Innovations in Community Management of Acute Malnutrition (CMAM)

Updated July 2018
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Definitions

Expanded Admission Criteria: A temporary option, most often used in emergency contexts, for treating acute malnutrition in the absence of a Targeted Supplementary Feeding Programme (TSFP) and/or Outpatient Therapeutic Programme (OTP) whereby in the absence of a TSFP children with MAM can be treated with Ready to Use Therapeutic Food (RUTF) and whereby in the absence of an OTP children with SAM can be treated with Ready to Use Supplementary Food (RUSF).

Integrated Treatment Protocol for SAM and MAM: A simplified protocol for the treatment of uncomplicated SAM and MAM for children aged 6-59 months. There is no standard definition available and the protocols piloted thus far have had different objectives as well as different criteria for admission, discharge, and treatment. Below is an example ‘definition’ used by the ComPAS study.

A protocol to simplify the treatment of uncomplicated SAM and MAM for children aged 6-59 months to improve the global coverage, quality, continuity of care, and cost-effectiveness of acute malnutrition treatment in resource-constrained settings. Using only one product (RUTF) at doses tested to optimise growth and minimise cost at each stage of treatment. Admission and discharge will be assessed using Mid-Upper Arm Circumference (MUAC) and oedema only.

MUAC Only: A protocol whereby admission and discharge for treatment of uncomplicated SAM and MAM for children aged 6-59 months is based on MUAC and bilateral pitting oedema only (not using weight for height z-scores).

Mothers using MUAC: A protocol to simplify screening for acute malnutrition at community level through using mothers to screen for MUAC, in addition or instead of community health workers/community volunteers.

Integration of Treatment for Acute Malnutrition into ICCM: A protocol whereby the treatment of SAM (and possibly MAM) is integrated into Integrated Community Case Management (ICCM), which entails the treatment of SAM being carried out by community health workers within the community instead of at a health facility.

Community Management of at Risk Mothers and Infants (C-MAMI): The identification and care of nutritionally vulnerable infants under 6 months, and their mothers.

MHealth: A subset of eHealth, the practice of medicine and public health, supported by mobile devices, such as mobile phones, Personal Digital Assistants (PDAs) and tablets.

CMAM Surge Approach: A methodology for health systems strengthening, which aims to support health systems becoming more resilient over time, by helping them to become better able to cope with periodic peaks in demand for services for acute malnutrition.
1. Introduction

The implementation of community-based management of acute malnutrition (CMAM) as the standard model of care for children with acute malnutrition has significantly increased cost-effectiveness of the treatment and the potential for larger coverage, largely due to a shift from inpatient to outpatient management. However, in places where CMAM services are available, coverage is still not optimal and distance and high opportunity costs to seeking treatment have consistently been reported as the top barriers to access. Moreover, adjustments of protocols might warrant better outcomes in resource-poor settings and in humanitarian emergencies.

Over the past years new methods have been developed, tested and implemented. These new methods were often born from a desire to simplify or improve the classic CMAM model to increase coverage, increase cost-effectiveness, facilitate implementation in a humanitarian emergency, or facilitate implementation by a health system. This report aims to provide an overview of the latest innovations in CMAM and includes evidence, country experiences, guidance documents available, as well as an overview of on-going initiatives.

Note: the first version of this document was developed in July 2017 and the document has been updated in July 2018.

Authors and Acknowledgements

This document was written by Anne Marie Kueter, Megan Gayford, Emily Keane, and Claudine Prudhon (Save the Children UK).

We are very grateful for the support of colleagues from different agencies who contributed to the development of this document, in particular: Jeanette Bailey (IRC), Amy Mayberry (Action Against Hunger UK), Nathalie Sessions (Action Against Hunger UK), Kevin Phelan (ALIMA), and Kerstin Hanson (MSF France).

The complete list of contact details can be found at the end of this document (Annex I).

2. Expanded Admission Criteria

2.1 Possible rationale for use of Expanded Admission Criteria

§ Implementing separate protocols for SAM and MAM treatment can be administratively cumbersome, and especially challenging in emergency settings, partly due to division of labour and responsibilities between UNICEF and WFP.
§ SAM has a higher relative risk of mortality but the larger numbers of MAM means that the population- attributable risk of malnutrition to mortality is much higher in this group.\(^2\)\(^3\)
§ The expanded admission criteria can offer a solution in emergency settings when there is either no OTP or TSFP available and patients with SAM can be treated with RUSF or patients with MAM can be treated with RUTF.
§ The expanded admission criterion for OTP allows the identification and treatment of patients before malnutrition becomes life threatening.
§ Integrated treatment of SAM and MAM is possibly more cost efficient when compared to standard treatment.

Note: Using the expanded admission criteria may be problematic in areas with a high burden of acute malnutrition (i.e. India) as it requires a large amount of resources.

2.2 Evidence and Country Experience

Use of Expanded Admission Criteria in Pakistan - operational emergency context (2010)

In 2010 OFDA issued a recommendation to all its partners to adopt expanded admission criteria, treating MAM with RUTF when RUSF was not available, in order to rapidly expand selective feeding programmes in response to the flood emergency. Children were admitted with MUAC <125mm and the dosage of RUTF provided was 2 sachets per day for children with MUAC <115mm and 1 sachet per day for children with MUAC 115-<125mm.

Note: This programme has not been evaluated

Simplified and Expanded Admission Criteria in Upper Nile State, South Sudan (2014)

In 2014 MSF Spain used a simplified and expanded protocol for the treatment of acute malnutrition in Kodok, South Sudan. A retrospective analysis of MSF Holland’s programme in Bentiu in 2012 showed that MUAC <125 mm would include 71.1% of the case load identified by WHZ -3, by comparison MUAC <115mm would include 25.8% of the caseload identified by WHZ -3. MSF Spain decided on this approach for the following reasons: 1) faster and easier to use than WHZ in emergencies, 2) better detection of younger children at higher risk of death, 3) facilitates coverage,

and 4) more adapted to the community. Following admission based on MUAC, this was also the only criteria for discharge because 1) easier to use than WHZ in CMAM, and 2) avoids discharge of children who are still malnourished (compared to old criteria of 15% weight gain). Dosages of RUTF were simplified, children <6kg received 2 sachets per day and children >6kg received 3 sachets per day.

The PowerPoint presented by MSF in South Sudan can be found below.

2.3 Available Guidance

Interim Guidance CMAM in Exceptional Circumstances

The draft Guidance Note on Expanded Admission Criteria was developed by a group of nutrition experts and validated at an interagency nutrition meeting in Washington in 2014. UNICEF and WFP have developed the interim operational guidance for CMAM programming in exceptional circumstances in 2017, in collaboration with GNCs MAM task force members. This document provides guidance for the use of the Expanded Admission Criteria in different scenarios: A) in the context where there is an OTP but no SFP, B) in the context where there is a SFP but no OTP, and C) in the context where there is no OTP or SFP.

The interim operational guidance is included as an appendix (D) to the Decision Tool for MAM in Emergencies and can be found here.

South Sudan - Operational Guidance Expanded Criteria of SAM and MAM Treatment

Based on the draft guidance note described above, an operational guidance note was developed for use in South Sudan in 2014. The document can be found below.

2.4 On-going Initiatives

There are several on-going initiatives, however, these can also be classified under the on-going initiatives for the Integrated Treatment Protocol for SAM and MAM and MUAC only programming since they incorporate all three. One of them is a ComPAS study in Kenya and South Sudan. Additional information of a study in Niger designed by MSF Spain can be found under paragraph 3.2; additional information from a study currently conducted by ALIMA in Burkina Faso can be found under paragraph 3.3; and additional information from an operational programme of MSF-France in Nigeria can be found under paragraph 4.4.
3. Integrated Treatment Protocol for SAM and MAM

The rationale for the use of an Integrated Treatment Protocol for SAM and MAM and the use of the Expanded Admission Criteria is largely the same. However, one of the main differences is that the Expanded Admission Criteria are more emergency focused and came into existence out of necessity, based on a lack of either OTP or SFP programmes whereas the Integrated Treatment Protocol is based on an informed choice looking at the potential benefits of the integration of both treatments.

3.1 Possible rationale for use of an Integrated Treatment Protocol for SAM and MAM

§ Implementing separate protocols for SAM and MAM treatment can be administratively cumbersome, and especially challenging in emergency settings, partly due to division of labour and responsibilities between UNICEF and WFP.
§ SAM has a higher relative risk of mortality but the larger numbers of MAM means that the population-attributable risk of malnutrition to mortality is much higher in this group.\(^4\,^5\)
§ The use of only one product would simplify the supply chain.
§ Treating malnutrition earlier is more effective (SAM more difficult to treat than MAM), poses fewer risks to the patient, and is less costly.
§ Integrated treatment of SAM and MAM is possibly more cost efficient when compared to standard treatment.

Note: A common concern is that integrated treatment will be more costly, both in terms of products (RUTF will be used for MAM) but also in terms of human resources and general service delivery. However, it is important to emphasize that the hypothesis that integrated treatment will be more cost-effective is based on several assumptions: by treating MAM we reduce the caseload of more costly and complicated SAM cases; and MAM children require less RUTF since the objective of MAM treatment is to serve as a supplement to the diet. Ultimately it is important to look at the bigger picture of cost-effectiveness taken into account the improved long-term health outcomes of children not becoming SAM, and through this reduced hospitalizations, and reduced mortality.

3.2 Evidence and Country Experience


In 2006 MSF integrated the treatment of MAM and SAM in two districts in Maradi using the same medical and dietary protocols as for SAM (with the exception of systematic antibiotic treatment, which was only given to children admitted with SAM). Children were admitted based on WHZ (<80% of NCHS median) and/or MUAC (<110mm) and/or bilateral pitting oedema. The distinction between SAM and MAM was abandoned in favour of a distinction between complicated and non-complicated

acute malnutrition. Complicated cases were admitted to one of two inpatient units. The equivalent of 1,000 kcal/day of RUTF was offered to all outpatients.

Results obtained by the study prove that RUTF is an effective treatment for MAM. The treatment of acute malnutrition at an earlier stage reduced admissions for SAM and eliminated the usual rise in severe cases during the hunger gap period.

The complete article can be found here.


A cluster-randomised controlled trial in Sierra Leone explored whether integrated SAM and MAM treatment improved recovery rate and community coverage. A total of 1,975 children 6-59 months of age were enrolled and randomly assigned to integrated treatment (decreasing RUTF dosage for SAM, LNS for MAM, limited duration of treatment (12 weeks), no routine medication, peer counselling) or standard treatment (government protocol, RUTF for SAM, CSB for MAM, micronutrient supplementation and prophylactic antibiotics). Different anthropometric enrolment criteria and definition of recovery were used for the different study arms, limiting direct comparison of outcomes. The integrated approach used oedema and/or MUAC for SAM and MUAC alone for MAM, whereas the standard protocol used oedema, MUAC and WHZ criteria. GAM recovery was 83% for integrated and 79% for standard treatment and coverage was 71% for integrated and 55% for standard treatment. Care group participation was associated with greater recovery rate. The cost of RUTF used to treat a SAM case in the integrated management was USD 68, whereas for the standard management of SAM it was USD 68. The cost of supplementary food used to treat a case of MAM was USD 12 for both treatment protocols. The findings suggest that integrated care may be an acceptable alternative to standard care.

The publication in the Journal of Nutrition can be found here and the publication in Field Exchange can be found here.

3.3 On-going Initiatives

The ComPAS Study (2014-2018)

The Combined Protocol for Acute Malnutrition Study (ComPAS) began in October 2014 and is a research consortium led by IRC, Action Against Hunger US and Action Against Hunger UK and funded by OFDA and CIFF. ComPAS is supported by an expert taskforce of scientists. ComPAS aims to simplify the treatment of uncomplicated SAM and MAM for children aged 6-59 months in one protocol to improve the global coverage, quality, continuity of care, and cost-effectiveness of acute malnutrition treatment in resource-constrained settings. The first stage of the three year ComPAS Study retrospectively analysed treatment data (growth, energy requirements) from acutely malnourished children to develop a simplified MUAC-based dosing chart to treat both SAM and MAM. The Combined Protocol proposes to use only one product (RUTF) at doses tested to optimise growth and minimise cost at each stage of treatment. Admission and discharge will be assessed using MUAC and oedema only.
During Stage One the analysis showed the following key findings:

1. Rate of weight and MUAC gain slows as children recover.
2. Weight and MUAC gain mirror each other.
3. In children from Asia, rate of weight and MUAC gain slows at lower MUAC’s than in children from Africa.
4. As rate of weight and MUAC gain slows, children need fewer kcal/kg/day to achieve observed growth.
5. 1000 kcal/day covers total energy needs for 95% of children <115mm, and 500 kcal/day covers half of energy needs of 95% of children 115-<125mm.

The conclusion of Stage One was a simplified MUAC-based dosage chart that suggests the following: <115mm – 2 RUTF/day and 115-<125mm – 1 RUTF/day. This will be tested during Stage Two of ComPAS. More information can be found here and the Briefing Note on the Stage One Findings can be found below (key findings from the briefing note are reflected under paragraph 4.2).

ComPAS_StageOne_Briefing.pdf

The second stage of the study consists of a multi country cluster-randomised controlled non-inferiority trial in Kenya and South Sudan, to test the Combined Protocol against the standard treatment of OTP and SFP. ComPAS will explore the following research questions:

- What is the effectiveness, in terms of recovery, defaulter, death, and non-response rates, length of stay, and average weekly weight gain following treatment under the Combined Protocol compared with the standard treatment of OTP +SFP?
- What is the cost-effectiveness of the Combined Protocol compared to the standard treatment of OTP + SFP?

The study protocols for both research questions have been published. The first – ‘Combined Protocol for Acute Malnutrition Study (ComPAS) in rural South Sudan and urban Kenya: study protocol for a randomized controlled trial’ can be found here. This study will assess recovery rate as a primary outcome and coverage, defaulting, death, length of stay. Average weekly weight gain and average weekly mid-upper arm circumference gain as secondary outcomes. This study is expected to be completed by mid-2018.

The second – ‘The ‘ComPAS Trial’ combined treatment model for acute malnutrition: study protocol for the economic evaluation’ can be found here. This study will calculate the total economic costs of both protocols from a societal perspective, sing accounting data, interviews and survey questionnaires. The incremental cost of implementing the combined protocol will be estimated, and all costs and outcomes will be presented as a cost-consequence analysis. The findings of this economic evaluation will be important for policy makers, especially given the hypothesised non-inferiority of the main health outcomes.
In addition to the above, the ComPAS study is also being conducted by IRC in Somalia. This study is funded by Research for Health in Humanitarian Crises Programme (R2HC).

**MANGO Study (2015-2019)**

Modelling an Alternative Nutrition Protocol Generalizable for Outpatient (MANGO) is a randomised control trial run by Action Against Hunger in Burkina Faso. The MANGO study is focused on testing the effectiveness and cost-effectiveness of reduced dosages of RUTF for the treatment of uncomplicated SAM in children 6-59 months of age. The aim of the study is to demonstrate reductions in the cost of treatment by reducing the amount of product used. In addition to anthropometry, the study will also look at duration of treatment, recovery, defaulter rates, death, relapse, average energy intake after four weeks of treatment, micronutrient blood status change, and changes in body fat and lean mass.

The first phase of the study, which ran from October 2014 to October 2015, resulted in two additional outputs:

1. A global dataset of over 11,000 SAM children without medical complications treated in outpatient treatment programmes in Yemen, Burkina Faso, Chad, and Myanmar was compiled;
2. Using this dataset, two new dosage tables for the treatment of SAM using RUTF were developed and are currently being piloted in the MANGO and ComPAS studies.

The report from the first project can be found [here](#).

The MANGO study is still underway in Burkina Faso. Enrolment is expected to complete in the summer of 2018 with final data collection by January 2019 and analysis and reporting of findings from mid-2019 onwards.

More information and updates on progress can be found [here](#).

**ALIMA, Burkina Faso**

ALIMA has completed a MUAC Only study in Yako health district in Burkina Faso. The follow up period has been concluded in April 2018, and at the time of writing it is anticipated that the data will be analysed in quarter 3 of this year. The study has three major components: 1) MUAC at home, earlier detection of malnutrition in the home through screening by mothers and other family members; 2) MUAC only at the health centre, earlier treatment and easier case management through expanding admission criteria to <125mm; and 3) MUAC status determines RUTF dose, more efficient use of expensive RUTF through a reduction of RUTF dosage during treatment. The latter allows for a significant increase in children treated without a significant increase in overall RUTF needs. The RUTF dosing regimen used during the study will be 175 kcal/kg/day for <115 mm, 125 kcal/kg/day for 115mm to <120mm, and 75 kcal/kg/day for 120mm to <125mm. ALIMA expects the innovative approach to result in earlier treatment initiation for a greater number of children, easier administration of programming for health professionals, and less costs for similar impact for policy makers. Results of the study are expected to be published in 2018.
4. MUAC Only

4.1 Possible rationale for using MUAC instead of WHZ as admission and discharge criteria

§ Faster and easier to use than WHZ, especially important in emergencies.
§ Better detection of younger children at higher risk of mortality.
§ Using MUAC as a general tool (i.e. for case finding, referral, admission, monitoring response to treatment, and discharge) has the potential to simplify the practical application of CMAM.
§ Has the potential to increase coverage.
§ Reduces the caseload in most contexts making it more practical/feasible to implement as part of a health system.
§ The use of proportional weight gain as a discharge criterion for MUAC admissions to CMAM programs is no longer recommended by WHO as it proved to be problematic with the most malnourished cases receiving the least amount of treatment6.

4.2 Evidence and Country Experience

➢ Development Context

Safety and practicability of using MUAC as a discharge criterion in community based management of severe acute malnutrition in children aged 6-59 months (2016)

This study conducted in Lilongwe District in Malawi showed that a MUAC discharge criterion of 125mm or greater is a safe discharge criterion and is associated with low levels of relapse to SAM and mortality with long duration of treatment only seen in the most severe SAM cases. Use of MUAC as discharge criterion for children aged six months or older and less than 65cm in height at admission was also found to be appropriate.

The complete article can be found [here](#).

Choosing Anthropometric Indicators to Monitor the Response to Treatment for Severe Acute Malnutrition in Rural Southern Ethiopia – Empirical Evidence (2017)

This study looked at non-oedematous children (n=661) aged 6-59 months admitted to a community based outpatient therapeutic program for SAM in rural southern Ethiopia. Children with the lowest MUAC at admission showed a significant gain in MUAC but not weight, and children with the lowest WHZ showed a significant gain in weight but not in MUAC. The response to treatment was largest for children with the lowest anthropometric status at admission for either measurement. The study concludes that MUAC and weight gain are two independent anthropometric measures that can be used to monitor recovery in children treated for SAM, supporting the latest recommendation from WHO (the complete article can be found [here](#)).

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Emergency Context

**MSF’s experience with MUAC-based (and oedema) programming**

From 2007 to 2015, MSF has operated MUAC (and oedema) only based CMAM programming in a number of challenging emergency contexts in Burkina Faso, India, Sudan, South Sudan, Mali, Chad, Central African Republic (CAR) and Democratic Republic of Congo (DRC).

The article shares experiences and lessons learned from this programming. Data analysis from MSF programmes in Burkina Faso and India showed that MUAC gains closely paralleled weight gain, suggesting that MUAC would work well for monitoring and discharge.

One of the major concerns related to MUAC-only programming is the potential exclusion of children with MUAC >115 mm, but WHZ < -3. MSF has addressed this concern in some instances by increasing the MUAC threshold for admission. The threshold was, for example, increased to 120 mm in northern Burkina Faso and Bokoro, Chad and to 125 mm in Upper Nile, South Sudan (described above).

Outcomes for recovery, mortality, and defaulters exceeded the Minimum Standards set by SPHERE in most of the MSF MUAC-based programmes. High recovery rates (88-90%) were achieved in the programmes in northern Burkina Faso, northern Mali, and Yida, South Sudan with lengths of stay in the order of 30-45 days. Consequently, MSF recommends MUAC-based (and oedema) programming for most of its emergency responses, with ongoing review. Further research is needed on appropriate MUAC thresholds and how to ensure low WHZ only children receive appropriate nutrition support.

The complete article can be found [here](#).

**Comparison of weight-for-height and MUAC in a therapeutic feeding programme in South Sudan: is MUAC alone a sufficient criterion for admission of children at high risk of mortality? (2015)**

This study retrospectively analysed the nutritional program from MSF in Aweil, South Sudan, in order to examine any differences in response to treatment between children identified with SAM using WHZ or MUAC as admission criteria. The analysis showed that a MUAC <115mm identified younger and more wasted children with a higher risk of mortality. However it failed to identify 1/3 of the children that died in the program. 95% of deaths were identified by a WHZ cut-off less than minus 3, a MUAC <130mm would have captured all deaths in the project.

**Note:** In this context the sliding scale MUAC approach (MSF-France) could be used, where raising the cut-off to <130mm would have captured all children at risk of mortality.

The complete article can be found [here](#).

Also see MSFs experience in South Sudan described under paragraph 2.2.

July 2018
Following a child’s progression using MUAC only

During Stage One of the ComPAS study growth trends and energy requirements of 8,000 children recovering from acute malnutrition in Outpatient Therapeutic Programs and Supplementary Feeding Programs from several different countries were analysed. Response to treatment was assessed for different sub-groups of children (including by region, age, stunting and wasting status and treatment outcome). The final analysis was reviewed by an expert panel who proposed a simplified protocol providing an optimal dosage of RUTF correlated with MUAC category. One of the key findings is that weight and MUAC gain mirror each other and supports the hypothesis that MUAC gain can be used as a proxy for weight gain. The rate of growth (defined by MUAC and weight gain) decreases as children recover.

The Briefing Note on the Stage One Findings can be found under paragraph 3.3 and the Field Exchange article can be found here.

Relationship between MUAC and weight changes in children 6-59 months (2015)

The two objectives of a study conducted by Binns et al. in 2015 were to describe the relationship between weight changes and MUAC changes in children between 6-59 months during treatment for SAM in CMAM programmes in Malawi, Ethiopia, and Bangladesh as well as to describe the sensitivity of both MUAC and weight to episodes of disease experienced during the SAM treatment episodes in CMAM programmes in the same countries. This study showed that MUAC and weight gain achieved over the entire treatment episode were strongly correlated in all country contexts and that MUAC and weight changes at each outpatient visit were closely correlated. In addition MUAC and weight appeared to respond rapidly and similarly to episodes of illness reported during outpatient treatment for SAM, responding similarly for each illness (measured for diarrhoea, vomiting, fever, and cough). The results of this study suggest that MUAC, besides being used as admission and discharge criterion, could also be used for the monitoring of recovery of the child.

The complete article can be found here.
A range of articles has been published on the use and validity of MUAC as an indicator for acute malnutrition. An overview of some of the most recent and important articles can be found below (please note that this is not an exhaustive overview as this is beyond the scope of this document).

<table>
<thead>
<tr>
<th>Title</th>
<th>Key Findings/Conclusions</th>
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<tr>
<td>Using MUAC to End Treatment of Severe Acute Malnutrition Leads to Higher Weight Gains in the most Malnourished Children. (Dale et al. 2013)</td>
<td>Data from 753 children cured from a MSF outpatient nutrition program in Gedaref, North Sudan were analysed. MUAC &gt;125 mm was used as discharge criteria. Length of Stay and percent weight gain of children were compared in relation to nutritional status on admission. Children with low MUAC on admission had a longer duration of treatment ( (p=0.000) ) and also a higher percent weight gain ( (p=0.000) ) than children with higher MUAC. Similar results with WFH z-scores categories were shown with both duration of treatment ( (p=0.000) ) and percent weight gain ( (p=0.000) ). This study shows that using MUAC as the discharge criteria eliminates the effect of shorter treatment in most severely malnourished children compared to least severely malnourished, as is observed with percent weight gain. MUAC could be used as discharge criteria, instead of percent weight gain, as having a longer duration of treatment and a higher percent weight gain for the most malnourished is highly desirable.</td>
</tr>
<tr>
<td>Weight-for-height and MUAC should be used independently to diagnose acute malnutrition: policy implications (Grellety &amp; Golden 2016)</td>
<td>Anthropometric surveys of children are used to assess the nutritional status of a population. WHO recommends that MUAC or WHZ are used to assess acute malnutrition prevalence. However, there are reports from several countries that the two criteria identify different children. In order to examine the external validity of these observations this study compared the direction and degree of discrepancy across countries. Anonymous data were collected from 1832 anthropometric surveys from 47 countries with measured children aged from 6 to 59 months and at least 75 malnourished subjects. The prevalence of GAM and SAM was calculated using either absolute MUAC or WHZ. For each country, the total number of children diagnosed as acutely malnourished by either criterion alone or by both criteria were summed from all the surveys conducted in that country. In all countries a minority of children were diagnosed as malnourished by both criteria. Both the magnitude and direction of the discrepancy varied dramatically between countries with some having most children diagnosed as malnourished by MUAC and others where nearly all the children were diagnosed by WHZ alone. For all countries examined the discrepancy was not adequately explained by any single hypothesis, such as variation in relative leg to body length. The perceived need for humanitarian intervention can be affected by the measurement chosen to assess the prevalence of malnutrition, which will vary from region to region. It is recommended that MUAC measurement be</td>
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included in all anthropometric surveys and that the two criteria are not alternative measures of the loss of body tissue leading to an increased risk of death, but complementary variables that should both be used independently to guide admission for treatment of malnourished children.

**Complete Article**

| Low MUAC identifies children with a high risk of death who should be the priority target for treatment (Briend et al. 2016) | SAM is currently defined by the WHO as either a low MUAC a low WHZ, or bilateral pitting oedema. MUAC and WHZ do not always identify the same children as having SAM. This has generated broad debate, as illustrated by the recent article by Grellety & Golden cited above.  
Regional variations in the proportion of children selected by each index seem mostly related to differences in body shape, including stuntedness. However, the practical implications of these variations in relation to nutritional status and also to outcome are not clear. All studies that have examined the relationship between anthropometry and mortality in representative population samples in Africa and in Asia have consistently showed that MUAC is more sensitive at high specificity levels than WHZ for identifying children at high risk of death. Children identified as SAM cases by low MUAC gain both weight and MUAC in response to treatment. The widespread use of MUAC has brought enormous benefits in terms of the coverage and efficiency of programs. As a large high-risk group responding to treatment, children with low MUAC should be regarded as a public health priority independently of their WHZ.  
While a better understanding of the mechanism behind the discrepancy between MUAC and WHZ is desirable, research in this area should not delay the implementation of programs aiming at effectively reducing malnutrition-related deaths by prioritising the detection and treatment of children with low MUAC. |
4.3 Available Guidance

According to WHO Guidelines MUAC, WFH and/or oedema can be used as admission criteria for the treatment of SAM. The anthropometric indicator used as admission criteria should also be used as the criteria for discharge. Children admitted with bilateral pitting oedema only should be discharged after oedema is resolved and based on whichever anthropometric indicator routinely used in the programme (WFH or MUAC).

4.4 Ongoing Initiatives

MSF - Sliding Scale MUAC for Admission

MSF first started to implement the sliding scale MUAC approach in South Sudan in 2012 and has more recently used this approach in Borno State, Nigeria. The idea of using a sliding scale MUAC is to adapt admission criteria based on the context, resources, and target population’s access to other programmes such as BSFP. This approach combines aspects of MUAC only programming, Expanded Admission Criteria, and Integrated Treatment Protocol. Criteria for admission are extended up to <120mm or <125mm, with criteria for discharge usually set to ≥125mm with a minimum stay of 4 weeks in the programme. The ration provided is 2 sachets of RUTF/day for children with MUAC <115mm and 1 sachet of RUTF/day for children with MUAC ≥115mm.

MSF’s experience with this approach has thus far only been in emergency interventions; they are still learning how best to use it, which depends strongly on context. Their different ways of operating as compared to other partners should be considered. Emphasis must be placed on explanation to staff, especially if changes to the admission/discharge criteria are made during programme implementation. Efforts are underway to document and publish evidence of the sliding scale MUAC approach.

An article published on the Lancet Global Health Blog can be found [here](http://www.who.int/elena/titles/full_recommendations/sam_management/en/).
5. Involvement of Mothers for Early Detection and Follow-Up

Related to the use of MUAC as the only admission and discharge criteria is the involvement of mothers to screen for acute malnutrition and follow-up the progression of the child using MUAC. This is not so much a protocol to simplify treatment of SAM and MAM but more so a protocol to simplify screening for acute malnutrition at community level through the involvement of mothers in addition or instead of community health workers/community volunteers.

5.1 Possible rationale for involvement of mothers for early detection (via MUAC) and follow-up

§ Mothers are in the best position to detect the earliest signs of malnutrition
§ Enables mothers to participate in promoting the health of their children
§ Regular screening in the community has been shown to improve early diagnosis while decreasing risk of medical complication or death
§ Mothers are able to follow-up their children during treatment and bring to the OTP if MUAC diminishes
§ Mothers can classify their children by MUAC as well as CHWs
§ Potential to increase coverage
§ More cost efficient than use of CHWs

5.2 Evidence and Country Experience

Mothers Understand and Can do it (MUAC): a comparison of mothers and community health workers determining MUAC in 103 children aged from 6 months to 5 years, 2012

A pilot study conducted by ALIMA in 2012 with 103 mother child pairs in Niger, showed that minimally trained mothers could classify their children by MUAC color-coded class as well as CHWs. Both groups had similarly high sensitivity and specificity for SAM and global acute malnutrition (GAM). Classification errors only occurred at the boundaries between normal/MAM and MAM/SAM. Accuracy was not influenced by which arm (right or left) was measured nor by how the mid-point of the upper arm was determined (by-eye or by measurement), providing evidence that can simplify the use of an already easy-to-understand tool, while maintaining accuracy and precision.

The complete article can be found here

Mothers screening for malnutrition by MUAC is non-inferior to community health workers: results from a large-scale pragmatic trial in rural Niger, 2013-2014

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A larger study conducted by ALIMA in Niger from 2013-2014 showed that the approach could successfully be scaled up at the health zone level. After training more than 13,000 mothers and caretakers, family members performed as well as or better than CHWs with regards to both MUAC and checking for oedema. SAM was detected earlier (i.e. higher median MUAC) and there were significantly fewer hospitalizations among children screened by their mothers or caretakers, demonstrating one of the major benefits of early detection. Making mothers the focal point of screening cost substantially less per child than the strategy relying on CHWs ($1.04 versus $3.00.)

The complete article can be found here.

5.3 Available Guidance

**ALIMA Mother-MUAC, Teaching Mothers to Screen for Malnutrition**

The guidelines are the product of ALIMA’s lessons learned and includes a set of tools developed to plan and deliver training sessions for mothers and caretakers on how to use MUAC tapes and check for oedema, and monitor the quality of implementation. The guidelines can be found here.

5.4 Ongoing Initiatives

The table below provides an overview of all agencies that are rolling out or planning to roll out mothers using MUAC programmes.

<table>
<thead>
<tr>
<th>Agency</th>
<th>Country/Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Action Against Hunger</strong></td>
<td>India (Rajasthan), Burkina Faso, Chad, Senegal, Madagascar, Central African Republic, Bangladesh, Myanmar</td>
</tr>
<tr>
<td><strong>World Vision</strong></td>
<td>Mauritania</td>
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<tr>
<td><strong>Concern</strong></td>
<td>Uganda</td>
</tr>
<tr>
<td><strong>IMC</strong></td>
<td>Chad, Sierra Leone</td>
</tr>
<tr>
<td><strong>GOAL</strong></td>
<td>South Sudan, Niger, Zimbabwe, Sierra Leone (during Ebola response)</td>
</tr>
<tr>
<td><strong>Valid</strong></td>
<td>India (in collaboration with Government)</td>
</tr>
<tr>
<td><strong>COOPI</strong></td>
<td>Niger, Democratic Republic of Congo</td>
</tr>
<tr>
<td><strong>MSF</strong></td>
<td>Cameroon, Sudan (planned), Democratic Republic of Congo (planned)</td>
</tr>
<tr>
<td><strong>Save the Children</strong></td>
<td>Niger, Mali, Bangladesh, Nigeria (planned), Sudan (planned), South Sudan (planned)</td>
</tr>
</tbody>
</table>

**MSF – Reduced Follow-Up**

MSF has completed the first phase of study addressing the use of a reduced follow-up approach in Niger. Where it is difficult for caregivers to come for follow-up due to access, security etc. caregivers would be given enough RUTF to allow up to 1 month between admission and follow-up. Caregivers would be trained on how to use a MUAC bracelet and recognize danger signs, to follow the progress of their children and alert them when the child requires consultation. Besides easing the burden on caregivers this approach also lightens the pressure on health facilities and facilitates emergency intervention. The results of the first phase of this study can be found here.
ACF – MUAC measurement

ACF is testing three simple MUAC measuring devices in Kenya, designed to be used by mothers/carers in the way developed by ALIMA. Data analysis is currently underway.
6. Integration of Treatment of Acute Malnutrition into ICCM

6.1 Possible rationale for the integration of acute malnutrition treatment into ICCM

§ No need for referral thus potential to increase coverage of treatment of acute malnutrition.
§ Potentially more cost efficient than treatment at health facility level.
§ Potential decrease in burden of care at health facility level.
§ Potential decrease in defaulter and death rates.
§ Reinforces link between nutrition and disease.

6.2 Evidence and Country Experience

The C-Project

The C-project is an Initiative from Action Against Hunger (funded by the Innocent Foundation) with the objective to increase the proportion of children with SAM treated globally in CMAM or similar programs through a transformation of the current service delivery model and increasing access to treatment services. Cohort studies have been implemented in Mali and Pakistan in 2015. In Mali SAM treatment has been integrated into the existing Malian iCCM model for treatment of malaria, pneumonia and diarrhoea. A one pager with more info on the C-Project can be found here.

An article published in 2017 showed that the majority of community health workers were able to correctly assess MUAC in 96.8% of children and oedema was correctly assessed in 78.4% of children. The composite indicator, including all essentials to provide high quality treatment, was achieved for 79.5% of cases. The article concludes that well trained and supervised community health workers are capable of managing uncomplicated SAM.

The complete article can be found here.

A recently published article on the study in Mali ‘The effectiveness of treatment for Severe Acute Malnutrition (SAM) delivered by community health workers compared to a traditional facility based model’ found that performance indicators were better for the intervention group (treatment delivered in health facilities and by community health workers) as compared to the control group (treatment in health facilities). Cure rates of 94.2% were reported for the intervention group compared to 88.6% for the control group. Defaulter ratios were found to be twice as high in the control group compared to the intervention group, 10.8% versus 4.5%. Differences in mortality ratios were not statistically significant. Coverage was also found to be a lot higher in the intervention group (86.7%) compared to the control group (41.6%).

The complete article can be found here.

Another recently published article on the same study looked at the cost-effectiveness - ‘Cost-effectiveness of the treatment of uncomplicated severe acute malnutrition by community health workers compared to treatment provided at an outpatient facility in rural Mali’. This study assessed
cost and cost-effectiveness of CHW-delivered care compared to outpatient facility-based care. The intervention and control arm enrolled different numbers of children and a modelled scenario sensitivity analysis was conducted to assess the cost-effectiveness of each intervention assuming equal numbers of children enrolled. In the base case, with unequal numbers of children in each arm, the cost per child treated was 244USD for the CHW-delivered care and 442 USD for outpatient facility-based care. However, the conclusion changed in the modelled scenario sensitivity analysis, with outpatient facility-based care being more cost-effective at 188USD per child. The study supports existing evidence that the delivery of treatment by CHWs is a cost-effective intervention, provided that good coverage is achieved. An important benefit of this strategy was the lower cost incurred by the households when treatment is available in the community.

The complete article can be found - [here](#).

**iCCM Typologies - A Review**

In 2014 a review was conducted to map out and describe operational experiences linking nutrition and Community Case Management/integrated Community Case Management (iCCM). The review used a desk review and key informant interviews as the two principal methods of data analysis.

The analysis of implementation experiences brought to light four typologies: 1) Advising on ‘feeding the sick child’ within existing iCCM services, 2) Linkages with Social and Behaviour Change activities on child nutrition, 3) Linkages between iCCM activities and acute malnutrition through treatment through assessment and referral, and 4) Treatment at community level of uncomplicated SAM.

Typology 4 is most relevant to this review and it was found that several NGOs and governments adapted CMAM protocols to extend treatment of acute malnutrition to the community level whereby two categories were identified:

1) The assessment, classification and treatment for acute malnutrition were added onto the existing responsibilities of the iCCM worker.

2) The iCCM worker was linked or connected with a second community-based cadre with responsibilities and skills for addressing acute malnutrition.

In an additional variation of implementation it should be noted that in some countries acute malnutrition is treated at a fixed location (health post) whereas in other countries treatment takes place at the community level or at home. Two examples of country experiences are outlined below.

A study conducted in South Bangladesh by Save the Children confirmed that the CHW-based diagnosis and treatment of uncomplicated SAM increased the proportion of malnourished children that accessed care, with a high likelihood of recovery. Due to the addition of SAM treatment the workload of CHWs increased significantly but despite this the quality of their performance was not affected and did not differ significantly between those CHWs doing only iCCM and those doing both iCCM and SAM treatment.

The results of the study can be found [here](#).
In Ethiopia there is a strong integration between CMAM, Integrated Management of Neonatal and Childhood Illness (IMNCI), ICCM, Community Based Nutrition (CBN) and immunization services. An evaluation was carried out by John Hopkins University and found that 53% of children were correctly assessed for ICCM conditions and 64% were correctly treated. Children with malnutrition were correctly classified for malnutrition only about half of the time (53%) and the most common errors were not checking for oedema and not carrying out the appetite test. 59% of children with uncomplicated malnutrition were generally managed correctly. The review identified several areas that would benefit from improvement including the assessment of danger signs, referral of children with severe illness, management of complicated malnutrition, and provision of vitamin A and mebendazole.

The review also identified several disadvantages to the integration of treatment at community level:

- Additional time and workload burden on CHW
- Quality of care (ICCM and treatment of acute malnutrition) could be compromised
- Training time and complexity increases
- Costs
- Logistics of RUTF supply
- Supervision
- National policy on CHW use of antibiotics
- Requires equivalent treatment policy and practice at CHW and health facility treatment sites (e.g. admission criteria)

Following the review a meeting was held in New York whereby five key objectives for integrating ICCM and nutrition were proposed and discussed:

1) Improving coverage and quality of services for the sick child, thereby exploiting the synergy between the health issues and ideally resulting in greater reductions in mortality.
2) Optimizing the preventive aspects of ICCM to maximize its contribution to child nutrition.
3) Improving implementation of the UNICEF/WHO package.
4) Strengthening linkages between the community and facility.
5) Linking health and nutrition at the institutional level.

**Operations Research in Kenya**

Save the Children has been conducting operations research in Kenya in collaboration with Action Against Hunger, the MoH and UNICEF to look at the feasibility of community health workers treating acute malnutrition (SAM and MAM) as an additional condition as part of the ICCM protocol. A research brief of the project can be found below:
2014 review - An update

The authors of the 2014 Report have recently finished an update for Action Against Hunger focusing on typologies 3 and 4. It aims to identify enabling factors for SAM treatment by CHWs. The report will be published once the papers from the Mali and Pakistan projects have been accepted and published. The 2014 review identified four countries where SAM treatment by CHWs was being conducted (Angola, Bangladesh, Ethiopia, South Sudan). As of January 2017, implementation continues in Ethiopia and South Sudan (Malaria Consortium). Three new country experiences have been identified: Mali & Pakistan (Action Against Hunger) and Togo (government programmes supported by UNICEF).

6.3 Available Guidance

Simplified Protocol and Tools for Low Literacy Health Workers

IRC have developed a simplified protocol and tools for low literacy health workers to treat SAM, based on several years of field testing in South Sudan. The tools have been developed using user centred design consultants and graphic designers to ensure that the job aids, tools and recording materials are possible to be used by low literacy health workers, which has required innovative thinking and approaches.

An article about the process that has been used to develop the tools can be found here.

Save the Children have now signed a teaming agreement with IRC to use these tools:

SPR-BA-0217013012
510.pdf

The tools can be accessed/viewed here, please speak to Emily Keane (see Annex I) if there is a desire to use these tools as she has been working on coordinating the relationship with IRC. A webinar showing the presentation of the tools will soon be available.

Mali and Pakistan

As mentioned above, Action Against Hunger has conducted operations research in Pakistan and Mali. Our current understanding is that the community health worker cadre in Pakistan and Mali have a relatively high numeracy, literacy level and training. Therefore the tools used in these contexts would not be so applicable in contexts where CHWs have lower numeracy / literacy levels.

6.4 Ongoing Initiatives

Nutrition Working Group as part of the CCM Taskforce

Following on from the evidence review and the meeting in New York, it was agreed that a working group should be formed under the CCM Taskforce to specifically look at how nutrition can be strengthened within ICCM.
The Nutrition Working Group contributes to reducing under-five mortality and morbidity by optimizing the role of nutrition within iCCM in policy and practice. The objectives of the Working Group are:

1. To consolidate, reinforce and promote the existing nutrition components of iCCM (e.g. nutrition counselling, screening and referral of acute malnutrition cases).

2. To explore options to strengthen the integration of nutrition into iCCM (e.g. acute malnutrition treatment, etc.).

3. To advocate for the development of nutrition within iCCM both in policy and practice including leveraging funding for this work.

All documents relating to the working group can be found here.

Subgroup on Simplified Protocol and Tools (under the Nutrition Working Group of CCM Taskforce)

One workstream under the nutrition working group is focusing on innovating and generating evidence so that CHWs can treat acute malnutrition as part of ICCM. The group is chaired by IRC, and aims to build evidence and share experience on using the simplified guidance and tools (see above) developed in South Sudan. The group currently consists of IRC, Malaria Consortium, Action Against Hunger, Concern Worldwide, Save the Children and UNICEF. The terms of reference for the working group can be found below:

TOR sub working group ICCM Nut low lit tools.docx
7. Community Management of At Risk Mothers and Infants (C-MAMI)

In 2009 the C-MAMI Project published a report on the management of acutely malnourished infants under six months of age (infants <6 months) in emergency programmes. The initiative was launched in order to improve practice by contributing to evidence-based, better practice guidelines. The objectives were:

- To establish the infant burden of disease.
- To establish what is currently advised in the form of guidelines, policies and strategies.
- To determine what is carried out in practice.
- To make recommendations for future practice and research.

The C-MAMI Project focused on treatment in emergency contexts, with specific reference to supplementary feeding programmes (SFP) and therapeutic feeding programmes (TFP), collectively described as selective feeding programmes. Since then Save the Children has partnered with a number of agencies (LSHTM, Wellcome Trust/KEMRI, icddr,b and ENN) to improve knowledge and evidence on the management of acute malnutrition in infants.

7.1 Rationale for C-MAMI

Infants <6 months are a unique group due to their particular feeding needs (exclusively breastfeeding is recommended), physiological and developmental differences from older children, vulnerability to a different range of pathologies and increased mortality risk compared to older children. Typically CMAM guidelines recommend inpatient management of infants with SAM; there are no recommendations for infants with MAM and no outpatient options for care. The WHO Guideline ‘Updates on the Management of Severe Acute Malnutrition in Infants and Children’ released in 2013 recommend outpatient management of infants with malnutrition but acknowledge a lack of evidence as to how to identify infants with malnutrition and how to manage them in an outpatient setting.

7.2 Evidence and Country Experience

Save the Children pioneered research on C-MAMI-related work from 2013-2016 in Bangladesh with the following objectives:

- Determine the prevalence of infant <6 months malnutrition in that community.
- Identify risk factors for infant <6 months malnutrition.
- Describe outcomes using current guidelines in the current context of health systems as implemented by the Ministry of Health and Family Welfare (MOH&FW), Government of Bangladesh (GoB).

The Emergency Nutrition Network (ENN), LSHTM and Wellcome Trust/KEMRI were technical advisors and icddr,b was the primary investigator on this research led by Save the Children in
Bangladesh. Similar research was also conducted by LSHTM in Malawi. Research from the project in Bangladesh was published in 2018\(^\text{10}\). The results of the research were used to inform the C-MAMI tool described below. In addition, Save the Children led research to explore perceptions of caregivers and health workers regarding community based treatment options\(^\text{11}\). In Malawi, an LSHTM MSc student carried out similar work.

A new phase of the research was launched in 2016, running until November 2018, which will involve piloting the C-MAMI tool in Bangladesh, led by Save the Children. The objectives for this research are:

- To translate and adapt the generic C-MAMI tool for use in Bangladesh.
- To field test and evaluate the C-MAMI tool - an identification/treatment guideline for malnourished infants aged <6 months (based on WHO 2013 SAM guidelines).
- To identify and initiate appropriate activities to manage infants <6 months with acute malnutrition in community settings (e.g. breastfeeding counselling, psychosocial support and follow-up).
- To determine technical capacity and training needs which is/are required at referral sites for infants <6m who require specialized support with lactation and other aspects of child care.
- To advocate for the addition of the Guideline for Community-based Management of Acute Malnutrition in Infants <6 months into the national CMAM guidelines if found to be effective.

Save the Children and ENN are also currently collaborating with researchers at LSHTM on a review of experiences and challenges regarding the current anthropometric case definition for acute malnutrition in infants <6 months. A similar collaboration undertook secondary data analysis to explore infant, maternal and household factors associated with acute malnutrition in infants <6 months. This is being finalised for peer review publication.

In 2015, an updated review of the C-MAMI-specific content of national acute malnutrition treatment guidelines, built on a 2010 review (published in the MAMI report) and updated to inform the 2013 WHO SAM guidance update, was funded by OFDA, Irish Aid and Save the Children funding to the ENN. This paper is being finalised for peer review publication.

Save the Children in collaboration with UNICEF also piloted the use of the C-MAMI tool in the Rohingya Response in Bangladesh from November 2017 till February 2018. The programme carried on beyond the pilot phase and a C-MAMI consultant is currently working on the development of a roll-out strategy for implementation by other partners. The experiences and lessons learnt from the pilot phase are described in a Field Exchange article that can be found here.

A special section on MAMI in Field Exchange with additional articles can be found here.

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7.3 Available Guidance

C-MAMI Tool
A simple, short practical tool to support community-based management of nutritionally vulnerable infants under six months of age (C-MAMI) without medical complications was developed by ENN, LSHTM and Save the Children in 2015. Modelled on, and complementing, the Integrated Management of Childhood Illness (IMCI) framework, it provides practical guidance to help put the WHO 2013 guidance into practice, based on evidence on risk factors gathered from the Bangladesh research and similar research completed in Malawi. In 2018 the C-MAMI Tool was revised based on an evaluation led by Save the Children and GOAL. ENN coordinated the revision and production of the C-MAMI Version 2. Version 2.0 is now available on the ENN website.

C-MAMI Tool checklist
In 2016 an MSc student from LSHTM developed a practical checklist for frontline health workers to use when implementing the C-MAMI tool version 1. A summary of this work can be found in Field Exchange. A similar checklist will be developed for version 2 of the tool in 2018 / 2019.

7.4 Ongoing Initiatives

Save the Children, LSHTM and ENN coordinate an informal C-MAMI Strategic Interest Group of practitioners and researchers involved in C-MAMI research and programming. Meetings are hosted every 1-2 years and ENN is a member of the CORTASAM of the No Wasted Lives Initiative (see chapter 10 for more info), representing a C-MAMI interest. ENN’s online technical forum, en-net, includes a C-MAMI thematic area. Save the Children is currently seeking funding with ENN and LSHTM for research to refine the anthropometric thresholds for C-MAMI as well as conduct qualitative research on the C-MAMI tools and training materials.
8. CMAM mHealth

World Vision, together with implementing partners International Medical Corps and Save the Children and technical partner Dimagi, have developed a CMAM mHealth app that guides health workers through CMAM protocols and provides accurate and timely data for district health managers to respond to changes in caseloads and treatment outcomes, manage supplies, and inform national statistics.

8.1 Possible Rationale for the use of CMAM mHealth

The success of CMAM is limited if treatment protocols are not followed, record keeping and data management is poor and reliable data is not available in time for decision makers. There is strong evidence that mobile device based (mHealth) apps can improve frontline health workers’ ability to apply CMAM treatment protocols more effectively and to improve the provision of supply chain management.

8.2 Evidence and Country Experience

Operational Learnings Across Five Country Pilot

The application was piloted in Chad, Kenya, Mali, Niger and Afghanistan between 2014 and 2016 through established World Vision, IMC and Save the Children CMAM programmes. In September 2016, Save the Children through Transform Nutrition, commissioned a consultant to interview headquarter and programme country staff across the five countries to capture their experiences adapting and piloting the mobile app in remote health facilities and inform other mobile health projects.

Despite facing a number of external factors, including security issues across all countries and the Ebola outbreak in West Africa, that caused significant delays throughout the project timeline, the pilot has shown that the app has great potential in strengthening health workers’ ability to provide improved quality of care for lifesaving CMAM services and more accurate and timely data for decision making.

Key lessons from the pilot project include that early and in-depth buy in from local ministries of health is essential to successful deployment, and plays a key role in scaling up and sustaining an mHealth initiative. Thorough technical landscape analysis, prior to deployment as well as on an ongoing basis, of electricity provision and network coverage can greatly minimise delays and increase uptake. Finally, in order to continuously motivate and engage health workers to use the app, it is essential to secure regular and onsite technical and software support from the technical partner, while also building local capacity for ongoing troubleshooting.

Whilst these points were not all successfully achieved across all project countries, all participating ministries of health, as well as the majority of health workers and caregivers, have accepted the CMAM mHealth app as a tool, and see its potential to improve CMAM quality of care and supply management.
Assessment of Effectiveness of CMAM mHealth App compared to the Paper Based System

In Kenya, Save the Children led a randomised evaluation comparing the completeness, quality and speed of data collected through the paper-based system and the CMAM mHealth app over one year. The study found that:

- The app reduced the number of reporting errors by 25 per cent
- Provided caseload and treatment data to decision-makers within 1.3 days of collection
- Increased the accuracy and reliability of treatment outcome data
- Improved health workers’ adherence to the IMAM treatment protocol

The study found that effectiveness is dependent on health workers being well trained and having adequate time to manage cases and ongoing software support. Next steps to address challenges include simplification of protocols, working closer with Ministry of Health (MoH) on data management and exploring scale-up linked to existing health services.

8.3 Available Guidance

There are no guidance documents as such for this approach, however there are some materials capturing operational learning and experiences:

- An article was published in Field Exchange summarising the experience of deploying the application and giving recommendation for the future, which can be accessed here.
- A video on the mHealth application in action in Kenya.
- A Learning / Working Paper capturing operational learning from the five pilot countries
- A 3-page Research Brief summarising the operational learning
- An article was published in Field Exchange summarising the evaluation in Wajir
- The preliminary findings from the randomised evaluation in Wajir, Kenya are available here

Also under development are an evaluation report from the Kenya Randomized Control Trial and articles for a peer review journal article which will be shared in Q3/4 2018.

If there is interest in piloting similar approaches in other programmes or countries, it is recommended that links are made with the World Vision and Save the Children’s teams who worked on this project, as there opportunities to build on what has already been developed, rather than having to build a system from scratch. Relevant contacts are: Miriam Chang <miriamchang@worldvision.ca>; Colleen Emary <Colleen_Emary@worldvision.ca>; Emily Keane <E.Keane@savethechildren.org.uk>
8.4 Ongoing Initiatives

There are no ongoing specific mHealth activities ongoing as donor funding has ended. There is intent in principle to continue the collaboration between Save the Children and World Vision, both at country and global level if further funding can be identified.

There are a number of mHealth forums and conferences that exist where lessons learnt can be shared among practitioners. One such websites, with an overview of 10 lessons learnt can be found here.
9. CMAM Surge Approach

In 2010 a framework for the surge approach was proposed as an alternative way of working to strengthen services for CMAM with the aim of providing a more sustainable less disjointed and less emergency focused approach.

9.1 Possible rationale for the use of the CMAM Surge Approach

§ Make health systems more resilient over time by making them better able to cope with periodic peaks in demand for services for acute malnutrition without undermining the capacity and accountability of government health actors.
§ Moves away from seeing treatment of SAM as an ‘emergency’ activity which often continues to be implemented in a vertical programme.
§ Creates a solution for exit strategies for external emergency nutrition support that are often unclear and developed with limited partnership and understanding of the existing health system.
§ Supports and protects the long-term positive impact of health system strengthening through a reduction of vulnerability and fragility of the health systems. Thus the health system becomes more adaptive and flexible.
§ May improve coverage indirectly, as services are expected to be of higher quality and better linkages are established with communities.

9.2 Evidence and Country Experience

Concern Worldwide in Kenya initiated a pilot project in collaboration with Sub-County Health Management Teams and HF staff from May 2012 to the end of 2014 in 14 health facilities in Marsabit County. These efforts were expanded in Kenya in 2014 and 2015 to three additional counties (Wajir, Baringo, and East Pokot) in an additional 24 health facilities with the support of Save the Children, Islamic Relief and World Vision. Concern Worldwide have also implemented surge in Karamoja Region of Uganda in 2009 and 2012 as well as preparatory work done in Niger.

An independent evaluation of the CMAM Surge Pilot in two sub-counties in Marsabit was conducted between May 2012 and October 2014. Overall the evaluation rated the Surge Model Pilot to be 4. VERY GOOD – SATISFACTORY. The pilot was able to show that it has contributed to strengthening the health system to increased caseloads of acute malnutrition during predictable AND unpredictable emergencies without undermining ongoing health system strengthening efforts. Therefore, the evaluation recommends further scale up within the pilot sub-counties and at a wider scale in Kenya and elsewhere.

The complete report can be found here.

9.3 Available Guidance

Concern Worldwide has developed an operational guide that can be found here and a facilitator’s guide that can be found here.
9.4 Ongoing Initiatives

- Concern Worldwide hopes to put in place a more formal mechanism for promoting and sharing learning, including rigorously monitoring and evaluating the CMAM Surge Approach in different contexts, under different parameters and conducting a more formal cost-effectiveness analysis to understand if and how a surge approach could be better value for money than the traditional, NGO-led emergency approach.
- Save the Children has started to implement the Surge Approach in Mali in 2018.
- A regional CMAM Taskforce has been set up in Western Africa and CMAM Surge is one of the focus areas of this taskforce, and CMAM Surge is being implemented in Mauritania, Senegal, Niger, Burkina Faso, and Chad. The organizations supporting implementation of the CMAM surge model includes: Save the Children, Action Against Hunger, French Red Cross (CRF), Concern, UNICEF and ECHO. Save the Children is supporting many organizations in Mali for the CMAM Surge scale-up plan: IRC, ALIMA, Action Against Hunger, COOPI, TDH and Acted and Concern is supporting several NGOs in Niger: SCI, IRC, CRF, Action Against Hunger, and COOPI.
10. No Wasted Lives Initiatives

The different approaches described are strategic priorities of the No Wasted Lives Coalition, which is focused on driving the generation and use of evidence to improve and expand the prevention and treatment of acute malnutrition. This includes direct technical support and funding for a number of research activities mentioned in this document, including the ComPAS study, the MANGO study, and iCCM integration. No Wasted Lives is led by Action Against Hunger, the Children’s Investment Fund Foundation (CIFF), the European Commission Directorate-General for Humanitarian Aid and Civil Protection (ECHO), innocent foundation, the International Rescue Committee (IRC), the Department for International Development (DFID), UNICEF, and World Food Programme (WFP). The Coalition has three objectives: 1) to make acute malnutrition a political and public health priority; 2) to discover and disseminate effective ways to prevent and treat acute malnutrition; and 3) to mobilise more money and maximise effectiveness of current spending for acute malnutrition. To achieve these objectives, No Wasted Lives is focused on three key work streams: a Technical Accelerator, a Donor Forum, and an Advocacy Agenda.

More information can be found at the No Wasted Lives website here.

CORTASAM

The Council of Research & Technical Advice on Acute Malnutrition (CORTASAM) is an independent group of experts that provide technical guidance to the No Wasted Lives Coalition. Their goal is ‘to drive the use of evidence for action, in order to ultimately reach more children with effective treatment and prevention programmes across the continuum of acute malnutrition’.

A recommendation on the use of MUAC in the community has recently been published stating that ‘MUAC should be used as the primary tool for the detection and discharge of acute malnutrition in children 6-59 months of age in the community’. The statement can be found here.

In mid-2017, CORTASAM led the implementation of a global research prioritisation exercise for the treatment of acute malnutrition, and this exercise identified key research areas that were priorities to achieve scale-up of management of acute malnutrition by 2020. Following this exercise CORTASAM published recommendations for a research agenda for acute malnutrition. The following seven priority areas were identified:

1) Effective approaches to detect, diagnose, and treat acute malnutrition in the community
2) Appropriate entry and discharge criteria for treatment of acute malnutrition to ensure optimum outcomes
3) Reduced dosage of ready-to-use food for treatment of acute malnutrition
4) Effective treatment of diarrhoea in children with severe acute malnutrition
5) Rates and causal factors of post-treatment relapse to acute malnutrition across contexts
6) Identification and management of at-risk mothers and infants
7) Alternative formulations for ready-to-use foods for acute malnutrition

The full Research Agenda for Acute Malnutrition can be found here.
# Annex I - Contact List Key Stakeholders

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Organisation</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Megan Gayford</td>
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<td>Claudine Prudhon</td>
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