supportive of the use of local foods for the management of moderate wasting over management using imported SFFs. Discussions are ongoing about the adoption of METU-I as a product that can be used for management of moderate wasting in children under 5. Despite this preference, informants told us that, at present, WFP still provides imported products for the management of children under 5 years with moderate wasting; however, for older children, management options are more limited. This provided an opening for the use of METU-I for management of moderate wasting in school-age children between 5–10 years of age. Prevention and management of wasting is mentioned in WFP’s 2022 Annual Report for Uganda, noting that there was an increased use of METU-I to manage moderate wasting in children under 5 years (WFP 2022).

### Program Design

The current programmatic use of METU-I happens in two ways. First, METU-I is promoted through training and cooking demonstrations at the community level for complementary feeding of children 6–59 months. The second approach is through the preparation and feeding of METU-I to older, school aged children at their primary schools. We did not document the prevention application of METU-I. Our findings in this section describe how METU-I was used to manage children 6–59 months as part of the efficacy trial for the product and how it is being used to manage children between 5–10 years of age. Table 16 details the staffing roles and responsibilities for the school-based program.

**Table 16. Staffing Roles and Responsibilities**

Role	Responsibilities
AFI staff	<ul style="list-style-type: none"> <li>• Site mapping in collaboration with partners and local authorities</li> <li>• Provide technical support and training to nutrition assistants, health workers, village health teams (VHTs), and caregivers</li> <li>• Procurement of local food inputs</li> <li>• Supervise and support on-site feeding</li> <li>• Monitoring and reporting</li> </ul>
Nutrition Assistants	<ul style="list-style-type: none"> <li>• Supervise METU-I preparation at the schools</li> <li>• Take weekly MUAC measurements of children</li> <li>• Provide nutrition education and counseling to caregivers</li> <li>• Conduct home follow-up visits</li> </ul>

Role	Responsibilities
Health workers and VHTs	<ul style="list-style-type: none"> <li>• Offer bi-weekly routine medication i.e., Vitamin A supplementation, deworming, and malaria testing and treatment</li> <li>• Conduct home follow-up visits</li> </ul>
Teachers	<ul style="list-style-type: none"> <li>• Create awareness of the program among parents and children</li> </ul>
Caregivers (Volunteers) 10 per site	<ul style="list-style-type: none"> <li>• Sort and weigh ingredients, prepare, and serve the porridge</li> <li>• Clean the utensils after preparation</li> </ul>

### Local Food-Based Recipe and Ration

When developing the recipe for METU-1, AFI sought to create a recipe that could be made from locally available ingredients but that also met the same nutritional standards as other products used to manage moderate wasting in children under 5. AFI undertook several studies, including an acceptability trial, detailed nutritional analyses, and an efficacy trial to ensure the product was suitable (Amegovu et al. 2013; Amegovu et al. 2014a; Amegovu et al. 2014b).

The standard recipe for METU-1 includes sorghum flour, peanut paste, ghee, honey, and water. The sorghum flour, honey, and peanut paste is mixed with water to form a paste. This paste is then added to boiling water. The ghee is added midway through the cooking process.

During the management of children aged 5–10 years, two ingredients from the original recipe were substituted. Ghee was substituted with vegetable oil because the market could not meet the quantity demanded for the program. Honey was substituted with granulated sugar and the recipe was adjusted to ensure the caloric value did not change.

### Preparation and Feeding

In the efficacy trial, children 6–59 months received 269g per day of METU-1. This amount corresponds to the higher end of the reference range of take-home ration calories used in the efficacy trial design (1,000–1,200 kcal, UNHCR 2011) in an effort to account for possible sharing of the ration at home. At the time of ration collection, demonstrations were conducted to show caregivers how to prepare porridge from the food items and information was shared on their proper use and storage (Amegovu et al. 2014a).

In the recent programmatic context, porridge was cooked daily by AFI-trained local community teachers, VHT members, and other community volunteers. AFI nutritionists also provided training on basic hygienic practices. The porridge was served twice daily, first mid-morning and then in the afternoon before the children went home. Children consumed a total of 1,000 milliliters of METU-1 in two, 500-milliliter portions. This is the same ration size as is provided to children under 5 but reflects the prepared volume of the porridge. Every 2 weeks a nutrition assessment using MUAC, weight, and height was conducted and recorded.

Caregivers are also taught to prepare METU-1 at home, using products that they can either grow or easily purchase locally in the small quantities required. Caregivers are instructed to sun dry the sorghum and groundnuts for 5 days to reduce moisture levels. Sorghum is cleaned by winnowing and milled into flour. Groundnuts are sorted to remove bad kernels and are then roasted for 30 minutes and ground to a semi-coarse paste. Traditional processing methods using milk from local *Karamojong Zebu* cows are used to produce ghee. Caregivers are encouraged to boil the ghee for 30 minutes to destroy microorganisms. Ingredient amounts for a daily ration of METU-1 can be found in Annex 1.

## Sourcing and Storing the Local Foods

For the most recent round of programming, all items are purchased by AFI from neighboring districts. This was because the program took place during the dry season in Karamoja, so little food was available in the districts where the program was being implemented. AFI has set up a community nutrition clinic where the raw ingredients for METU-I are processed, such as the milling of sorghum and groundnuts. AFI has not completed studies on the shelf life of prepared METU-I but has noted that ensuring ingredients are properly dried is important to ensure overall moisture content is within acceptable levels (Amegovu et al. 2013; Amegovu et al. 2014a).

## Program Enrollment and Discharge Criteria

For the efficacy trial, children 6–59 months were screened and enrolled based on standard TSFP cutoffs. Children were initially screened by VHTs using MUAC. Those with a MUAC between 115mm and 125mm were invited to an enrollment session at a health facility. At the health facility, the child's weight and height were taken. Children with a weight-for-height z-score (WHZ) of  $< -2$  were enrolled in the trial (Amegovu et al. 2014a).

In the most recent round of programming, AFI focused on children 5–10 years and enrolled them if they had a MUAC  $\geq 135$ mm to  $< 140$ mm. This was a one-time enrollment. Screening was conducted at schools in the selected sub-counties. Children were considered cured when they reached a MUAC  $\geq 145$ mm; however, they were still maintained in the program for the full 3 months. It is important to note that there are no internationally validated or endorsed MUAC cutoffs for children of this age. However, these cutoffs do align with what some countries have used for children in this age group (Cashin and Oot 2018). The Uganda National IMAM Guidelines do not include MUAC among the anthropometric measurements used to identify moderately wasted children. Instead, the guideline recommends body mass index (BMI)-for-age and checking for edema (MOH 2020).

## Program Duration

In the efficacy trial, children 6–59 months were retained in the trial for a maximum of 90 days. A child was considered to have recovered when they reached a WHZ-2 and had attained 10 percent of their admission weight for two consecutive visits. The average length of stay in the trial for children who received METU-I was 57 days, compared to a length of stay of 43 days for children who received CSB+ (Amegovu et al. 2014a).

The most recent iteration of the program that targeted older children ran for 90 days. Children were maintained in the program for the full 90-day period.

## Procedures for Non-Responders

Among children 6–59 months included in the efficacy trial, the non-response rate for children consuming METU-I was 7.7 percent, compared to 11.8 percent for those who received CSB+ (Amegovu et al. 2014a). Home visits were conducted for older children whose nutritional indicators more slowly to determine if there were other household factors that might be affecting recovery but informants did not state a specific timeframe (e.g. in weeks or months) after which this follow up would take place. Home visits also took place if the child was absent from school, and therefore missed feedings, more than 2 to 3 times in a week. However, there was no further follow-up after the initial 3-month period. Data on non-response rates was recorded for three of the sites for both children categorized as severely and moderately wasted. Non-response rates were higher among severely wasted older children (table 17).



**Table 17. Non-Response Rates Among Severely and Moderately Wasted Children 5–10 Years**

Site (Primary School)	Moderately Wasted	Severely Wasted
Kosike	4.7%	12.5%
Lolachat	3.2%	16.4%
Losakucha	10.1%	14%

## Implementation Challenges

The implementation challenges below were shared by key informants in reference to the use of METU-I in the management of older children.

### Enrollment and Retention

Because the program took place during the lean season when food insecurity is high, the program observed enrollment of siblings from the same household in the program - sometimes including twins or triplets. General food insecurity likely contributed to other challenges related to enrollment and retention that were mentioned by key informants, despite the fact that the program happened alongside the WFP and government lean season response during which households receive a supplemental ration. Some mothers wanted to bring siblings of the enrolled child so that they could also benefit from the porridge from school. Key informants mentioned situations where mothers deny their children food or reduce the frequency of feeding so that children can qualify for the targeted supplementary feeding program. However, we did not receive information about how widespread this issue was. A key informant also mentioned that at one site, retention in the program was affected based on the food security situation at the child's home. Children would only come to school for the feeding when home food stores reduced. To mitigate this, VHTs, schoolteachers, and neighbors followed up with absentee children. At another site, key informants explained that caregivers preferred being given a dry ration to be take back home. This might indicate a preference for being able to share the ration at home, which was not possible with the on-site feeding program design. Sensitization and home visits by nutrition assistants were used to encourage caregivers to allow their children to attend the program.

### Access to Raw Materials

During the dry season, there is very little food in Karamoja, and food prices are high. For the program, food was sourced from neighboring districts. The quantities of honey and ghee needed for the program were not readily available on the market, so this was substituted with sugar and vegetable cooking oil.

The METU-I recipe has been adjusted to make use of foods more commonly available in different areas. For example, in Amudat district, in the southeast of the region, sorghum is substituted with maize since it is commonly grown there. In Abim district, in the western part of the region, both maize and orange fleshed sweet potato can be substituted in the recipe. Formulas for different contexts have been developed but laboratory analyses are not yet available. However, efficacy studies on these different formulations have not yet been conducted.

## Additional Benefits and Facilitating Factors

The approach to developing and testing METU-I was very rigorous, making it potentially easier for it to be accepted as an alternative to other SFFs for the management of moderately wasted children. The original formulation of METU-I was based on the idea that communities should be able to use local

foods to prevent and manage wasting themselves, thus lowering the need for imported management products. AFI also engages in other agricultural activities that support some aspects of production of the METU-I inputs and its local processing at the community nutrition clinic.

Key informants also mentioned that METU-I is not perceived in the same way as imported SFFs like CSB++, which can be found for sale in the market at 2,000 Ugandan shillings (\$0.50) for a 2kg bag. Informants also reported you can find RUTF for sale for 500 Ugandan shillings (just over \$0.10) and that children in town eat it as a snack. The local food items used to produce METU-I are not seen to have a monetary value so the risk of it being resold is lower. In some instances where it is suspected that a caregiver or household member is selling imported rations, METU-I is proposed as an alternative product to minimize and discourage this practice. Also, because it is made from locally available and familiar ingredients, it is well accepted.

## **Contextual Considerations**

We identified the following contextual consideration for the use of METU-I in addressing the management of moderate wasting.

### **Availability of Food Items**

For large scale programs that will enroll and manage large numbers of children, adequate availability of the necessary inputs should be assessed. However, if METU-I is promoted as a product that can be produced and used at home, this becomes less of a concern as households can cultivate or purchase the smaller quantities of items needed. Flexibility in the recipe that allows for substitutions that will not have a large impact on the nutrition value of the recipe (e.g., changing ghee for vegetable oil or honey for sugar) also helps to mitigate some of these issues.

## Annex 5: Multi-Nutrient Dense Mix (Kitoobero), Caritas MADDO

Caritas MADDO is a faith-based organization under the trusteeship of the Masaka Diocese in the Central Region of Uganda. The organization predominantly engages in social services delivery, advocacy, and development work. In 2007, Caritas MADDO worked with the local district health office to identify strategies that could be used to provide support to and empower communities. At the time, the government had launched a VHT training package but had no funding to conduct the training. The VHT is a community-based (village) structure whose members are volunteers selected by community members to promote the health and wellbeing of the people in their areas of residence/jurisdiction. It is the lowest health delivery structure in Uganda. Generally, in Uganda, each village is supposed to have a VHT composed of five members that jointly cover 20 to 25 households. Caritas MADDO secured funding from Terre des Hommes Netherlands to support the VHT training, which resulted in the larger Primary Health Care (PHC) Support project. The project ran from 2007–2015, in two phases. The first phase covered just one sub-county in Bukomansimbi district and then expanded in phase two to include three additional sub-counties, one in Masaka district and two in Rakai district.

During the implementation period, the PHC project undertook several health-related interventions including nutrition, immunization, and treatment for a range of common infectious diseases such as malaria and diarrheal diseases. The program sought to empower the local communities to be in charge of their own health through capacity strengthening for VHTs and by improving positive health-seeking behaviors.

One of the project's objectives was to improve household nutrition and domestic hygiene through training mothers and by providing care for malnourished children. Before the start of the project, there were no moderate wasting management services in the area. This is because the districts within the project's implementation area are considered to be within acceptable standards in terms of overall wasting levels and other aggravating factors; they are therefore not supported with moderate wasting management services through a TSFP that provides an additional food ration. The PHC project introduced a multi-nutrient dense mix, locally known as kitoobero, to support the recovery of moderately wasted children. Kitoobero is a Luganda word meaning both "mixture" and "feast" and is used colloquially to describe hearty meals made from multiple food groups. The term has been used in the context of nutrition programming in Uganda for decades stemming from early nutrition rehabilitation centers that were used for wasting management and, more recently, in reference to complementary feeding programs and approaches.

The PHC Support project was handed over to the district health office in 2015 and is continuing to be implemented by the VHTs. Although Caritas MADDO is still operating in the area, they only provide occasional support, and the program is run primarily by the VHTs.

### Program Design

During the PHC project, project staff trained VHTs, and caregivers (including men) on how to prepare kitoobero. VHTs mobilized all parents with children under 5 to gather either at the home of a VHT member or at a typical village gathering site that is a walkable distance for the majority of village members. At these sessions, parents were trained on how to prepare the kitoobero, including the types of foods to use and the ratios of each food in the basic recipe. During the training, VHTs conducted both theoretical and practical sessions for the food demonstrations. Mothers received additional training on family planning, breastfeeding, vegetable growing, latrine hygiene, child immunization, how to treat diarrhea, and how to prepare and manage water for drinking. Parents were not given any food items or equipment to help facilitate the preparation of the kitoobero at home, only instruction.

Since the closure of the PHC project in 2015, training of community members on how to make kitoobero and other health and nutrition activities is now carried out by the VHTs without ongoing support from Caritas MADDO. However, the VHTs no longer conduct large group sessions for nutrition education and cooking demonstrations or provide some of the food inputs (e.g., silver fish) as was done under the PHC project. Instead, training on how to make the kitoobero happens at the household level when a moderately wasted child is identified and in need of management.

Table 18 outlines staffing roles and responsibilities during the PHC project when these approaches were first introduced.

**Table 18. Staffing Roles and Responsibilities for PHC Project**

Role	Responsibilities
PHC program staff	<ul style="list-style-type: none"> <li>• Overall design and program implementation</li> <li>• Program monitoring and evaluation</li> </ul>
VHTs	<ul style="list-style-type: none"> <li>• Nutrition screening of children (MUAC, weight, height)</li> <li>• Conduct group and individual nutrition counseling</li> <li>• Train caregivers on how to prepare the multi-nutrient dense foods and other health/nutrition-related skills</li> <li>• Individual home follow-ups</li> <li>• Linkage of caregivers to other livelihoods programs</li> <li>• Refer clients with severe wasting to health centers</li> </ul>

### Local Food-Based Recipe and Ration

The kitoobero multi-mix recipe can be adapted based on the local foods that are available in the home. The general principle for the recipe is that, as a ratio, the plant-based protein foods should be twice as much as the carbohydrate foods. A small amount of silverfish powder is used to complement the plant-based proteins as an animal-source protein, and salt is added to enhance the flavor. The amount of each type of food to be prepared is adjusted based on the age of the child. There are recipes with progressively larger amounts of ingredients for three different age groups: children 7–11 months; children 1–5 years; and children 6–10 years (see Annex 1 for recipes for the first two age groups. We did not include the recipe for older children in our nutritional analysis). During the PHC project, the mothers contributed the food for the cooking session component of the training and Caritas MADDO purchased the firewood and silverfish.

### Preparation and Feeding

The kitoobero is prepared in a daily batch at the caregiver’s home at least four times a week. It should be fed to the child twice a day, at lunch and for the evening meal.

A cooking demonstration was organized during one of our site visits to allow us to see how the kitoobero is prepared. The number of under 5 children were counted to determine the amount of ingredients needed to make the batch of food to be consumed. Ingredients for this special session were contributed by the participating households, with the silverfish being provided by the Caritas MADDO staff who organized the session. Based on our observations, the recipe developed by the Caritas MADDO team during the PHC project was followed according to the standards. Caregivers actively participated in the preparation, cooking, and serving of the food. We observed that younger children ate around three quarters of their portions whereas older children completed their portions. Sanitation and hygiene practices were observed by washing hands with soap and water and using clean utensils.

### **Sourcing and Storing the Local Foods**

The foods required for the kitoobero can either be grown by households or are otherwise readily available in the community. No special storage guidance is required as foods are purchased and prepared as needed.

### **Program Enrollment and Discharge Criteria**

During the PHC project, VHTs used to conduct monthly nutrition screening exercises. Children 6–59 months of age who were found to be moderately wasted with a MUAC of  $\geq 115\text{mm}$  to  $< 125\text{mm}$  were enrolled, and caregivers attended monthly nutrition meetings. WHZ was also used for enrollment but was less common than MUAC. Children with WHZ  $\geq -3$  and  $< -2$  were enrolled. Since enrollment was on a rolling basis, there were new clients each month attending sessions. Key informants also explained that occasionally under the PHC project children aged 6–10 years whose MUAC was  $\geq 135\text{mm}$  and  $< 145\text{mm}$  are also enrolled in the program. Younger children were considered cured and discharged from follow-up once they reached a MUAC  $\geq 125\text{mm}$ . The discharge cut off for older children was not explicitly shared but is assumed to be MUAC  $\geq 145\text{mm}$ .

### **Program Duration**

During the PHC project, moderately wasted children were followed up for 3 months. VHTs conducted bi-weekly home follow-ups to ascertain that the mothers were preparing the kitoobero according to the standard recipe using their available home foods. Children who had slow recovery progress were followed up more frequently (see section below on “Procedures for Non-Responders”).

### **Procedures for Non-Responders**

During routine monthly follow-ups, if a child was found to be recovering more slowly, VHTs increased their home visits to ensure the caregiver was preparing kitoobero at least three times a week. If the child still did not improve, the VHT discharged the child from the community-based program as a non-responder and referred him or her to a hospital, if inpatient care was required, or to the nearest outpatient treatment center for further health assessment for any underlying issues. The PHC program did not record any non-responders during its implementation period.

Currently, VHTs only record the number of children screened who were found to be moderately or severely wasted, along with edema status. Reporting on outcomes is not part of a VHT’s usual scope. This is currently only done at the facility level.

## Implementation Challenges

The following are some of the main implementation challenges identified in PHC project documentation and present challenges shared by key informants.

### Educating Community Members on the Causes of Wasting

Across rural and semi-urban areas of Uganda, it is commonly believed by caregivers and community members that malnutrition is caused by witchcraft. Key informants also explained that the PHC project conducted significant education activities on basic nutrition and hygiene practices as part of its work. Children were not being fed a diverse diet; instead, project staff would observe children consuming just basic staples as a meal. Sanitary practices were also poor, including a lack of latrines and safe water storage. These practices were improved through social behavior change activities that accompanied the monthly follow-up of moderately wasted children and through other project activities.

### Compensation and Motivation of VHTs

Although VHTs are considered part of the formal health system in Uganda, members are volunteers and are not on the government payroll. The lack of compensation for VHTs is a broader challenge facing the Ugandan health system and is not unique to this particular nutrition approach. The Uganda 2010 VHT Strategy and Operational Guidelines clearly stipulate that a minimum monthly stipend of 10,000 Ugandan Shillings (approximately \$3) should be provided but is less clear on who should pay it. The strategy encourages local councils to put in place “innovative financing mechanisms” to support VHTs (MOH 2010). In practice, VHT stipends are typically only paid when there is an NGO partner present that depends on VHTs to support the implementation of their project activities (MOH 2022).

The programing limitations seen since the closure of the PHC project are directly linked to VHT stipends. VHTs have maintained the knowledge and skills on kitoobero preparation, but they lack the necessary funding through their stipend to conduct the community mobilization for the group activities. Caritas MADDO did not pay a salary to the VHTs; they were only given a transport refund if they were required to attend meetings outside their usual area of operation. The project provided some incentives to VHTs during the PHC program, including providing bicycles, to mitigate these challenges but these ended when the project closed. In addition, the highest performing team of VHTs, based on a set of project-established annual indicators, was rewarded with a public address system to help in community mobilization and a saucepan for mass catering, which could be hired out for income when not being used for project-related activities. This motivated the VHTs to work hard in each of their villages. Key informants also reported that the training offered by the project was also seen as an incentive and was motivating for the VHTs.

## Additional Benefits and Facilitating Factors

Management of moderately wasted children with kitoobero was just one of the components of the PHC project. The project invested heavily in strengthening the capacity of VHTs and their connection with the respective District Health Office and health facilities. The involvement of district and sub-county local authorities to establish and provide non-technical supervision of the VHTs was instrumental in sustaining the work of VHTs. During the project’s implementation, other efforts supported by the government and UNICEF ensured that VHTs also received additional training at the health center on topics including the integrated management of childhood illnesses and rapid malaria testing. Health centers also supplied VHTs with drugs that could be dispensed at the community-level; however, the supplies of these were not always adequate compared to demand (Caritas MADDO 2015). Increasing the number of services and support the VHTs could provide improved the community’s perception of seeking timely care, which in turn may have helped reduce wasting outside of the support provided using kitoobero. The project also tackled some of the water, sanitation, and hygiene (WASH) issues by constructing shallow wells in one of the sub-counties. According to the 2014 project evaluation report,



there was improvement in general household sanitation standards and many households had established vegetable gardens to supplement household diets and improve nutrition. Wasting in the project intervention area was also found to have reduced from eight percent to five percent during the project period, based on the number of reported wasting cases (Caritas MADDO 2014).

The basic kitoobero recipe is included in the 2020 National IMAM Guideline. This recipe varies slightly from the recipe promoted by Caritas MADDO, which includes silver fish. The base recipe in the National IMAM Guidelines uses beans, meat, and *matooke* and notes that other tubers (e.g., Irish potatoes, sweet potatoes, cassava, yams) can be substituted for the *matooke* and that beans can be substituted with peas. The types of meat to be used are not specified. However, in the National IMAM Guideline, kitoobero is only mentioned for use during the transition and rehabilitation phase for severely malnourished adolescents and adults (MOH 2020).

## Contextual Considerations

### Household Food Security

The approach is currently being implemented in a relatively food secure environment where households are able to grow many of the items needed to make the kitoobero recipe. Availability of local foods through subsistence farming ensures year-round supply of food for all household members. Availability of safe, clean, and potable water for water-stressed areas is critical. Caritas MADDO continues to support communities to ensure access to safe water.

### Strong Network of Community-Based Volunteers

The role of VHTs is central to the success of this approach. The PHC project invested in the training of VHTs to improve their skills but also worked to strengthen linkages between the VHTs, district health teams, and health facilities to further strengthen support for the VHTs and improve their ability to provide higher-quality services. Continuous support and monitoring of VHTs to identify key health issues and solutions is important to the sustainability of the approach, especially in instances where VHT turnover and attrition is a challenge. Additionally, key informants told us that caregivers have also shared their knowledge about kitoobero with their neighbors and daughters, helping to expand knowledge of the approach outside the VHT network and further sustaining the efforts of the PHC project.

## Annex 6: Nutrition Education Centers, Iowa State University Uganda Program

The ISU-UP is managed by the Iowa State University Center for Sustainable Rural Livelihoods (CSRL) under the College of Agriculture and Life Sciences. CSRL began working in Kamuli district in 2003, starting with a farmer training program that grew into ISU-UP. Since then, ISU-UP has conducted a wide-range of community-based programming including WASH, income generation, health, nutrition, and youth-focused interventions.

The ISU-UP Nutrition Education Centers (NECs) were initiated in 2010 in response to the numerous severe and moderate wasting cases that program staff encountered in the communities. ISU-UP had prior experience working in nutrition and had implemented a rural livelihoods program in partnership with the local NGO Volunteer Efforts for Development Concerns and Makerere University that included nutrition education, hygiene and sanitation, growth monitoring and promotion, and therapeutic feeding for children with severe wasting using RUTF obtained from UNICEF in Kampala.

### Program Design

NECs are community-based and staffed by ISU-UP staff with some voluntary support from community members. Children with moderate wasting either receive a nutrient dense amaranth-based porridge that is consumed on site during each NEC session, or they receive a take-home ration that can be prepared at home. In addition, the caregivers of the moderately wasted children are required to complete a training program that includes skill building on nutrition, health, and WASH practices and the production of the key crops (e.g., soybeans, millet, and amaranth) used to produce the amaranth-based porridge. ISU-UP also provides each caregiver with the necessary seeds for the crops required to make the porridge so they can continue to produce it after they graduate from the NEC. Caregivers and children graduate once they have completed the required training and completed a first harvest from the starter seeds, which usually takes about 6 months. Different households may specialize in certain ingredients and then exchange them between households so that the caregivers can continue to make the porridge at home to help prevent relapse and prevent other children in the household from becoming wasted.

The NEC also provides a platform for other services provided by other organizations. One example is a partnership with the Uganda Women's Network, which provides gender-based violence support. NECs also partner with health workers from nearby health facilities to support complementary child clinic days, immunization, and family planning activities at the sites.

NEC sites are chosen by ISU-UP staff in close consultation with district nutritionists, health center staff, and local authorities (e.g., the local or village council). There are two ways that sites are identified. The first is by identifying locations with high levels of wasting. ISU-UP staff liaise with district nutritionists and health centers to identify where the majority of malnutrition cases come from by consulting health records. This approach is used most often when ISU-UP has additional funding to set up new NECs. The second way relies on observations from NEC staff about the direction and distance from which participating mothers are coming. Once it is established that mothers attending NECs are traveling more than 3km, the villages are mapped. Once the number of moderately wasted children in a current NEC village drops, usually after about 12 months (or two 6-month cycles), the NEC is phased out and a new NEC is started in a different village.

Once a village is identified using one of the above methods, a community meeting is held with the attendance of the local authorities. The meeting is meant to create awareness of the NECs and the services offered at the sites. Information about the program is sometimes presented using performing arts drama groups that perform skits sharing key messages on nutrition and health promotion actions. During the meeting, a NEC host home is chosen where mothers can meet daily. The home should have

a big compound, a kitchen, a latrine, free room for storage, and some form of shade. In cases where the identified home does not have these facilities, ISU-UP constructs a gazebo (locally known as an *engangu*), toilet, and kitchen. To ensure proper hygiene and sanitation, constructed toilets are designed with a capacity to be used by up to 200 people.

Table 19 summarizes the staffing roles and responsibilities for the NECs.

**Table 19. Staffing Roles and Responsibilities**

Role	Responsibilities
ISU-UP NEC staff	<ul style="list-style-type: none"> <li>• Overall design and program implementation</li> <li>• Program monitoring and evaluation</li> <li>• Procurement and processing of food raw materials</li> <li>• Mobilize funding to run the NECs</li> </ul>
NEC supervisor (ISU-UP staff)	<ul style="list-style-type: none"> <li>• Ensure weekly delivery of dry ration flour to all NEC sites</li> <li>• Supervise and support NEC trainers</li> <li>• Collect data and reports from the NECs</li> <li>• Facilitate referrals from community to hospital</li> </ul>
NEC trainers (one trainer per NEC site, paid by ISU-UP)	<ul style="list-style-type: none"> <li>• Enrollment of new clients</li> <li>• Preparation and serving of porridge</li> <li>• Weekly nutritional assessment</li> <li>• Individual home follow-up visits</li> <li>• Individual and group nutrition counseling</li> <li>• Data entry</li> </ul>
Community/caregivers	<ul style="list-style-type: none"> <li>• Provides venue/home for NEC site</li> <li>• Caregivers provide the firewood used to cook</li> <li>• Support porridge preparation</li> </ul>
Health workers	<ul style="list-style-type: none"> <li>• Support clinic days to treat common infections and provide immunization and family planning services at NECs</li> </ul>
ISU-UP program staff and visiting students, specializing in agriculture, WASH, livelihoods	<ul style="list-style-type: none"> <li>• Conduct training on poultry and crop production.</li> <li>• Ensure proper WASH practices at NECs</li> <li>• Train vulnerable caregivers on income generating activities</li> </ul>

### Local Food-Based Recipe and Ration

NECs have two different approaches that are used for managing moderately wasted children - an on-site feeding program and an off-site feeding program.

### Preparation and Feeding

Originally, all NECs were on-site feeding centers where children came daily, Monday through Friday, to prepare and drink amaranth-based porridge. Later, ISU-UP started to provide off-site feeding through the NECs to accommodate mothers who otherwise had to walk long distances (more than 3km) to attend daily on-site sessions. At off-site feeding centers, caregivers receive a weekly ration of 1kg of amaranth-based flour to prepare and give to children at home. Off-site centers also serve clients living in

villages where NEC centers have been phased out once the levels of moderate wasting have dropped off.

For NECs that operate on-site feeding (five in total at different locations), the caregivers, with support from the NEC trainer, cook porridge and serve it to the moderately wasted children at the centers. For NECs operate off-site feeding (five in total at different locations), training for mothers, health outreach services, and MUAC screening is also sometimes provided by NEC and health center staff on ration collection day.

### Sourcing and Storing the Local Foods

The procurement, storage, quality control, and post-harvest handling of ingredients used for both on- and off-site feeding is done by ISU-UP staff at the oldest NEC site called Naluwoli, located about 10km from the ISU-UP office in Kamuli town. Most of the food items are commercially procured by ISU-UP, however, a small amount of items occasionally come from graduated beneficiaries from the NEC programs who have received seeds to grow key inputs. Milling and processing is done at the ISU-UP premises in Kamuli town. Once the flour is mixed, staff package and dispatch it to the different NEC sites weekly.

### Program Enrollment and Discharge Criteria

The primary target population for NEC services are moderately malnourished children and their caregivers. However, the NEC will also enroll pregnant women at risk of malnutrition and breastfeeding mothers who have indicated that they are struggling with breast milk production to provide them with additional support. The majority of children referred to NECs are identified by health workers at health facilities. Other clients come to the center at the suggestion of other mothers already enrolled on the program or are identified by VHTs.

Children who are moderately wasted with a MUAC of  $\geq 115$ mm to  $< 125$ mm are enrolled at an NEC. Children who are screened and found to be severely wasted (MUAC  $< 115$ mm) are referred to the district referral hospital for either outpatient or in-patient care. ISU-UP provides financial support for transportation and drugs for referred children. In the case of admittance for in-patient treatment of severe wasting, the program also provides caregivers support for their food during the hospital stay.

Children are screened and enrolled on an ongoing basis. Caregivers can join the training program at any time.

Children are not discharged from the program once they reach a healthy MUAC. Instead, both the caregiver and child are retained in the program until graduation. To graduate, two criteria must be met: the child should have a MUAC of  $\geq 137$ mm and the caregiver must have completed the full 6-month training course, including completing a first harvest. Each NEC has two graduations a year, equating to roughly two 6-month feeding and training program cycles. Some pairs are retained longer than 6 months, depending on where



A volunteer from the community helps to prepare the porridge for on-site feeding of moderately wasted children at a NEC in Buguwa, Uganda. Photo Credit: Gloria Nabaasa, consultant for USAID Advancing Nutrition



A NEC trainer checks a child's MUAC at the NEC site. Photo Credit: Gloria Nabaasa, consultant for USAID Advancing Nutrition

in the training cycle the caregiver joined and on how long it takes the caregiver to complete his or her first harvest.

Children who reach a MUAC of  $\geq 137$ mm before the end of the 6 months will continue to attend the NEC feeding and receive the porridge even after this threshold is achieved. The NEC recovery MUAC cutoff is higher than the standard discharge cutoff for TSFP and the cutoff used in the Uganda National IMAM Guideline, both of which are  $\geq 125$ mm. This higher cutoff was adopted by the NECs to minimize the chance of relapse.

### **Program Duration**

When originally designed, children were intended to be enrolled in feeding and followed up with for 3 months. However, when feeding stopped, caregivers also stopped coming to training sessions. Because of this, children are now fed for the entire time the caregiver is completing training sessions - usually a full 6 months, regardless of MUAC status. Furthermore, no child, regardless of MUAC status, can be discharged during the lean season (April to June) in an effort to prevent relapse.

In exceptional cases, caregivers may request to be discharged early once their child has recovered. The NEC trainer will assess the home situation before allowing early discharge.

### **Procedures for Non-Responders**

If a child is still moderately wasted at the time that the caregiver qualifies for graduation, the NEC trainers will continue to follow up with the child for up to 6 more months or until the NEC is phased out in that village. The trainers conduct a home assessment to identify factors that may be preventing recovery. During this follow-up period, caregivers are no longer provided with pre-made porridge or porridge flour mix. Instead, they are encouraged to make it themselves at home, using the inputs that they have grown with the seeds they received as part of the NEC training program. If the child becomes severely wasted, he or she will be referred for treatment at the district hospital.

## **Implementation Challenges**

Based on our desk review and key informant interviews, ISU-UP has been able to learn and adapt when challenges arise. However, some challenges that the program continues to work to address are noted below.

### **Poor Access to Safe Water**

One of the criteria for becoming a NEC host is to have access to clean water. However, some communities are not able to access clean water. In these circumstances ISU-UP requests local authorities to support borehole construction. In one instance, ISU-UP directly supported the construction of a borehole, but this is not common practice.

### **Unreliable Referral Services**

Local hospitals that are supposed to provide treatment for severe wasting often encountered shortages of necessary drugs. To ensure referred children received quality treatment, ISU-UP provided financing for treatment and transportation to a private facility that was located about 60km away in Jinja. Additionally, sometimes children older than 5 are found to have severe wasting. Although they are not part of the usual target population, they are also referred to health centers for further management.

### **Stigma Associated with Going to the NEC**

In one community, attending NEC sessions was associated with stigma related to poverty and HIV status. The program used community sensitization to help mitigate this challenge. It is not clear how widespread this problem is or if it was associated with just one community.



## **Additional Benefits and Facilitating Factors**

Although NEC trainers are paid ISU-UP staff, they are recruited from the community. Some trainers are NEC program graduates who are now using the skills acquired during their own NEC training to further strengthen their livelihoods through these paid positions. Having locally based trainers and other knowledgeable program graduates contributes to the sustainability of the approach, at least in terms of knowledge and skills transfer within the community, even after NEC center has been phased out of the community. However, program staff noted that it is not advisable to have an NEC trainer working at the NEC within his or her home community as there have been instances where the trainer is biased in terms of enrollment (e.g., enrolling non-qualifying family members).

ISU-UP has a very flexible approach to its programming that has allowed it to adapt its approach based on ongoing learning. One example is the way that NECs phase in and out based on observations of where caregivers are traveling from to seek support for their children. Even the timing for program enrollment and the overall duration of an NEC in a village is not fixed. The program has also adapted the porridge recipe to accommodate allergies (replacing millet with sorghum) or to remove culturally problematic ingredients (one community believed fish causes malnutrition so the silverfish was removed from the recipe). Much of ISU-UP's funding seems to come from individual donor support, which undoubtedly contributes to the level of flexibility in programming.

## **Contextual Considerations**

The following contextual considerations should be considered when implementing the approach.

### **Integration with Agriculture and Livelihoods Programming**

ISU-UP's programming in its districts goes far beyond nutrition. Its comprehensive approach to WASH, agriculture, income generating activities, and other livelihood programs help reinforce and are an integral part of the NEC approach. The training of NEC graduates on how to continue to produce porridge ingredients at home also contributes to the sustainability of the approach and to the prevention of wasting in the community.

### **Availability of Local Food Inputs**

Although local production of food inputs is a key part of program graduation, large amounts of the raw materials are required to ensure there are enough ingredients commercially available to produce enough porridge for all the NEC sites. Adequate space for storage and processing of the raw materials is also required before onward distribution to the NEC sites. In areas with poor infrastructure, this aspect of the programming may need adjustment. In addition, the acceptability of porridge is high since caregivers and children are familiar with the taste of the ingredients.



## Annex 7: Full Nutrition Analyses, by Country

Table 20. Nutritional Composition of Local Food-Based Rations, Nigeria

Nutrient	WHO Guidance 60% of 120/kcal/kg/day	Tom Brown Flour	Porridge Mum - Moi Moi	Porridge Mum - Jollof Rice and Beans	Porridge Mum - Tuwo with Vegetables
Energy maximum, kcal/kg/day	72	72	72	72	72
Ration size, g/kg/day	n/a	17.6	20.8	29.7	18.1
Protein, g	1.4	3.3	3	2.7	1.7
Fat, g	1.8	2.4	4	3.1	2.7
Vitamins					
Vitamin A (retinol), µg	144	0.3	0.4	0.9	0.2
Vitamin B1 (thiamine), mg	0.1	0.1	0.1	0.1	0
Vitamin B2 (riboflavin), mg	0.3	0.1	0	0	0
Vitamin B3 (Niacin), mg	1.8	0.9	0.2	0.5	0.4
Vitamin B5 (Pantothenic acid), mg	0.4	0.2	0.1	0.1	0.1
Vitamin B6 (pyridoxine), mg	0.1	0.1	0.1	0.1	0.1

<b>Nutrient</b>	<b>WHO Guidance 60% of 120/kcal/kg/day</b>	<b>Tom Brown Flour</b>	<b>Porridge Mum - Moi Moi</b>	<b>Porridge Mum - Jollof Rice and Beans</b>	<b>Porridge Mum - Tuwo with Vegetables</b>
Vitamin B9 (Folate), µg	28.8	26.4	44.3	34.5	7.1
Vitamin B12 (Cobalamin), µg	0.4	0	0	0	0
Vitamin C (Ascorbate), mg	10.8	0	1.3	1.7	0.7
Vitamin D (Cholecalciferol), µg	1.4	0	0	0	0
Vitamin E, mg	2.2	0.3	0.6	0.5	0.4
Vitamin K (Phytomenadione), µg	3.6	4	1.2	1.1	0.2
<b>Minerals</b>					
Iron, mg	1.3	0.7	0.7	0.6	0.2
Zinc, mg	1.4	0.5	0.3	0.3	0.1
Calcium, mg	72.0	13.4	15.6	19.2	4.9
Copper, mg	0.1	0.2	0.1	0.1	0
Magnesium, mg	20.2	38.4	17.2	14.6	6.3
Selenium, µg	2.5	1.6	1.3	1.9	1.4

**Table 21. Nutritional Composition of Local Food-Based Rations, Senegal**

<b>Nutrient</b>	<b>WHO Guidance 60% of 120/kcal/kg/day</b>	<b>Generic Compound Flour Recipe</b>	<b>Variation with Palm Oil and Baobab Fruit</b>
Energy maximum, kcal/kg/day	72	72	72
Ration size, g/kg/day	n/a	18	16.1
Protein, g	1.4	2.2	1.8
Fat, g	1.8	1.8	3.2
<b>Vitamins</b>			
Vitamin A (retinol), µg	144	0	0.1
Vitamin B1 (thiamine), mg	0.1	0.1	0
Vitamin B2 (riboflavin), mg	0.3	0	0
Vitamin B3 (Niacin), mg	1.8	0.9	0
Vitamin B5 (Pantothenic acid), mg	0.4	0.2	0
Vitamin B6 (pyridoxine), mg	0.1	0.1	0.1
Vitamin B9 (Folate), µg	28.8	33.4	1
Vitamin B12 (Cobalamin), µg	0.4	0	0

<b>Nutrient</b>	<b>WHO Guidance 60% of 120/kcal/kg/day</b>	<b>Generic Compound Flour Recipe</b>	<b>Variation with Palm Oil and Baobab Fruit</b>
Vitamin C (Ascorbate), mg	10.8	0	0.3
Vitamin D (Cholecalciferol), µg	1.4	0	0
Vitamin E, mg	2.2	0.3	0
Vitamin K (Phytomenadione), µg	3.6	0.4	0
<b>Minerals</b>			
Iron, mg	1.3	0.6	0.1
Zinc, mg	1.4	0.3	0
Calcium, mg	72.0	8.8	5.6
Copper, mg	0.1	0.1	0.1
Magnesium, mg	20.2	18.4	2
Selenium, µg	2.5	1.5	0.5

**Table 22. Nutritional Composition of Local Food-Based Rations, Uganda**

<b>Nutrient</b>	<b>WHO Guidance 60% of 120/kcal/kg/day</b>	<b>METU- I</b>	<b>Amaranth Porridge</b>	<b>Kitoobero - Sweet Potato</b>	<b>Kitoobero - Cassava</b>	<b>Kitoobero - Matooke</b>
Energy maximum, kcal/kg/day	72	72	72	72	72	72
Ration size, g/kg/day	n/a	16.4	25.5	22.3	20.1	21.2
Protein, g	1.4	1.5	3.4	3.4	3.1	3.3
Fat, g	1.8	2.9	1.6	5.3	4.8	5
<b>Vitamins</b>						
Vitamin A (retinol), µg	144	9.7	3.6	74.4	0.1	5.6
Vitamin B1 (thiamine), mg	0.1	0	0.1	0.1	0.1	0.1
Vitamin B2 (riboflavin), mg	0.3	0	0.1	0	0	0
Vitamin B3 (Niacin), mg	1.8	0.8	0.8	1.4	1.3	1.4
Vitamin B5 (Pantothenic acid), mg	0.4	0.1	0.2	0.3	0.2	0.2
Vitamin B6 (pyridoxine), mg	0.1	0.1	0.1	0.1	0	0.1
Vitamin B9 (Folate), µg	28.8	9.6	20.8	27.9	26.7	27.6

<b>Nutrient</b>	<b>WHO Guidance 60% of 120/kcal/kg/day</b>	<b>METU- I</b>	<b>Amaranth Porridge</b>	<b>Kitoobero - Sweet Potato</b>	<b>Kitoobero - Cassava</b>	<b>Kitoobero - Matooke</b>
Vitamin B12 (Cobalamin), µg	0.4	0	0	0	0	0
Vitamin C (Ascorbate), mg	10.8	0	0.2	0.3	1.9	1.8
Vitamin D (Cholecalciferol), µg	1.4	0	0	0	0	0
Vitamin E, mg	2.2	0.3	0	0.9	0.8	0.9
Vitamin K (Phytomenadione), µg	3.6	0.7	1.7	0.2	0.2	0.1
<b>Minerals</b>						
Iron, mg	1.3	0.4	0.9	0.6	0.5	0.6
Zinc, mg	1.4	0.2	0.4	0.4	0.3	0.3
Calcium, mg	72.0	4	23	17.1	14.1	13.6
Copper, mg	0.1	0.1	0.2	0.1	0.1	0.1
Magnesium, mg	20.2	16	32.7	20.2	17.9	20.4
Selenium, µg	2.5	1.3	1.8	0.8	0.8	0.9



## Annex 8: Recipes and Rations

The recipes and ration amounts used for the nutrition analysis are detailed in the tables below.

### Nigeria

Table 23. Tom Brown Flour

Ingredient	Amount in Daily Serving	Preparation Notes
Millet	48.2g	Flour is cooked with water for 5 to 15 minutes to make a porridge.
Sorghum	48.2g	
Maize	48.2g	
Soya	64.2g	
Groundnuts	21.4g	
Total daily ration portion (g)	Total of 214g of prepare flour, consumed over 2-3 servings	

Table 24. Porridge Mum Recipe Example 1: Moi Moi

Ingredient	Amount in Daily Serving	Preparation Notes
Beans	173g	None provided.
Spinach	1g	
Palm oil	67g	
Onion	3g	
Iodized salt	1g	
Maggi	3g	
Pepper	3g	
Bell Pepper	15g	
Crayfish	93g	
Ginger	2g	
Turmeric	2g	
Total daily ration portion (g)	Amounts are for 1 portion of 363g.	

**Table 25. Porridge Mum Recipe Example 2: Jollof Rice with Beans**

Ingredient	Amount in Daily Serving	Preparation Notes
Beans	118g	None provided.
Rice	211g	
Spinach	7g	
Palm oil	45g	
Onion	5g	
Iodized salt	1g	
Maggi	3g	
Pepper	23g	
Ginger	2g	
Turmeric	2g	
Tomatoes	23g	
Dry fish	23g	
Total daily ration portion (g)	Amounts are for 1 portion of 461g.	

**Table 26. Porridge Mum Recipe Example 3: Tuwo with Vegetables**

Ingredient	Amount in Daily Serving	Preparation Notes
Maize flour	314g	None provided.
Sorrel	1g	
Spinach	5g	
Palm oil	45g	
Onion	5g	
Iodized salt	1g	
Maggi	3g	
Pepper	23g	
Ginger	2g	
Turmeric	2g	

Groundnut paste	34g	
Dry fish	23g	
Total daily ration portion (g)	Amounts are for 1 portion of 455g. There are larger amounts for a batch, then divided by 22 children.	

## Senegal

**Table 27. Recipe with Standard Ratios**

Ingredient	Amount in Daily Serving	Preparation Notes
Millet	15g	Flour cooked into a porridge, amount of water to be added was not specified.
Rice	15g	
Sorghum	15g	
Cowpeas	15g	
Peanuts	15g	
Powdered sugar (optional)	15g	
Total daily ration portion (g)	90g of flour, prepared as porridge, consumed in 2 portions.	

**Table 28. Example from Aéré Lao, Pété Health District**

Ingredient	Amount in Daily Serving	Preparation Notes
Millet	16.88g	Flour cooked into a porridge, amount of water to be added was not specified.
Rice	16.88g	
Sorghum	16.88g	
Corn	16.88g	
Cowpeas	5.62g	
Peanuts	5.62g	
Palm Oil (unrefined)	5.62g	
Baobab fruit	5.62g	
Total daily ration portion (g)	90g of flour, prepared as porridge, consumed in 2 portions.	

## Uganda

Table 29. METU-I

Ingredient	Amount in Daily Serving	Preparation Notes
Sorghum	148g	Bring water to a boil, then add millet paste and stir until the mixture turns brown. Then add the peanut paste and stir until it dissolves. Add ghee and stir until it dissolves and allow to cool. Add honey and stir for a few minutes until uniform.
Groundnut paste	50g	
Ghee	19g	
Honey	51g	
Water	1 L	
Total daily ration portion (g)	269g per person per day	

Table 30. Amaranth Porridge

Ingredient	Amount in Daily Serving	Preparation Notes
Millet	80g	The first five ingredients are in a powder form. Mix these with half a cup of water to make a paste. Boil remaining water and add the paste. Cook for 15 minutes. Then add milk and sugar and cook for an additional 5 minutes.
Amaranth grains	60g	
Soybeans	40g	
Maize	20g	
Silverfish	6g	
Milk	88.58ml	
Sugar	28g	
Water	1.2 L	
Total daily ration portion (g)	322g (weight without water), consumed in 3 portions.	

**Table 31. Kitoobero Variation 1 with Sweet Potato**

<b>Ingredient</b>	<b>Amount in Daily Serving 7–11 months</b>	<b>Amount in Daily Serving 1–5 years</b>	<b>Preparation Notes</b>
Groundnut powder (sometimes swapped with beans)	250g	500g	Mix ingredients and steam for 1.5 hours. Each recipe makes two daily portions; one for lunch and one for evening meal (evening meal should be reheated to steaming). To be given at least four times a week.
Sweet Potatoes	125g	250g	
Silver fish	2 pinches	4 pinches	
Salt	1 pinch	2 pinches	
Water	750ml	1.5l	
Total daily ration portion (g)	265g	530g	

**Table 32. Kitoobero Variation 2 with Cassava**

<b>Ingredient</b>	<b>Amount in Daily Serving 7–11 months</b>	<b>Amount in Daily Serving 1–5 years</b>	<b>Preparation Notes</b>
Groundnut powder (sometimes swapped with beans)	250g	500g	Mix ingredients and steam for 1.5 hours. Each recipe makes two daily portions; one for lunch and one for evening meal (evening meal should be reheated to steaming). To be given at least four times a week.
Cassava	125g	250g	
Silver fish	2 pinches	4 pinches	
Salt	1 pinch	2 pinches	
Water	750ml	1.5l	
Total daily ration portion (g)	265g	530g	

**Table 33. Kitoobero Variation 3 with Matooke**

<b>Ingredient</b>	<b>Amount in Daily Serving 7–11 months</b>	<b>Amount in Daily Serving 1–5 years</b>	<b>Preparation Notes</b>
Groundnut powder (sometimes swapped with beans)	250g	500g	Mix ingredients and steam for 1.5 hours. Each recipe makes two daily portions; one for lunch and one for evening meal (evening meal should be reheated to steaming). To be given at least four times a week.
Matooke	125g	250g	
Silver fish	2 pinches	4 pinches	
Salt	1 pinch	2 pinches	
Water	750ml	1.5l	
Total daily ration portion (g)	265g	530g	





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## **USAID ADVANCING NUTRITION**

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