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RAPID REVIEW:

Screening of Acute Malnutrition by the Family at community level

Rapid review protocol

A. Background on the Family-MUAC approach and the justification for the rapid review

The Family-MUAC approach is widely implemented in countries across Africa and Asia, but predominantly in in the West and Central Africa region. Also known as "MUAC for mothers" or "Mother-MUAC", this approach trains mothers and other caregivers to identify early signs of malnutrition in their children using a simple to use Mid-Upper Arm Circumference (MUAC) tape. The approach was developed with the objective of improving coverage of treatment services, detecting cases earlier and improving awareness on malnutrition.

B. Objectives

The overall aim of the rapid review is to provide an assessment of the current evidence and practice on the Family-MUAC approach.

The specific objectives of the review are:

- To present a clear overview of the **available evidence**
- To summarize the available evidence, showing what is known about the **impacts, outcomes** and implementation of this approach
- To apprise about **what is still not known**, or difficult to establish (i.e. to identify critical weaknesses in the evidence and practice).

C. Methodology

A rapid review of published and unpublished evidence was conducted, including future evidence (coming between April 2020 and October 2020). Implementers of the Family-MUAC approach in the West and Central Africa region were also contacted.

C1. *Review question*

The review questions were mainly oriented around effectiveness and cost-effectiveness of this community approach to detect and diagnose malnutrition. This review presents the main results in terms of detection, quality of treatment, cost-effectiveness and coverage of the Family-MUAC approach.

Main review question:

- **What is the effectiveness and cost-effectiveness of the Family-MUAC approach?**

Additional sub-questions:

- **What are the effectiveness outcomes of the Family-MUAC approach (quality and timing of screening/quality of treatment/impact on coverage)?**
- **What is the cost-effectiveness of the Family-MUAC approach?**

Other operational questions:

- **What are the implementation approaches of the Family-Approach (what context are considered? What tools? What trainings? What M&E mechanism…)?**

C2. *Study inclusion criteria*

The rapid review used peer-reviewed literature, grey literature (reports, evaluations/assessments, webinars, briefs…), unpublished evidence (workshop reports, internal reports, guidance note, M&E tools, training tools) and *expert consultations*.

- **Population/Intervention:** Mothers/caregivers screening malnutrition using a MUAC-tape at community-level, in any countries, any context.

- **Comparators (potential):** Community Health Workers screening acute malnutrition at community level, Standard protocol.
- **Outcomes:** The effectiveness of the intervention will be assessed through the timing of detection (early detection) and its quality (capacities of mothers to correctly detect and diagnose malnutrition and edema), the quality of treatment (fewer hospitalization/faster recovery), the impact on coverage, the cost-effectiveness and the sustainability/feasibility of the approach.

The cost-effectiveness will be assessed trough the available data (cost per child, total cost, cost of tools, costs of trainings, cost-effectiveness analysis)

C3. *Search strategy (simplified for the rapid review)*

- Electronic bibliographic databases to locate peer-reviewed literature: *PubMed and ClinicalTrials*. This type of evidence was also obtained directly through authors sharing their publication.
- Field Exchange website and the *State of Acute Malnutrition* website to locate evidence on field experiences and to have an overview on simplified approaches experimentations.
- Websites of known implementers of the Family-MUAC approach: GOAL, World Vision, COOPI, ALIMA, ACF, Concern Worldwide, IRC, IMC, MSF.
- Reference lists of relevant studies and browse the reference lists of papers that have been identified by the database searches to identify further studies of interest.
- Google and *Clinical Trials* to identify recent/future evidence, implementers and all "invisible" evidence for which we need to contact implementers.

The search structure consisted of the following key words:
Community-based management of acute malnutrition; Mid-upper arm circumference; Screening by mothers; Severe acute malnutrition; Family-MUAC, screening at community-level; task shifting

Rapid review: results

A. Quick assessment of evidence

In total, **44 resources have been included in this review:** 6 peer-reviewed evidence, 1 document on preliminary results from ComPAS Mali, 1 trial, 1 landscape review, 1 conference abstract , 9 case-studies, 4 guidance notes, 19 documents related to implementation (5 training guides, 3 capitalization reports, 4 M&E tool kits, 4 final reports, 3 coverage surveys), 1 webinar and 1 workshop report including case-studies.

Type of evidence

Most of the available evidence on the Family-MUAC approach consists of operational evidence (86%) such as case-studies and documents related to implementation (e.g. training guides and final reports).

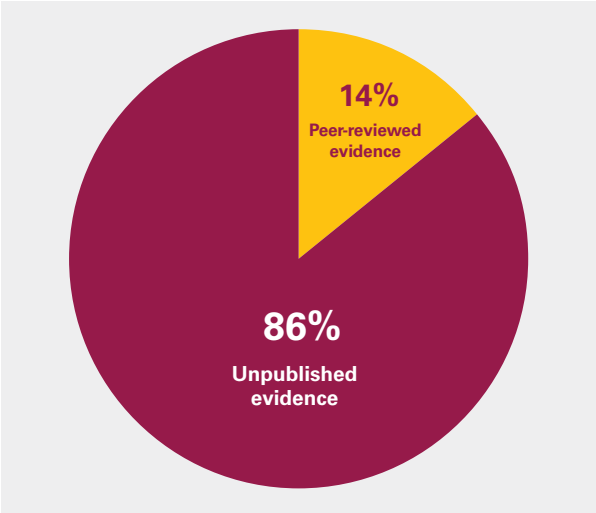
There are several documents linked to implementation, such as case-studies or capitalization reports in different countries which provide an overview of outcomes linked to this approach and contexts where it has been implemented. Several of these case-studies have been produced with the support of the *No Wasted Lives* coalition which has gathered and coordinated evidence for acute malnutrition on a single platform[1]. Peer-reviewed studies mainly focus on assessing the ability of mothers to take MUAC measurements and/or comparing outcomes with screening by CHWs but also include some evidence on the timing of detection and its association with the cost-effectiveness of treatment (fewer hospitalizations/faster recovery).

Countries

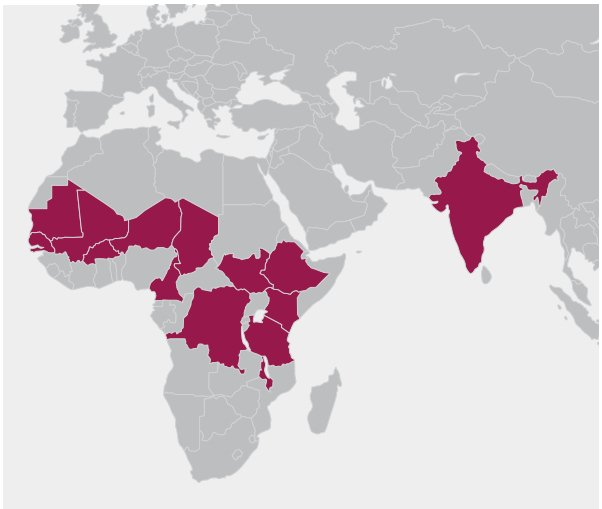
Regarding countries covered by the available evidence, 14 countries (out of 26 countries where the approach is known to be implemented; https://www.acutemalnutrition.org/en/Family-MUAC) have produced the available evidence on the Family-MUAC approach, mainly countries on the African continent.

Only 3 countries are covered by peer-reviewed evidence: **Kenya (ACF), Niger (ALIMA, MSF) and Burkina Faso (ALIMA)**. In Niger, trials have been undertaken in the Zinder region (2 by ALIMA) and in the Maradi region (1 by MSF) and have resulted in peer-reviewed publications.

GRAPH 1. Type of available evidence on the Family-MUAC approach (n=44)



GRAPH 2. Countries covered by collected evidence on the Family-MUAC approach for this review (n=14)



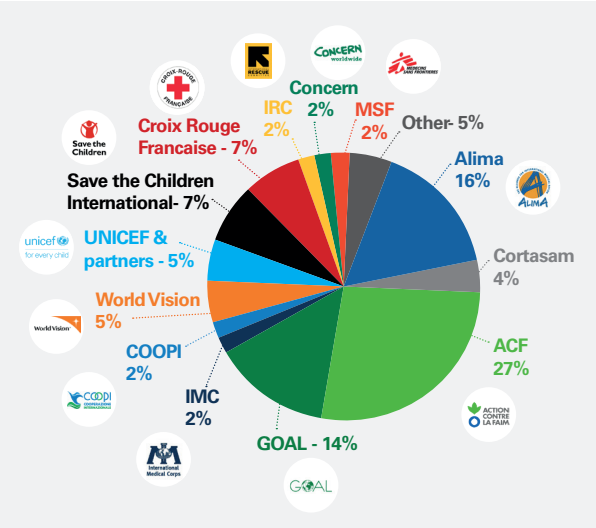
1. https://www.acutemalnutrition.org/en

Implementers

ACF (30%), ALIMA (16%) and GOAL (14%) are the 3 main organizations who contributed to a wider available evidence generation on the Family-MUAC approach (see graph 3).

Evidence from ACF comes from the Eastern and Southern part of the African continent (Kenya, Tanzania), from the Western part (Senegal) and from Asia (India) whereas ALIMA has produced large and solid evidence for countries in the WCA region (Niger and Burkina Faso). Whilst ALIMA provided more data/evidence on different effectiveness outcomes of the approach, ACF publications have focused on sharing information on the approach in different contexts and capitalizing on operational experiences.

GRAPH 3. Production of evidence depending on organizations (n=44)



B. Outcomes: effectiveness, cost-effectiveness and gaps

The Family-MUAC approach considers that mothers are positioned to detect signs of nutritional deterioration in their own children, and that training mothers to regularly screen by MUAC and check for edema is the next step in a process of improved access to CMAM services.

The rationale for teaching mothers/caregivers to perform MUAC is to achieve an early diagnosis of wasting, which if acted upon in a timely manner would decrease mortality and morbidity related to malnutrition, reduce program costs due to shorter treatment times and lower the proportion of children requiring expensive in-patient care for wasting with complications (Ale et 2016; Blackwell et al, 2015; Grant et al, 2018; Puett et al, 2013; Sadler et al, 2011; Daures et al, 2020).

▸ The effectiveness and cost-effectiveness of this approach can be assessed through the available evidence (published evidence and operational findings) in terms of:

▹ Quality of detection (correct MUAC measurements, MUAC measurement protocol)

▹ Timing of detection (potential earlier detection)

▹ Quality of treatment: rate of hospitalization/need for inpatient care (potential lower rate), average length of stay (potential shorter stay), recovery (potential faster recovery)

▹ Cost (potential reduction per case treated)

▹ Coverage (potential improved coverage through massive and repetitive screening by mothers at the household level)

▹ (Sustainability/Implementation: contextualization and limitations)

B1. *Quality of detection: Ability of mothers to measure MUAC*

The peer-reviewed studies give solid information on the effectiveness of this approach in terms of quality of detection by demonstrating the effectiveness of the measurements made by mothers/caregivers compared to CHWs and/or experienced worker (see table 1).

5 studies (including 1 systematic review) have clearly assessed the capacity of mothers to make MUAC measurements.

▸ Blackwell et al (2015) and Ale et al (2016) have identified the **capacity of mothers** to make MUAC and edema measurements (2 studies) + cost-effectiveness compared to CHWs (Ale et al)

▸ Grant et al (2018) have compared and assessed the **sensitivity of tools** used by caregivers/mothers in a Family-MUAC approach (1 study)

▸ Bliss et al (2018) have **concluded that caregivers are able to use MUAC to detect SAM** after a systematic review of the available evidence on

the use of MUAC by Novel Community Platforms

▸ Daures et al (2020) have assessed the **effectiveness of the approach as part of a simplified protocol** for treatment of wasting (no direct indicator to assess effectiveness except the % of self-referral by mothers).

▸ Isanaka et al (2020) have assessed the feasibility of engaging caregivers in at-home surveillance of children with uncomplicated severe acute malnutrition. They found that caregivers **could correctly perform a MUAC measurement after a short training** (less than 30 min).

TABLE 1. Results on the quality of detection (published peer-reviewed studies including the Family-MUAC approach)

Peer-reviewed evidence	Objective	Results on Quality of detection (sensitivity)
Grant, 2018 (Kenya)	To test the sensitivity of 3 MUAC classification devices when used by caregivers/mothers (Kenya)	**All devices yielded high sensitivity (>93%) for detecting SAM.** Sensitivity for SAM was highest (100%) with the standard MUAC insertion tapes.
Blackwell, 2015 (Niger)	To determine whether minimally trained mothers could identify children with SAM, using either arm and without measuring the specific midpoint (Niger)	**Good ability of mothers:** Mothers' ability to classify GAM and SAM had high sensitivity (>90% of GAM and >73% of SAM cases correctly identified as such) and high specificity (>80% of GAM and >98% of non-cases correctly identified as such).
Ale et al, 2016 (Niger)	To compare the efficacy and cost-effectiveness of maternal measurement of child MUAC and edema with CHW measurement (Niger)	**Good capacity of mothers** (compared to/superior to CHWs): Mothers' MUAC measurements were in agreement with those of health workers more frequently than those made by CHWs (non-inferiority. 75.42% vs 40.11%, P<.0001).
Daures et al, 2020 (Burkina Faso)	To determine whether OptiMA (strategy including training mothers to use mid upper arm circumference (MUAC) bracelets for screening and targets treatment to children with MUAC < 125 mm or oedema with one therapeutic food at a gradually reduced dose) conforms to SPHERE standards (recovery rate > 75 %).	No mention
Bliss et al, 2018 (systematic review)	To summarize published and operational evidence published describing the use of MUAC for detection and diagnosis of SAM in children aged 6–59 months by caregivers and CHWs, and of management of uncomplicated SAM by CHWs, all outside of formal health care settings	**Caregivers can use MUAC to detect SAM in their children** with little apparent risk and many potential benefits to early case detection and coverage
Isanaka et al, 2020 (Niger)	To assess the feasibility of shifting clinical surveillance to caregivers in the outpatient management of SAM	Agreement between nurse–caregiver mid-upper arm circumference color classifications was 77% (98/128) immediately after training These findings lend preliminary support to pursue further study of alternative models of care that allow for **greater engagement of caregivers in the clinical and anthropometric surveillance of children with SAM.**

Errors only at boundaries. Regarding errors, MUAC classification errors (or discordance) occurred at class boundaries, i.e. the border between red (SAM) and yellow (MAM), and yellow and green (normal), rather than randomly, and there are no gross discordances. Thus, mothers do not classify a child as normal when the CHW diagnosis is SAM, nor do they classify a child as SAM when the CHW diagnosis is normal (Blackwell et al, 2015; Ale et al, 2016), which reinforce the demonstration of the effectiveness of the Family-MUAC approach.

What are the operational findings telling us about the capacity of mothers?

Among operational findings and studies, the same observation can be made concerning the ability of mothers measuring MUAC (see table 2.)

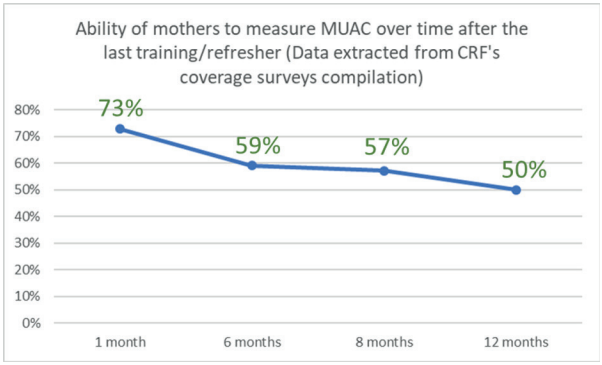
TABLE 2. Results on the quality of detection (operational findings)

Operational findings	Country	Results on Quality of detection (sensitivity, correct measurements)
Multicountry project_GOAL (2018)	Malawi, Ethiopia, South Sudan	**86%** of self-referrals to Health Facilities were recorded as correct admissions (79% Malawi, 80% S.S. and 100% Ethiopia)
Project_COOPI_2018	RDC	**97%** of referral by MUAC mothers were admitted in health centers
SLEAC survey and impact study of Mother-MUAC_ ACF_2016	Senegal (Matam)	**60%** of mothers made a correct MUAC measurement 5 months after the first training
Final report_ACF_2018	Senegal (Louga)	**93%** of mothers made a correct MUAC measurement 6 months after the first training
LQAS survey_CRF_2016	Cameroun, Chad, Niger, Mauritanie	Mothers/parents correctly using MUAC: Cameroon 2019 (**72.7%**), Chad 2020 (**59%**), Niger 2019 (**57,1%**), Mauritanie 2019 (**50%**)
UNICEF_Case-study_2020	Zimbabwe	MUAC measurements that were validated as correct **were 80%** (CI 69% -100%)
UNICEF_Evaluation_2018	Madagascar (Androy and Anosy regions)	**87%** of the mothers have correctly identified acute malnutrition (MAM+SAM)

However, two main limitations have been reported by available evidence (qualitative and quantitative data):

- The capacity of mothers seems to decrease several months after the last training, meaning that refreshments/trainings should be regularly done and in a sustainable manner
- Mothers seem to have less ability to detect edema, especially in area where there is a low prevalence of edema (Ale et al, 2016; Hamer et al, 2004)

GRAPH 4. Ability of mothers to measure MUAC over time after the last training/refresher course



Ability over time

Data provided by the CRF (Niger-Cameroon-Chad-Mauritania) and extracted in the graph 4 below show that the sensitivity of MUAC measurements made by mothers may be decreasing over time, as time passes from the last training or refreshment. After 1 year, only half of mothers can take correct MUAC measurements (see graph 4.)

Detection of edema

In Niger, Ale et al (2016) showed that more children were referred for edema and agreement in the Mothers Zone compared to the CHWs zone (suggesting that mothers are in a better position to detect potential cases of a deadly condition with rapid onset and resolution in either death or spontaneous recovery), and yet, fewer children were admitted to the treatment program for edema (47.19%). Based on Hamer et al (2004), Ale explains this result by suggesting that in settings where there is a low prevalence of edema, it can be difficult (even for health staff) to reliably identify edematous malnutrition and therefore recommends that ability of mothers to detect edema should be further studied in an area of high prevalence.

In Senegal (Matam), results of the interviews from keypersons involved in the MUAC-mother pilot project (ICP, staff from ACF) also raise this concern of reduced ability of detecting edema while indicating that mothers can detect SAM and MAM using MUAC but not edema[2].

2. Enquête SLEAC du programme PECMAS et étude sur l'impact du projet pilote « PB Mamans », ACF Lort-Philips et al, November 2016. Projet Renforcement de la lutte contre la malnutrition aigüe sévère et de sa prise en charge au Sénégal par une approche multisectorielle et intégrée dans la région de Matam, Sénégal.

B2. *Quality of detection: MUAC measurement (either arm visual mid-point)*

In the standard protocol for measuring MUAC to screen for acute malnutrition, a health care provider bends the child's left arm to locate and mark the midpoint. Then the arm is relaxed straight, the MUAC tape is wrapped around the midpoint, and the circumference of the arm is recorded to the nearest 1 millimeter (De Onis, 2004). Another MUAC protocol recommends using either arm and a visual ascertainment of midpoint to measure MUAC (ALIMA, Guidelines for training of trainers, 2016) to simplify measurements.

Blackwell et al (2015) have showed that **this protocol (either arm and visual ascertainment of midpoint) performed as well as the standard protocol**, as currently implemented by ALIMA, CRF and ACF. 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 could simplify training while maintaining accuracy and precision

Other published evidence didn't mention the use of a "simplified" MUAC protocol for measurement but some stated (Ale et al, 2016, Bliss et al, 2018) that this way of measuring could increase effectiveness while simplifying training of mothers/caregivers.

Main results on Quality of detection

Ability of mothers. Based on operational findings and peer-reviewed studies, it is clearly assessed that mothers/caregivers can do correct MUAC measurements.

Detection of edema. In setting with low prevalence of edema, ability of mothers to detect edema seems to be lower and yet aligned with the "global ability" (CHWs, health workers) of detecting edema in these settings.

MUAC measurement protocol: the MUAC protocol (either arm and visual ascertainment of midpoint) used by some implementers performed as well as the standard protocol

Recommendations

Recommendation: Conduct regular assessment of ability of mothers and/or integrate (refresher) trainings in the health system platform as the ability of mothers tends to decrease over time after the last training/refresher course (may be reduced by half after one year).

Recommendation: Further studies are needed to assess the ability of mothers in high-prevalence settings (Ale et al, 2016) and/or improve trainings related to the specific detection of edema for both health staff and mothers/caregivers in low-prevalence settings.

Recommendation: The "simplified" MUAC protocol (either arm and visual ascertainment of midpoint) should be used in all Family-MUAC strategies, as it doesn't influence accuracy of measures and as it can greatly simplify trainings.

B3. *Timing of detection and quality of treatment: Early detection and fewer hospitalizations*

One of the expected outcomes of this approach is an earlier detection and treatment seeking with an expected lower rate of hospitalization and reduction of cost per case treated.
In terms of timing of detection, there are promising results on an earlier detection among operational findings and peer-reviewed studies.

However, most of the peer-reviewed studies (4/5) rather **suggest and/or presuppose** that the approach leads to an earlier detection. **Only one (Ale et al, 2016) includes results showing an effective earlier detection.** It showed higher median MUAC measurements at admission (for children referred by mothers compared to children referred by CHWs) and a lower requirement for inpatient care among children admitted upon referral of mothers (see table 3).

TABLE 3. Results on the timing of detection and quality of treatment: early detection and hospitalizations (published peer-reviewed studies)

Article	Early detection	Fewer Hopitalizations	Quality of evidence
Grant, 2018 (Kenya)	**Assumptions (No results/indicators).** In the background, the author is presenting the **advantages of an early diagnosis** of a SAM case in decreasing mortality and morbidity related to malnutrition, reducing per-case treatment costs thanks to shorter treatment times and lowering the numbers of children requiring expensive in-patient care for SAM (based on published evidence in the context of Bangladesh: Sadler, 2011; Puett, 2013)	**Assumptions (No results/indicators).** In the background, the author is stating that an early diagnosis of a SAM case would reduce per-case treatment costs thanks to shorter treatment times and lower the numbers of children requiring expensive in-patient care for SAM (based on published evidence in the context of Bangladesh: Sadler, 2011; Puett, 2013)	
Blackwell, 2015 (Niger)	**Assumptions (No results/indicators).** In the discussion, the author is advocating for the use of the Family-MUAC as the tipping point in scaling up CMAM programmes thanks to repeated screening with MUAC,that will increase the **likelihood of early diagnosis**, even if the initial screen classified the child incorrectly.	**Assumptions (No results/indicators).** In the background, the author states that the rationale for teaching mothers to perform MUAC is to achieve an early diagnosis of SAM, which will result in lowering the proportion of children requiring expensive in-patient care for SAM with complications (as shown in a study from Bangladesh (Sadler, 2011;Puett, 2013)	
Ale et al, 2016 (Niger)	**Proved. In the Mothers Zone, there was earlier detection of cases, with median MUAC** at admission for those enrolled by MUAC <115 mm estimated to be 1.6 mm higher using a smoothed bootstrap procedure This study demonstrates that earlier detection of SAM can be achieved by training mothers to classify the nutritional status of their children by regular MUAC screenings	**Proved.** Consistent with earlier detection and treatment seeking, **children admitted in the Mothers Zone were less likely to require inpatient care** than children in the CHWs Zone, both at admission and during treatment, with the most pronounced difference at admission for those enrolled by MUAC < 115 mm (risk ratio = 0.09 [95 % CI 0.03; 0.25], p < 0.0001)	Strong[3]
Daures et al, 2020 (Burkina Faso)	**Suggested.** In the discussion, the author suggest that under OptiMA and compard to the study of Maust et al (2015) in Sierra Leone, the OptiMA programme might have achieved achieved good coverage and caught most children early in the wasting process as only 16 % of children treated were admitted with MUAC < 115mm or oedema, while 84 % were admitted with MUAC between 115 and 124 mm, whereas the proportion of children in each category in the Sierra Leone study was 30 and 70 % (Maust et al, 2015).	**Assumptions (No results/indicators).** No Other studies found that identification and treatment of children earlier in the wasting process led to fewer hospitalisations and that inpatient care was shown to be twice as costly as outpatient SAM management.	
Bliss et al, 2018	**Suggested:** the author found evidence that caregivers are able to use MUAC to detect SAM in their children with minimal risk and many potential benefits to early case detection and coverage	No mention	

3. Strong = evidence extracted from a peer-reviewed article; medium = evidence extracted from a case-study including a relative important set of data; weak = case-study or policy brief with little/absent data or opinions of experts including no data

- Ale et al (2016) showed that children in the Mothers Zone **were admitted at an earlier stage of SAM and required fewer hospitalizations**[4]
- Daures et al (2020) suggested that under OptiMA and compared to the study of Maust et al (2015) in Sierra Leone, the OptiMA programme **might have caught most children early in the wasting process** as there is a smaller proportion of SAM children (16% vs 30 % in Maust et al, 2015)
- Both Grant (2018) and Blackwell (2015) are stating that an early admission would lead to an increased effectiveness (shorter treatment time) and cost-effectiveness (lower the number of inpatient care) based on published results in Bangladesh (Sadler et al, 2011; Puett et al, 2013).

What are the operational findings in terms of early detection and lower requirement for inpatient care at admissions and/or during treatment?

Out of the current evidence including operational findings (19 documents: 9 case-studies,4 final reports, 3 coverage surveys, 3 capitalization reports), only 4 document a potential early detection as an outcome of the Family-MUAC approach, and 2 document a potential decrease in hospitalizations.

As stated by some partners, it can be difficult to prove an early detection/impact on hospitalization through operational research or implementation of a Family-MUAC project. Probably because there is a need for a "standard" and feasible indicator to be able to assess these outcomes. The indicator "Median MUAC at admission for children referred through mothers" seems to be the most reliable to assess an early detection when compared to another source of referral and/or zone and/or periods of time since the beginning of a projects (the comparison with another screening mechanism/standard protocol may however be the most striking evidence to support advocacy).

- In Kenya, ACF suggests that Family-MUAC may have also led to earlier detection of MAM, as the average MUAC on admission to MAM treatment was increased at the end of data collection when compared to the start of data collection. In the same country, Concern Worldwide used the same indicator in time to prove an earlier detection.
- In the DRC, COOPI uses the frequency of screenings as a proxy of an early detection, suggesting that the higher frequency of screening made by mothers (four times a month) will therefore allow an earlier detection compared to the "standard" detection (once a month) made by CHWs.

TABLE 4. Results on the timing of detection and quality of treatment: early detection and hospitalizations (operational findings)

Operational findings	Early detection	Fewer Hopitalizations	
SLEAC survey and impact study of Mother-MUAC_ ACF_2016_Senegal (Matam)	**Suggested:** Median MUAC at admission = 111 with a high proportion of children admitted with MUAC 110-114mm. The author suggested that this constitute an early detection	**Assumptions (No results/indicators).** In the background, the author is stating that an early diagnosis of a SAM case would reduce per-case treatment costs thanks to shorter treatment times and lower the numbers of children requiring expensive in-patient care for SAM (based on published evidence in the context of Bangladesh: Sadler, 2011; Puett, 2013)	
Case-study_ACF Kenya (Isiolo County, 2017) linked to Grant et al (2018)	**Suggested:** Results indicate that the use of the simplified tape **may have also led to earlier detection of MAM**, as the average MUAC on admission to MAM treatment was increased at the end of data collection, as compared to the start of data collection.	**No significant change in admissions** but in comparison to the previous year, admissions reduced slightly, and this could indicate that fewer children are becoming malnourished as their mothers are monitoring their state of malnutrition	**Medium**

4. Ale et al (2016), Niger: Although it is likely that screening by mothers contributed to the observed difference in proportion of hospitalized cases in the two zones, this is not certain as hospital referrals depend on many factors (e.g. clinicians' level of training and/or experience).

Operational findings	Early detection	Fewer Hopitalizations	
Case-study_COOPI (DRC)_2018	**Suggested:** The higher frequency of screening by mothers (88% of children admitted through referral by mothers were screened at least 4 times per month) compared to CHWs (once a month) allows the author to conclude that there is an early detection of cases of malnutrition.	**Assumptions:** By taking MUAC measurements at least four times per month, MUAC mothers improve nutrition surveillance and the early detection of malnourished children. The earlier the detection, the shorter and more efficient the treatment, which therefore reduces the risk of medical complications and mortality.	
Final report_Concern Worlwide_2020_ Kenya	**Proved:** There was an improvement on the Median MUAC at admission for both OTP and SFP Programs from 11.0cm and 12.0cm during the baseline to 11.4cm and 12.2cm respectively, observed during the end line assessment.		**Medium**

B4. *Quality of treatment: average length of stay and recovery*

Apart from an expected decrease of children needed inpatient care, the quality of treatment associated to the approach has been assessed by the comparison of the average length of stay of children admitted through the referral of mothers compared to another source of referrals (mainly CHWs, standard protocol…). A case-study from COOPI in DRC (2018) suggests, that "the earlier the detection, the shorter and more efficient the treatment, which therefore reduces the risk of medical complications and mortality".

Among all studies/operational findings, there is little evidence related to a shorter stay and/or an impact on recovery, and/or there is almost no comparison between the average time to recovery for children admitted by mother-MUAC and average from another source of referral.

However, Daures et al, 2020 **showed for the first time that children of a caretaker who received MUAC training were more likely to recover, which could be explained by a better care-seeking behaviour resulting from such trainings.** Operational experiences of COOPI in DRC revealed a shorter stay of children referred by MUAC mothers (32 days vs 41 days) compared to children referred by CHWs.

TABLE 5. Results on the timing of detection and quality of treatment: early detection and hospitalizations (published peer-reviewed studies)

Study	Quality of treatment (Average length of stay and recovery)	Quality of evidence
Ale et al, 2016 (Niger)	**No possible comparison due to presence of MAM treatment** Program lengths of stay were expected to be shorter in the Mothers Zone but comparison was not possible because the therapeutic supplementary feeding programs (i.e. programs treating MAM) in the zones were operating at different levels of capacity, causing children to be retained in the therapeutic feeding program longer in the Mothers Zone than in the CHWs Zone.	
Daures et al, 2020 (Burkina Faso)	**No comparison between average length of stay and source of referral.** Average time to recovery : 5.8 weeks (all children); 8.1 (<115 and edema) **Positive association between being MUAC-trained and recovery.** Child of a caretaker who received MUAC training (adjusted hazard ratio 1·09; 95 % CI 1·01, 1·19) were more likely to recover. It is the first time that a positive association is demonstrated between training mother to use MUAC bracelet and recovery, **likely due to a better care-seeking behaviour resulting from such trainings**	Strong[5]

5. Strong = evidence extracted from a peer-reviewed article; medium = evidence extracted from a case-study including a relative important set of data; weak = case-study or policy brief with little/absent data or opinions of experts including no data

Study	Quality of treatment (Average length of stay and recovery)	Quality of evidence
Operational findings		
COOPI (DRC)	**Shorter stay for children referred by MUAC mothers.** With regards to the recovery of children screened and admitted by CHWs and MUAC mothers: • The average length of stay of the children referred by CHWs was 41 days • The average length of stay of the children referred by MUAC mothers was 32 days	Medium
ACF Senegal (Matam region, SLEAC)	**No comparison.** Average time to recovery: 6 weeks (2016)	
GOAL (Ethiopia-Malawi-S.Sudan)	No significant results (Ethiopia) or absence of data (Malawi/S.Sudan) on average length of stay or weight gain	

Main results on timing of detection and quality of treatment

Early detection and fewer hospitalizations

Although it is mainly presupposed or suggested by implementers/researchers that the Family-MUAC approach leads to an earlier detection, one study (Ale et al, 2016) showed an effective earlier detection and fewer admissions to hospitals in Niger. Results are promising but further evidence/documentation is needed in different contexts.

Shorter stay and recovery

There is little evidence on the fact that a Family-MUAC approach can improve the quality of treatment by reducing time needed for it and by fasting recovery. But one study (Daures et al, 2020) showed for the first time that children of a caretaker who received MUAC training were more likely to recover, which could be explained by a better care-seeking behavior resulting from such trainings.
In the DRC, COOPI found a shorter stay for children admitted through mother's referral, compared to CHWs (32 vs 41 days)

Recommendations

Recommendation:
Further studies are needed to assess the effectiveness of this approach in terms of quality of treatment (earlier/shorter) in different settings and by comparison with standard protocol or referral by another source (CHWs).

Recommendation:
Implementers should include standard and feasible indicators in their M&E strategy to enable implementers to further assess this part and make comparisons possible between different contexts (See part on M&E)

Recommendation:
Same recommendations.
Further studies are needed to assess a significant difference in length of treatment for children admitted by referral of mothers.
Implementers should include standard and feasible indicators in their M&E strategy to more systematically assess the impact on treatment (by comparing number of days of treatment for example).
See part on M&E

B5. *Coverage*

Coverage assessments consistently show therapeutic program coverage for CMAM services to be lower than expected and failing to meet context-specific internationally agreed minimum standards for coverage (50% or under in rural settings), meaning high-risk cases are not being diagnosed and children are not accessing the essential life-saving treatment they need.

In most community settings, either community health workers periodically, or opportunistically measure/check children for acute malnutrition in the communities where they work or periodic mass screenings occur. Opportunistic screening by health workers is known to have very limited coverage and mass screenings happen so periodically that again, many cases will be missed between cycles.

By including caregivers in the detection of malnutrition, the Family MUAC approach is perceived to have the potential to increase coverage of CMAM programs.

Regarding evidence on the impact of the Family-MUAC approach, the word "coverage" remains a broad term which covers very different indicators depending on what is attempted to be assessed by implementers/researchers (screening, coverage of CMAM services…). At the same time, it seems difficult to assess the real impact of this approach on coverage as there are other permanent factors which can explain variations of coverage (presence of other actors/programmes, external events, difference in terms of RH capacities, geographic distance…). Therefore, it may be difficult to clearly assess the impact of the Family-MUAC approach on coverage, independently from other factors, and this could explain why the impact on coverage is still not clear for this home-based screening (Bliss et al, 2018; CORTASAM, landscapes analysis, 2020).

These may also be the reasons why implementers are using (and testing) various indicators - and not sharing the same standard indicators – and sometimes struggling to try to assess the impact of the Family-MUAC on coverage of CMAM services.

However, based on available evidence, an examination of all indicators used by implementers/researchers to assess coverage was conducted and their reliability/limitations were also assessed. Below are the 2 main types of indicators related to coverage observed within the available evidence:

- Indicators related to the **coverage of community screening/coverage of MUAC utilization** (frequency of screening by mothers; % children admitted to malnutrition treatment upon referral of mothers)
- Indicators related to the **coverage of programme**: proportion of children aged between 6 and 59 months with MUAC < 115 mm or bilateral oedema at the time of a survey who are effectively supported in an appropriate nutrition program (indicators used for SLEAC/SQUEAC surveys); variation in admission to services (routine programme data)

Coverage of community screening

According to the evidence, the Family-MUAC approach can lead to an improved coverage of screening. This improvement has been demonstrated by an increase in the frequency of community screening in different contexts. Operational findings suggest and prove that screening within households is more likely to be repeated several times a month (ALIMA, COOPI) and that screenings repeated frequently over time can give the best results (Briend et al, 1986). Moreover, when mothers/caregivers are in charge, the valuable time of CHW's can be put towards covering other geographic areas and therefore improve the coverage of screening (GOAL, COOPI).

Frequency of screening. **Some implementers have demonstrated an increased frequency of screening when this is done by mothers which then indicates an improved coverage of screening.** According to the available evidence, an "increase" can be defined by comparing data with data from another screening mechanism (CHWs) but is mainly based on the fact that a mother is expected to screen her child at least once a week (as recommended by several implementers in training guides/see part C.2).

Operational findings include data on the frequency of screening by mothers among operational findings. Multiples experiences of ACF in Senegal, ALIMA in Burkina Faso and the CRF multi-country scope in Niger-Chad-Mauritania-Cameroon, provide an interesting overview of this indicator. **A vast majority of mothers/caregivers are reported to take MUAC measurements several times a month (see table 6).**

TABLE 6. Operational findings related to frequency of screening by mothers (improved coverage of community screening)

Operational findings	Frequency of screening by mothers (coverage of MUAC utilization)
COOPI (DRC)	**Children are screened by mothers at least four times a month instead of once a month by the CHWs.** COOPI concludes that because mothers of malnourished children are taking care of the screening and follow-up of the children in their village, this allows CHWs to screen in other villages, and to come back only to follow up with the children detected by the mothers
ACF Senegal (Matam region) SLEAC 2016	**89.8%** of mothers are taking MUAC measurement once a week
ACF Senegal (Louga region) Capitalization report 2018	**93.2%** of households have taken MUAC measurement at least once a week (61.5% have taken measurement once a week)
CRF_LQAS survey_ Cameroon-Chad-Niger-Mauritania_2016	**90.4%** (Cameroon); **68.3%** (Chad); **53.7%** (Niger); **20%** (Mauritania) have taken MUAC measurements in the past four weeks
ALIMA_Capitalization report_Burkina Faso_2016	**91%** of mothers have taken MUAC measurements at least every two weeks

But it is also important to consider the sustainability of MUAC utilization: there may be a decrease of MUAC utilization overtime if no refreshment/support is provided. Data from CRF showed that the ability of mothers using MUAC would decrease as the months pass following the most recent training/refresher (see part B.1).
Regarding frequency of MUAC utilization, it seems to follow the same pattern. For instance, the low proportion of mothers who took MUAC measurements (20%) in the past month (April 2019) in Kaedi/Mauritania could be (partially) explained by the fact that there have been 10 to 14 months since the initial training, with no follow-ups.

Children admitted to malnutrition treatment by referral of mothers (self-referral by mothers)
Theoretically, this indicator can inform well on the effectiveness of the Family-MUAC approach, showing that there is an important proportion of children arriving and being admitted at the health centers by referral of their mothers who detected potential malnutrition at home.

Table 7 shows that the proportion of children admitted by reference of mothers is quite low, less than 40% and always lower than the proportion referred by CHWs (DRC, Senegal, Mali, Burkina Faso…).

Some implementers (CRF, ALIMA) have investigated why and found that mothers were screening but then went to CHW to confirm the screening (to save time and money before going to the health center). If confirmed by the CHW and once they arrived at the health centers, mothers were telling the health center staffs they were referred by the CHW.

TABLE 7. Evidence on children admitted by referral of mothers

Study	Admissions referred by mothers
Daures et al, 2020 (Burkina Faso)	**12·9 %** of all admissions are referred by mothers vs 39.3% by CHWs. ALIMA explains that this low proportion is likely due to an underestimation because many mothers sought confirmation from a Community Health Worker (CHW) after using MUAC at home and then reported being referred by a CHW at admission.
Operational findings	
IRC Preliminary results ComPAS Mali (Nara) 2020	**24%** of all admission are referred by mothers vs 45% by CHWs
GOAL (Ethiopia-Malawi-S. Sudan)	GOAL provides data on numbers of children U5 presenting at OTP/TSFP as nutrition self-referals but no estimation of the proportion of these children to total admissions
ALIMA Mirriah Niger 2017	**71%** of all admissions are referred by mothers
COOPI (DRC)	**37.8%** of all admissions are referred by mothers vs 62.2% referred by CHWS
ACF Senegal (Matam region) SLEAC 2016	**Less than 10%*** of all admissions are referred my mothers vs 14% by CHWs
Save, 2017, Niger, Diffa	**34%** of SAM children admitted to CREN in Maradi and Zinder are referred by mothers

**this very low proportion can be linked to the fact that the data on admission were collected from January to September 2016, but the mother-MUAC program started only in May 2016. The survey took place in November 2016.*

So, in practice, this indicator seems to underestimate the true level of screenings being done at home.

Also, as the Family-MUAC approach is relatively recent and/or not yet scaled-up and/or integrated in the health system, it may take time to adopt this new behavior (make MUAC measurement) and observe tangible results in the proportion of children admitted by reference of mothers and results on coverage, in general.

Coverage of programme

Regarding assessment of CMAM coverage, SLEAC/SQUEAC surveys can provide information on the proportion of children aged between 6 and 59 months with MUAC < 115 mm or bilateral oedema at the time of a survey who are effectively supported in an appropriate nutrition program (point coverage/period coverage estimators). Results obtained from SLEAC/SQUEAC surveys are generally used to assess the level of coverage of a CMAM programme, and therefore evaluate its overall performance.

Coverage estimated by SLEAC/SQUEAC surveys

There are two different estimators of coverage (point coverage and period coverage) using current coverage assessment methods: point coverage and period coverage.

Point coverage reflects the ability of a program to find and recruit cases. The point coverage estimator does not account for recovering cases and so does not directly reflect the program's ability to retain cases from admission to cure, unlike a period coverage estimator but it tends to overestimate program performance because the denominator does not include recovering cases that are not in the program. A new single coverage estimator has been proposed which is a measure of overall program performance and which should be used in preference to use either the point or period coverage estimators. (Balegamire et al, 2015) to overcome the mutual limits of the two usual estimators. This new indicator has been used by ACF in Senegal and Concern Worldwide in Kenya. **Based on available evidence extracted from SLEAC or SQUEAC surveys, no significant impact on coverage has been demonstrated for the Family-MUAC approach.**

TABLE 8. Evidence related to program coverage

Study	Results from SQUEAC/SLEAC surveys on coverage
Ale et al, 2016 (Niger)_ SQUEAC method	Coverage was assessed several times (x4) based on a SQUEAC method with a point coverage estimator. **Point coverage was similar in both zones at the end of the study** (35.14 % Mothers Zone vs 32.35 % CHWs Zone, difference 2.78 %, [95 % CI –16.34 %; 21.90 %], p = 0.9484, Yates corrected chi-square test. = **mothers are not inferior to CHWs in terms of coverage**
Operational findings	
IRC Preliminary results ComPAS Mali (Nara) 2020_SQUEAC surveys	**No significant impact on coverage** (50.1% in February 2019 vs 56.1% in February 2020). Coverage was assessed twice based on a SQUEAC survey but no information yet on coverage estimator used
ACF Senegal (Matam region) SLEAC 2016	**No significant impact on coverage** (46.6% in 2016 vs 48.5% in 2014) Coverage was assessed based on a SLEAC method with a single coverage estimator
ACF Kenya (Isiolo County, 2017)	**No significant impact on coverage** (no data/information on coverage estimators used)
Concern Worldwide Kenya (Tana River County, 2019) SQUEAC Survey	**No significant impact on coverage** (Single coverage estimator. 52.6% in Outpatient therapeutic care (OTP) at baseline and 53.7% at end line.)
ACF-CRF Cameroon (Tokombere and Roua Health districts, 2020) SQUEAC survey	**Coverage increased from 31.2% to 44.7%** in Tokombere but decreased in Roua from 51.5% à 29.7%. But coverage still under 50% and no mention of a significative difference. Single coverage estimator.

Operational findings didn't identify a significant impact on coverage in areas where the approach has been implemented. As stated in the introduction of this section, it may be difficult (or less relevant) to clearly assess the only impact of the Family-MUAC approach on coverage, independently from other factors. This could explain why the impact on coverage is still not clear among the available evidence for this home-based screening.

As Ale et al (2016) did in Niger, it could be more relevant to make comparisons in terms of coverage with another screening mechanism, so that to demonstrate that coverage in zones where mothers are screening can be similar (superior or at least non-inferior) to coverage where CHWs/others are screening. In Niger, this ALIMA's study showed that coverage can be similar whether it is a zone where mothers are screening or where CHWs are in charge.

Including comparison with other standard mechanisms will allow more relevant comparisons and would be a more striking piece of evidence to support advocacy and scale-up of this approach.
Regarding coverage, the evidence is expected to grow with upcoming results of simplified approaches in different contexts such as the results of OptiMA protocols in Mali, DRC, other operational research projects and a specific project focusing on assessing impact on coverage led by Concern Worldwide in Kenya (see part B.7)

Variation in admission to services

Variation in admission to therapeutic services has also been considered by some implementers as an indicator to assess the impact of the Family-MUAC approach on coverage of program.
Here again, it is well known that there can be a lot of factors to "explain" a variation in admissions to therapeutic services (seasons, external event, presence of new programmes…) so this indicator, inside and outside from a Family-MUAC based programme, could not really be considered as a reliable indicator.
By looking at the total percentage of admissions to CMAM services from mother-MUAC approach, GOAL saw that the Family-MUAC approach was a significant contributor to the caseload in both Malawi and South Sudan, both of which were previously relying on traditional, relatively low resource methods of case identification, through community health workers (CHWs), either by active case finding or periodic mass-screenings. In Malawi and South Sudan, the average increase in admissions to therapeutic care services was 43%, over and above the normal methods employed, which is seen as an enormous increase in case identification for GOAL. In Matam, ACF used these admission data but observed no significant change.

Why is the impact of coverage unclear or not significant?

Here we compiled the 2 main reasons which can explain why the impact on coverage appears not to be clear and what could be done to overcome this issue.

- **Coverage estimators used in SLEAC/SQUEAC survey may not be enough or too large to clearly assess the impact on coverage for this approach. It may be more relevant to assess the impact on the coverage of screening to inform on effectiveness of the Family-MUAC approach.**

Estimators assessing the coverage of screening can be reached by using relevant and reliable indicators. Based on ALIMA, ACF and CRF's experiences and reflections, the indicators below can be used to assess the coverage (and effectiveness) of the Family-MUAC approach:

- % of mothers trained to use MUAC (to assess potential coverage of screening)
- % of functioning MUAC bracelet in the home (to assess coverage of utilization)
- % of correct utilization of the MUAC (to assess sustainability of the training)
- % of MUAC utilization in the last 4 weeks (to assess sustainability of the approach)

CRF is using all these indicators during LQAS community surveys to regularly monitor the effectiveness of the approach and prioritize refreshments or MUAC replenishment depending on these results.
Coverage surveys remain essential to inform and address barriers to health access.

- **But also coverage should be assessed in terms of comparison with other screening/ standard mechanisms.**

Comparing effectiveness of different approaches can help support the work advocacy and better inform on how the Family-MUAC approach can reach better results or at least non-inferior ones.

Using different indicators to assess coverage does not help to give a clear overview of the impact on coverage, nor does it enable comparison across contexts

Implementers/researchers are using different indicators to assess coverage depending on what part of a program is being assessed by implementers/researchers (screening, overall program…) and depending on their initial objectives (show the ability of mothers to screen compared to CHWs, demonstrate an improved frequency of screening by mothers…). This may explain why the word "coverage" remains a broad term which encompasses very different indicators within the available evidence.

However, it seems important to have standard and feasible indicators to be able to monitor and/or assess the coverage and effectivity of the approach, on a regular basis and across contexts.

Main results on coverage

Coverage of community screening

According to the evidence, the Family-MUAC approach can lead to an improved coverage of screening. A vast majority of mothers are reported to take MUAC measurements several times a month.

Coverage of CMAM programs

Some indicators used to assess impact on coverage *"children admitted to malnutrition treatment by referral of mothers" (1), variation in admission to therapeutic services (2), coverage estimators used in SLEAC/SQUEAC surveys (3)* may not be properly adjusted to this approach, as they can underestimate the real coverage by mothers (1) or are difficult to link with the sole impact of the approach (2-3). However, it seems important to have standard and feasible indicators to be able to monitor and/or assess the coverage and effectivity of the approach, on a regular basis and throughout contexts.

Comparing coverage between the Family-MUAC approach and another standard mechanism such as CHW screening can produce more striking evidence to support advocacy and scale-up of the approach.

Recommendations

Recommendation: coverage of the Family-MUAC approach can be well assessed by directly assessing the specific coverage of screening (Frequency of screening)
Recommendation: Conduct regular assessment of ability of mothers and/or integrate (refresh) trainings in the health system platform as both the ability of mothers and MUAC utilization tend to decrease over time

Recommendation: These indicators should be systematically used to assess coverage (see M&E part)
% of mothers trained to use MUAC (to assess potential coverage of screening)
% of functioning MUAC bracelet in the home (to assess coverage of utilization)
% of correct utilization of the MUAC (to assess sustainability of the training)
% of MUAC utilization in the last 4 weeks (to assess sustainability of the approach)

Recommendation: Assess coverage while enabling comparisons with comparable standard/mechanism (CHW screening) in the same geographical area over the same period.

B6. *Cost-effectiveness*

Globally, it is well known that if a child with wasting is detected and admitted early in the disease episode, this can decrease mortality and morbidity related to malnutrition, **reduce per-case treatment costs thanks to shorter treatment times and lower the numbers of children requiring expensive in-patient care for SAM with medical complications** (Sadler et al, 2011; Puett et al, 2013;).

As such the cost-effectiveness of the Family-MUAC approach could be assessed by demonstrating its effectiveness in terms of early detection, shorter treatment times and lower need for inpatient care (see results above). **There is still little evidence on the cost-effectiveness of this approach as effectiveness on quality of treatment (earlier/ shorter) would need to be further studied in different contexts.**

Regarding costs, cost-comparisons between the Family-MUAC approach and existing screening mechanisms for active case finding, such as CHWs, were examined. Below is a summary of the main data which can be collected on costs related to the Family-MUAC approach among current evidence.

Costing

Evidence for the Family-MUAC's cost-effectiveness mainly includes costs related to the trainings/cost per trainee.

Despite different tools, approaches and calculations to estimate and compare costs, it appears that a caregiver-based strategy is less costly than a screening strategy based on CHWs (GOAL, ALIMA).

Why? Regarding ALIMA's experience in Burkina Faso, the main difference is explained by the monthly (modest) cash incentives generally allocated to CHWs.

ALIMA provides the most developed information on costs and their variations related to the Family-MUAC approach, based on an efficacy and

Main results on cost-effectiveness

There is a limited evidence on cost-effectiveness of the Family-MUAC approach. Cost-effectiveness can be linked to all outcomes of the Family-MUAC approach (ensuring effectiveness and sustainability). And especially to the promising results on the quality of treatment (early detection, fewer hospitalizations, shorter treatment, faster recovery). Comparisons in terms of coverage (CHWs) would also document cost-effectiveness.

Regarding cost, despite an initial higher investment for training, the approach seems cheaper than a CHW's screening approach, but the cost-effectiveness of the approach also mainly depends on the sustainability of the training.

Recommendations

Recommendation: More evidence is required on cost-effectiveness including comparisons with standard protocols/ CHW screening in different contexts. Impact on the quality of treatment and on coverage should be also better defined in several contexts to support evidence on cost-effectiveness.

Cost-effectiveness is a crucial tool to enable scale-up and integration of this approach into the health system.

Recommendation: An integrated training routine seems more cost-effective and adapted to the need for a continuous learning, considering the decreasing ability of mothers in measuring MUAC and using MUAC, if no refreshment is made (see B1).

cost analysis of each screening strategy (CHW/caregiver) conducted in Niger and a capitalization report developed in Burkina Faso.

Variation of costs over time

According to ALIMA, training mothers required higher initial up-front costs, but overall costs for the year are then much lower.

Variation of cost with strategies used for training

The cost per trainee can significantly vary depending on the chosen strategy used for training: mass-campaign, routine training or household visit (ALIMA, Burkina Faso, 2016). Training integrated in the care pathway and mass-campaign provide significant lower costs (around $0.65) than household visit ($4.83) according to ALIMA's experience in Burkina Faso. Households visits were found to be inefficient regarding costs. The cost-effectiveness of the approach is however also conditioned by the ability of mothers to make correct MUAC measurements in a sustainable manner as it seems to decrease over time (see B.1), pointing out the need to refresh trainings and/or to identify sustainable training such as an integrated training in the care pathway.

B8. *Conclusion on effectiveness and gaps*

Below is the main conclusion on the effectiveness of the Family-MUAC approach.

In conclusion, we can say that the evidence gathered on the Family-MUAC approach has shown different promising results and yet heterogenous depending on the expected outcomes of this approach. Gaps in evidence remain and this can limit the assessment of the effectiveness of this approach. The lack of standard indicators among implementers/researchers to assess the effectiveness of the approach may also limit the assessment itself.

1. **In terms of quality of detection,** based on a solid peer-reviewed basis and large operational findings, it has now been fully demonstrated that mothers understand and can do correct MUAC measurements (Blackwell et al, 2015; Ale et al, 2016; Grant et al, 2018, Bliss et al, 2018). It has also been shown that a simplified MUAC protocol (either arm and visual ascertainment of midpoint) is effective (Blackwell et al, 2015) and it has high implications in terms of simplifying training and allowing an improved scaling-up of this approach.

2. And yet, we identified 2 gaps/limitations in terms of quality of detection: **(1) the ability of measuring MUAC seems to be non-continuous**, decreasing over time after the last training (may be reduced by half after one year/CRF-LQAS surveys). This indicates the need to integrate the training in the health system to ensure mothers/caregivers will have regular refreshments and/or the need for implementers to regularly assess the ability of mothers in order to provide prioritized refreshments in areas most in need. Second **(2)**, if mothers can successfully measure MUAC, operational and research findings seem to indicate **a limited ability to detect edema**, especially in setting with low prevalence of edema (Ale et al, 2016).

3. **In terms of timing of the detection and quality of treatment, the results are promising.** One study showed higher median-MUAC at admission for children referred by mothers and fewer hospitalizations (Ale et al, 2016), which **proves an early detection** and a positive impact on the quality of treatment. Another study showed for the first time that children of a caretaker who received MUAC training were more likely to recover, which could be explained by a better care-seeking behavior resulting from such trainings.

4. **But as the evidence remains scarce and as such there may be a need to define standard and feasible indicators for implementers/researchers to further assess the impact on early detection and treatment** in different contexts in the region to make comparisons possible.

5. Does the Family-MUAC approach eventually improve coverage of CMAM program? The available evidence on coverage remains low and the few results available show no significant

impact on coverage. As some indicators used to assess impact on coverage may not be properly adjusted to this approach, it seems important to have a set of standard and feasible indicators to be able to monitor and/or assess the coverage and effectivity of the approach, on a regular basis and throughout contexts. Coverage should also be assessed between different screening mechanisms (CHWs vs mothers/caregivers) to support advocacy and scale-up.

6. And lastly, much more evidence is required on the cost-effectiveness and this must be linked with exploring the outcomes in terms of the quality of treatment, timing of detection and coverage in different contexts to build evidence on cost-effectiveness and more widely to support advocacy for scaling-up the approach.

C. Implementation and related recommendations

C1. *Contexts*

Family MUAC fits within existing normative guidance on how to manage Acute Malnutrition. WHO guidelines state the following with regards to the involvement of community members in the screening of children:
" In order to achieve early identification of children with severe acute malnutrition in the community, trained community health workers and community members should measure the mid-upper arm circumference of infants and children who are 6–59 months of age and examine them for bilateral pitting edema."

Therefore, training families/community members how to screen by MUAC is already endorsed by normative guidance.

- At a global level, this approach has been officially endorsed by the Council of Research and Technical Advice on Acute Malnutrition (CORTASAM), who have published a systematic review recommending this approach at community level[6].
- From a regional perspective, multiple countries in the Sahel have already adapted their protocols to include community member training on MUAC to facilitate early detection and treatment. In Mali, a revision of the protocol in 2017 resulted in community members being cited as instrumental in the detection process, with mothers being specifically identified as important targets for training. In Mauritania, the approach has also been integrated into national policy, with over 18,000 family members having received training. Likewise, the national policy in Niger endorses this approach. Finally, in Burkina Faso the Nutrition Division has standardized the approach by annexing it into national protocols to ensure the approach can be delivered at scale.

In which contexts the Family-MUAC approach has been implemented?

This has been mainly implemented in rural areas of Sub-Saharan Africa. One pilot including a simplified protocol (treatment) and a screening at household level is currently ongoing in an urban area (OptiMA Bamako, ALIMA).

According to the available evidence and to implementers, the selected areas for implementing the approach are mainly **areas with existing low coverage of routine community screening/low program coverage, areas where malnutrition poses a high risk of death or illness (high burden of malnutrition/ wasting) and areas where an earlier detection of malnutrition could improve the situation for children (see table 9).** Addressing the low coverage of CMAM programs and aiming at an earlier detection are the 2 main objectives of the Family-MUAC approach quoted by implementers. Below are some contexts in which the approach has been implemented, according to the description of contexts made by implementers (when stated in documents).

6. The Council of Research and Technical Advice on Acute Malnutrition. Recommendations on the use of Mid-Upper-Arm-Circumference (MUAC) in the community: A statement from the Council of Research and Technical Advice on Acute Malnutrition (CORTASAM). No Wasted Lives; 2018

TABLE 9. Characteristics of the selected areas for the Family-MUAC approach

Areas with existing low coverage of routine community screening/ low program coverage	ALIMA	ACF	GOAL	MSF	COOPI	SCI	World Vision
Late presentation (resulting in more complications)	ALIMA	ACF	GOAL	MSF	COOPI	SCI	World Vision
Areas where malnutrition poses a high risk of death or illness (high burden of malnutrition/wasting)	ALIMA	ACF	GOAL	MSF	COOPI	CRF	
Areas where there is a chronic shortage of qualified health personnel	ALIMA	SCI					
Areas where population is accustomed to nutrition programs (to better understand and engage)	ALIMA	ACF					

According to ALIMA, this strategy will be most efficient in MUAC-based programs integrating SAM/ MAM (to provide better coverage).

The implementation of the approach should be done also in countries where national guidelines recognize (or accept in exceptional circumstances) MUAC as an independent admission criterion (Niger, Nigeria, Mali, South Sudan, Burkina, Mauritania, Sierra Leone, DRC…).

Main results on contexts

The Family-MUAC approach is mainly implemented in rural areas of the African continent, known for their high burden of malnutrition, with a presence of CMAM services for which a low coverage is observed (for any reason) and where late presentation has subsequentially been observed.

Recommendations

Recommendation:

The Family-MUAC approach can be implemented in areas with high burden of malnutrition, with a (minimal) presence of CMAM services displaying a low coverage and late presentation of children affected by malnutrition.

It seems however better to implement the approach in an area where the population is already accustomed to nutrition programs as the Family-MUAC approach can be viewed as a complementary approach to improve coverage and performance of existing CMAM services.

C2. *Trainings*

There is no one-size-fits-all approach to teaching mothers how to use and interpret a MUAC tape or check for edema.

During a workshop on the Family-MUAC approach held in Dakar, April 18th 2019 (UNICEF, SCI, CRF, ALIMA, MSF and Action Against Hunger), one conversation debated whether it is preferable to identify one approach for community MUAC training which is adhered to by all partners. Whilst one standardized approach may help coordination, a singular approach may be too restrictive given different ways of working of partners, and the different community platforms that exist. It was determined that a minimum set of criteria could be a useful approach to ensure coordination at country level.

These minimum standards should include the following considerations: desired outcomes, cost-effectiveness, communications and messaging, integration and data collection.

The minimum standards should be based on lessons learned from existing implementation in country and developed in a collaborative manner amongst all implementing partners under the guidance of the Ministry of Health, Direction of Nutrition. Furthermore, consideration should be given to existing community health platforms and community groups. Priority should be given to identifying and reinforcing the capacity of these existing community mechanisms, and to integrate MUAC training using these entry points rather than creating new parallel groups specifically for this activity. **These are the reasons why there are a variety of approaches developed by implementers according to the context (entry points, situation) and their way of working.**

It is however important to co-design the approach in coordination with other implementers and by using lessons learned in the country. Selection of entry points will depend on the context, the objectives and the resources of the implementer.

About Entry points. The identification of the Entry point (s) is a core-step of the Family-MUAC approach to integrate the approach into existing community mechanism so as to ensure both sustainability and a context-specific implementation. This identification will depend on the context, the resources and the target. SCI has deepened the reflection on what entry points should be selected according to these 3 points.

First, it is important to consider **what is already existing in the country**/locality and to be aware of the MoH recommendations (regarding the coordination of the Family-MUAC approach and MUAC as an admission criteria). Using lessons learned will help facilitate the implementation and coordination.

Several implementers are recommending engaging community leaders for the success of this approach for them to support the adoption of Family MUAC. ACF also recommends developing a SBCC strategy which will reinforce the effectiveness of the Family-MUAC approach, especially if members of the family others than mothers are included.

Then, the **selection of entry points** should depend on the context (what are the existing community mechanisms) but also resources. High number of entry points implies a higher number of women and therefore higher resources required for training and monitoring.

Lastly, selection of targets will also depend on the context, the objectives and the resources (mothers 6-59 months, mothers of SAM children, women of reproductive age, soon-to-be-mothers, fathers, other members of the family…). For examples, depending on resources and objectives, the approach can prioritize children at risk of relapsing and emphasizing the need for early detection and referral and select a CMAM entry point such as OTP and TSFP platforms (SCI). In case Family-MUAC is first introduced to a community, ALIMA recommends covering an entire health area to help ensure maximum impact.

Below is a list of pros and cons to consider while developing the approach (developed by Save the Children International WCARO):

- Higher coverage vs lower quality if limited resources (low monitoring capacities)
- Multiplying entry points for a stronger impact vs dividing/scattering your resources
- Focusing on reducing relapse and late referral (Targeting the most vulnerable (malnourished Children/Children at risk of malnutrition) vs Prevention (all children)

About key messaging

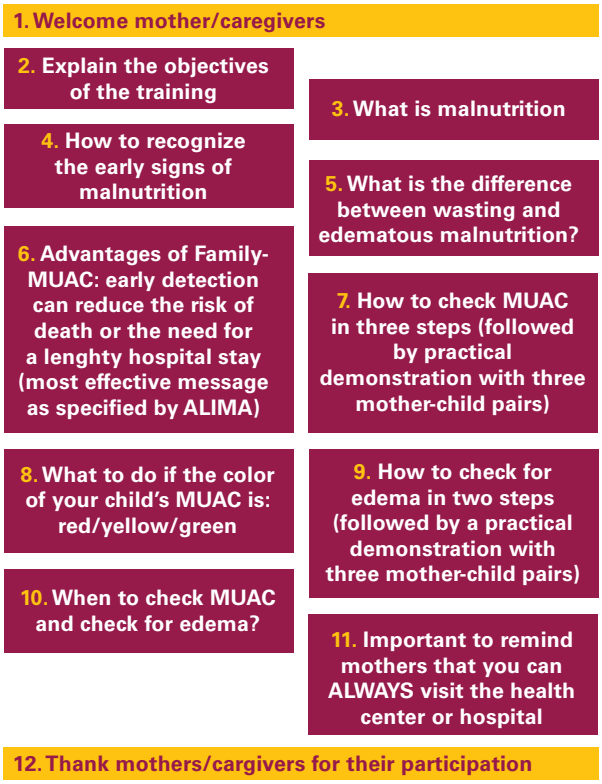
Implementers stated during the Dakar workshop on Family-MUAC that a standardized approach to Family-MUAC would facilitate coordination but could be less relevant regarding the importance of being context-specific (adaptation to existing community platforms, context and cultural appropriateness…). But it was also recommended to conduct a review of key messaging given in trainings to move towards a semi-standardization of the approach and therefore improve the quality of trainings.

By conducting this review of key-messaging in trainings, it appears that there is already a semi-standardization of the training, as the content and structure of reviewed trainings are nearly the same for implementers (CRF, GOAL, World Vision and ALIMA). The training guides developed by implementers are based on the training guide developed by ALIMA (which is the most complete) including all steps of the training from the identification of the coverage area to the monitoring tools.

Below is a review of key messaging given in trainings (available evidence from GOAL, CRF, ALIMA and World Vision) which can be summarized in 12 essential and recommended steps.

Regarding the part on the advantages of Family-MUAC, ALIMA recommends highlighting the fact that early detection can reduce the risk of death or the need for a lengthy hospital stay for children. This statement has been particularly effective (ALIMA). If no nutrition services are available for MAM children in the area, nutritional education should be provided.

GRAPH 6. 12 recommended steps for a Family-MUAC training



About tools

As the approach is mainly implemented in areas where participants are low literate/non-literate, it is important to adapt tools to the targets and to the context. Messages should be clear and simple and must be communicating while using "attractive" tools such as videos, pictures and drawings to support the content of the training.

Below are some recommendations about what tools should be used and how.

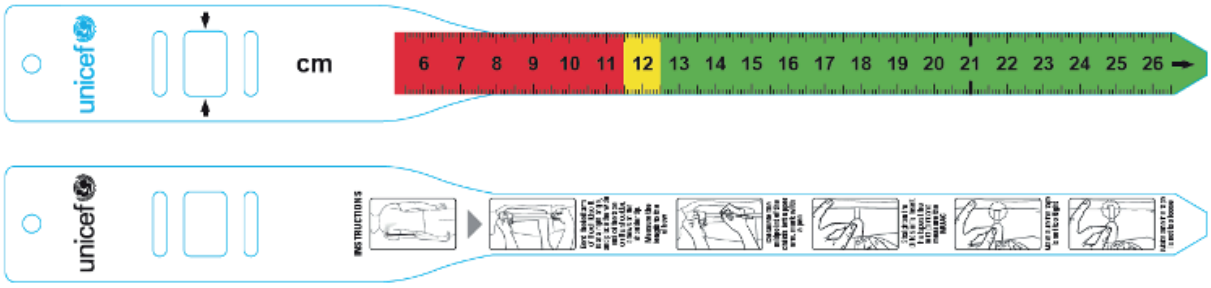
- **Use videos, pictures and drawings in support.**

In order to maximize the impact, it is highly recommended to use pictured tools which are considered relevant low-literacy tools regarding the context of implementation of the approach.

- **Use as simple and clear as possible messages in the local language**

ALIMA has also found that that key messages need to be as simple and clear as possible in the local language to ensure a right assimilation of the training.

GRAPH7. UNICEF (new) MUAC insertion tape



Use a MUAC insertion tape

A study in Kenya (Grant et al, 2018/ACF) has tested three simple MUAC classification devices to determine whether they improved the sensitivity of mothers/caregivers at detecting acute malnutrition. The sensitivity of mother/caregiver classifications was high for all devices (>93% for severe acute malnutrition (SAM), defined by MUAC < 115 mm) but the MUAC insertion tape performed best. This could be due to the use of an improved MUAC tape design which has several new design features compared to the standard UNICEF MUAC* tape such as three slots (which stabilize the measurement) and a wider band.

**During COVID-19 context, UNICEF Supply has recently revised their MUAC templates to include 3 slots and images on the back to improve sensitivity and use of the tape.*

Use bags filled with clay/soil

To demonstrate how to check for bi-lateral pitting edema, ALIMA and other implementers are using a plastic bag filled with clay (or soil). This can greatly help understand what an edema looks like for persons who are not used to seeing or checking for them, especially in settings where there is a low prevalence of edema (Ale et al, 2016). Therefore, the training on detecting edema should be emphasized and supported with visual/practical tools.

Repeat messages (refresher trainings)

Lastly, it is important to consider that making MUAC measurements at the household level is a new behavior for mothers/caregivers. Even if mothers/caregivers understand well the advantages of screening their child's nutritional status, this requires changing/adopting new behaviors and this generally takes time. That's why refresher trainings and/or integrated trainings in the health system are needed to ensure the sustainability of the training outcomes. So, this is an important point to consider while developing a Family-MUAC approach: one training won't be enough. Messages must be repeated and that's also the reason why ACF has recommended to jointly develop a SBCC strategy to the approach in order to facilitate behavior change/adoption and ensure the sustainability of trainings.

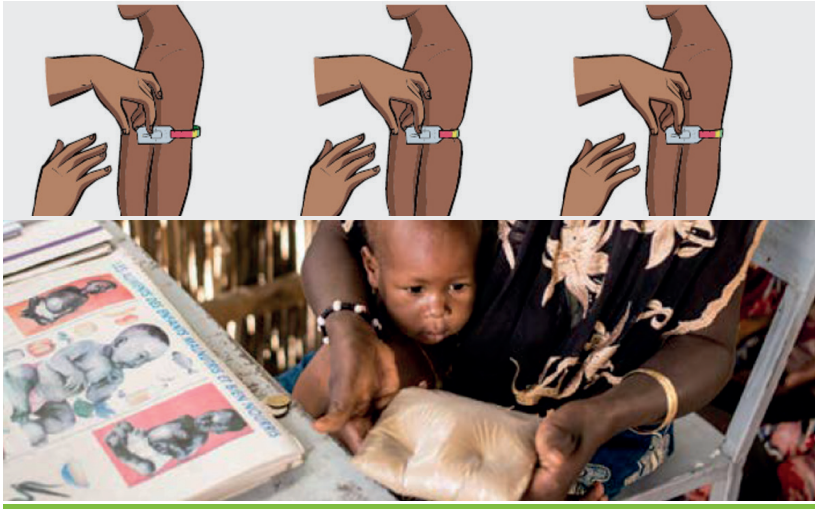
GRAPH 8. Summary on tools

Use videos, pictures and drawings in support

Use as simple and clear as possible messages in the local language

Use plastic bags filled with soil/clay to demonstrate how to check edema

Use color-coded MUAC tapes



ALIMA, Mother-MUAC Guidelines for trainings of trainers

Compared sensitivity/specificity of MUAC devices used by mothers (published results)		Sensitivity to SAM	Specificity to SAM
Grant, 2018	CLICK-MUAC	96,1%	98,8%
	MUAC insertion tape (uniMUAC)	**100%**	**98,8%**
Blackwell, 2015 (Niger)	MUAC tape (color-coded and numbered mid-upper arm circumference tapes)	>73%	>98%

The MUAC insertion tape performs best but other devices perform well

About current training issues

The main issue regarding training is sustainability which depends on entry points selected and/or the integration of the training into the health system.

The results of this rapid review showed the **decreasing ability of mothers taking MUAC measurements over time after the last training/refresher** (see part B.1). Prior to the workshop in Dakar, a questionnaire was shared amongst field actors from different NGOs (CRF, ACF, Save the Children) implementing the approach in different countries (Mauritania, Niger, Senegal, Mali, Burkina Faso) to gain a better understanding of the lessons learnt (good practices, bottlenecks) in implementing and scaling-up the approach. "**Poor training and difficulties in monitoring & evaluation**" were identified as a barrier to implementation and scaling-up. They stated that current trainings are non-sustainable and that there are high requirements for retraining.

But as stated above (in the part About tools), it is quite "normal" that current trainings are non-sustainable because a new behavior for mothers/caregivers (take MUAC measurements) cannot be adopted in one step, especially if they don't perceive it as an immediate benefit to their children. That's why this is highly recommended to integrate trainings in the health system (and ideally into national protocols) and/or to make refreshers trainings (which may be more expensive) to ensure caregivers/mothers can receive regular and systematic trainings on MUAC. Repetition of messages can help assimilation and therefore behavior change. To support the sustainable adoption of taking MUAC measurements, a SBCC approach should also be jointly developed to the approach. *See part C.3 to assess whether a refresher training is needed.*

Main results on trainings

- There is no one-size-fits-all approach to teaching mothers how to use and interpret a MUAC tape or check for edema, but the strategy of the Family-MUAC approach has to be context-specific: existing models and entry points should be considered.

- The identification of the Entry point (s) is a core-step of the Family-MUAC approach to integrate the approach into existing community mechanism so that to ensure both sustainability and a context-specific implementation.

- There is already a semi-standardization of the training, as the content and structure of existing trainings are nearly the same for implementers (CRF, GOAL, World Vision and ALIMA) and based on ALIMA's work.

- Consider MUAC measurement as a new behavior for mothers/caregivers for which the advantages have to be repeated to ensure the sustainability of the approach

- There are a set of common indicators to measure the outputs of training, currently used by most of the implementers (see C.3 on M&E)

Recommendations

Recommendation: Use existing community mechanisms to integrate Family-MUAC trainings to ensure sustainability and use lessons learned from existing implementation in the country

Recommendation: Select your entry points according to your objectives, your resources and the context

Recommendation:
- Use cascade-training and a short duration
- Use the 12 essential and recommended steps for key-messaging of the training
- Use "attractive" tools (videos, pictures, drawings) and simple words in local language

Recommendation: Develop a SBCC strategy to ensure the sustainability of the approach (motivation of mothers/caregivers to make MUAC measurements, support from other members in the family)

Recommendation: Define an M&E strategy clearly integrating standardized indicators outcomes for training (see C.3 on M&E)

C3. *M&E tool*

Monitoring and follow-up actions are as important as the training itself. The M&E part of the Family-MUAC approach is crucial to ensure the effectiveness and the sustainability of the approach.

During the workshop held in Dakar, "difficulties in M&E" were also identified as a barrier for implementation and scaling-up, because there are no harmonized tools and an inadequate budget for M&E compared to targeting/training. And yet, M&E will ensure the sustainability of the training over time.

There is no standardized set of indicators and organizations use different tools and measure activities in a variety of different ways, which tend to be linked to internal monitoring and evaluation systems as well as donor reporting requirements. **However, it seems possible to gather a minimal set of reliable, feasible and standard indicators.**

Why is it important to use standard indicators?

It appears as a need for ensuring more coordination between implementers at the national level, a harmonization of the approach but also a way to further assess the effectiveness of the approach

in different contexts, as there remain gaps for some outcomes (early detection, impact on treatment…).

A minimal set of indicators can be defined and adjusted to the context (according to the selected entry points) and resources. Optional indicators can be added. There are 2 levels to monitor the Family-MUAC approach (community level and health facility level) but also additional indicators (to assess sustainability and effectiveness).

M&E at the community level

At the community level, the M&E mechanism will collect data to **monitor trainings** (number of caregivers trained, number of MUAC distributed) .Special attention will be given to gender (men/women) and location (name of villages, health centers) in collection of data.

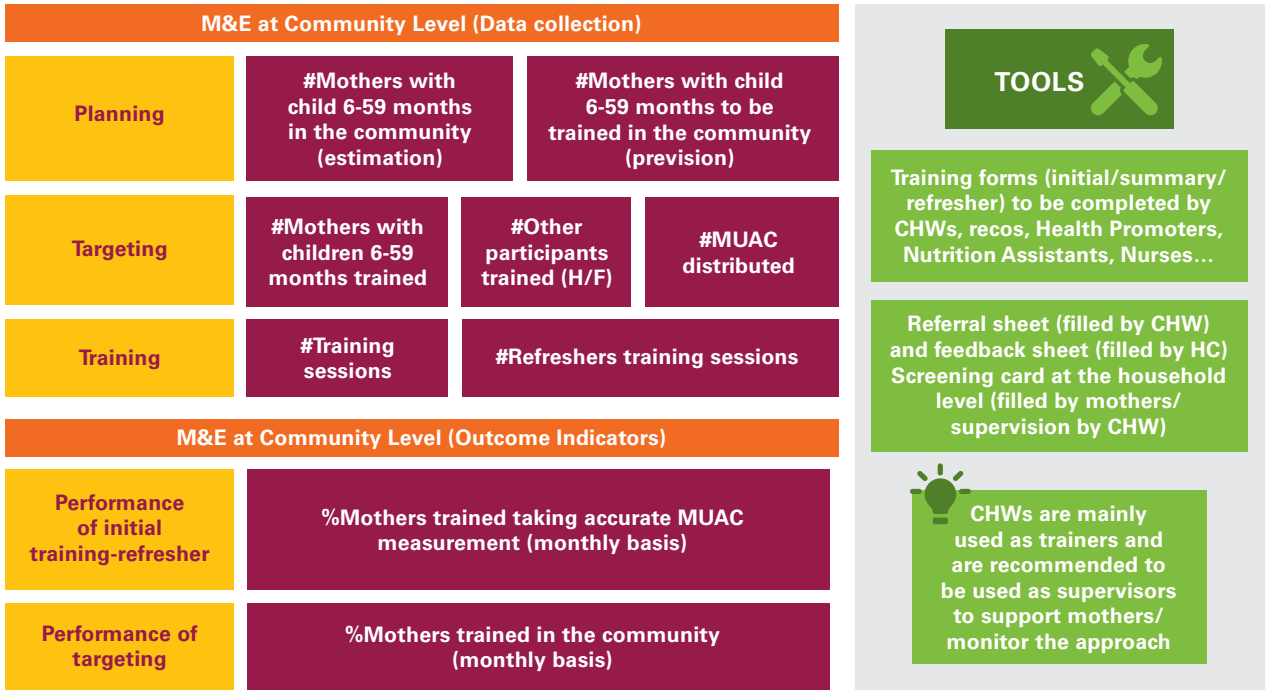
Generally, implementers are using trainers (mainly CHWs) to complete training forms.

GOAL has developed M&E tools for monitoring at the community levels (training forms) which can be adapted and consulted here.

At the household level, a community screening card (monitoring by mothers over months supervised by a CHW) is currently used by ACF, which enables to collect information on what is happening at the household level (frequency of screening and child's nutritional status over months). ACF is also using a reference sheet (to be filled by a CHW before referring a child screened by mothers for confirmation and admission at the health center). To help monitor the performance of screening, a feedback sheet (filled at the health center level after referral) is then used to monitor children eventually admitted for SAM or MAM. Including a M&E mechanism at the household level should however consider whether this task-shifting would not overburden the mother/caregiver who already has a "new" behavior to adopt (i.e. taking MUAC measurement).

Below is a graph including a proposed set of indicators for M&E and some guidance at community level, based on the review of tools used by implementers and their related efficacy to monitor the approach.

GRAPH 9. Proposed set of data collection and indicators for M&E at the community level



Some remarks

- 2 main outcome indicators can be used at the community level to assess performance of the initial training/refresher) and the performance of targeting (in yellow on graph 8).

- But the indicator "Percentage of mothers trained in the community" assessing the performance of targeting may be optional as implementers are generally only considering the number of mothers trained in the community. However, a percentage could help assess the coverage of the training in the community.

- Due to their competencies, it is recommended to use CHWs as supervisors to monitor the approach and support motivation and understanding of mothers at the community-level.

- Task-shifting a part of the monitoring at the household level should consider whether this could be an overload for mothers/caregivers.

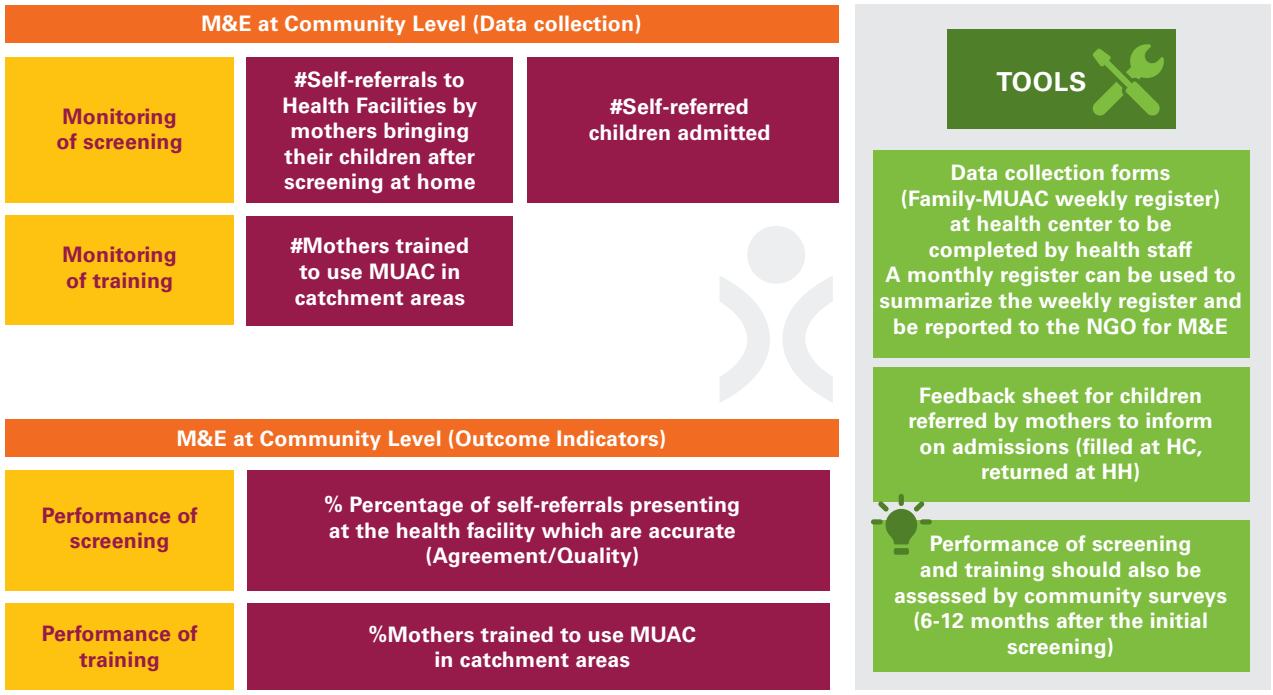
M&E at the health facility

At the health facility level, the M&E mechanism will collect data to **monitor the performance of the approach mainly in terms of screening, but performance of training can also be included at this level** (ALIMA). Data collection is managed by health staffs.

The main outcome indicator collected at this level is the "Percentage of self-referrals presenting at the health facility which are accurate (Agreement/Quality)". It enables to assess the ability of mothers to detect malnutrition and therefore the performance of screening and training.

Below is a graph including a proposed set of indicators for M&E and some guidance at health facility level, based on the review of tools used by implementers and their related efficacy to monitor the approach.

GRAPH 10. Proposed set of data collection and indicators for M&E at the health facility level



Some remarks

- The indicator directly related to the performance of training "Percentage of Mothers trained to use MUAC in catchment areas (out of mothers coming to HC)" can also be more widely assessed at the community level during community surveys (see next part).
- According to operational experiences, the data on self-referral may undercount the true screenings being done by mothers, mainly explained by the fact that mothers are confirming their first screening with CHW before going to the health center and then are declaring to the health staff that they were referred by a CHW. This is a very important point to monitor (verify) and to mention during the training of mothers (mothers should mention "self-referral" anytime they did screen first).

Additional M&E to assess sustainability of the approach

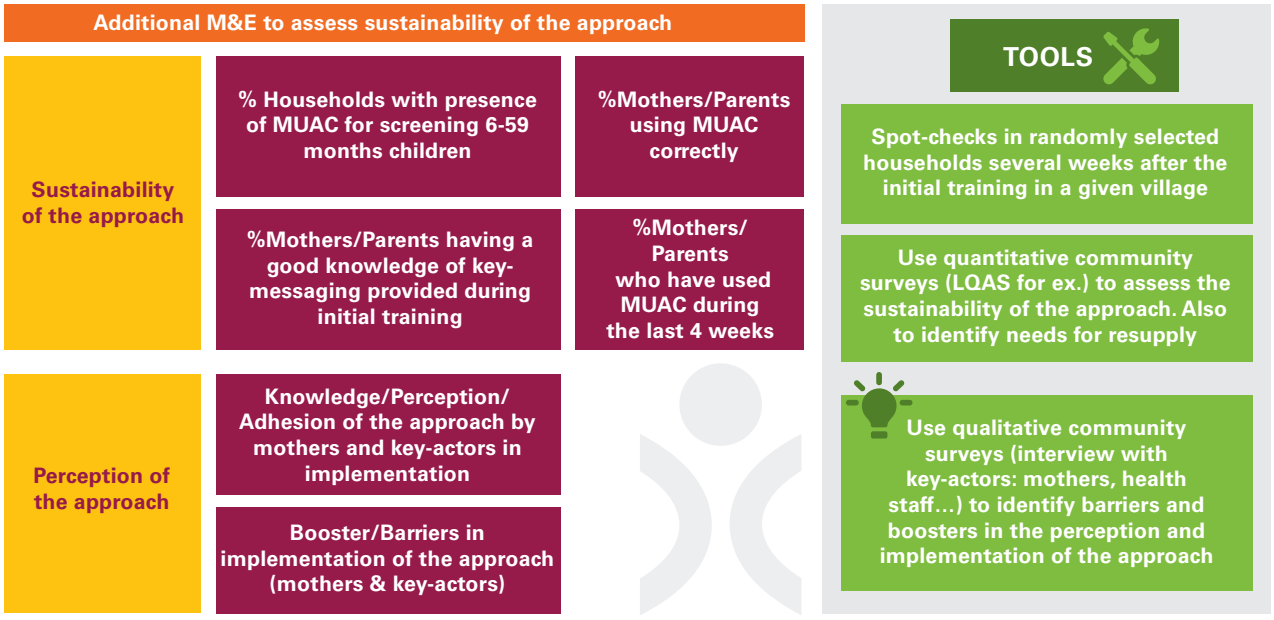
As the ability of mothers to take MUAC measurements is decreasing over time after the last training/refresher (see B.1), it is important to monitor the overall sustainability of the approach.

4 main indicators regularly used by implementers (ACF, CRF…) seem to be the most appropriate to assess how the approach changes over time in terms of effectiveness (see Graph 11). Moreover, this assessment can help reorient the communication on the approach and identify need for refreshers training and/or need for resupply. This should be done 6 to 12 months after the initial training in order to be able to observe a minimal change in time but less than 12 months to avoid long time without MUAC and/or low reduced screening coverage in the community.

Community surveys such as LQAS surveys are well-recommended to provide an overview of the state of the learning outcomes in the community and can be used as a consistent tool to prioritize refresher trainings and resupply in areas where a low coverage of this indicators has been observed. Moreover, qualitative studies can be used as a complement to identify how the key-actors involved in the approach are perceiving and using it but also to further assess barriers and boosters (what works and what doesn't) in that context. This can both help improve/adapt the approach and contribute to the documentation regarding this approach in different contexts.

Below is a graph including a proposed set of indicators to assess the sustainability of the approach in the community (and at health facilities), based on the review of tools used by implementers and their related efficacy to monitor/evaluate the approach.

GRAPH 11. Proposed set of indicators for M&E to assess sustainability of the approach



Additional M&E to assess the effectiveness of the approach

Eventually, as Family-MUAC remains a new approach, increased evidence is needed to assess the effectiveness of the approach in different contexts. M&E should be also used to help support the advocacy to scale-up these programs at a country-level. Implementers should consider including at least indicators on early detection.

What is important to support advocacy and scale-up of the approach is to document comparisons between the Family-approach and other screening mechanisms.

Based on the previous parts of this review (see B.3/B.5/B.6), below is a minimal set of indictors which can be used to assess the main expected outcomes of effectiveness for this approach (Graph 12).

GRAPH 12. Proposed set of indicators for M&E to assess the effectiveness of the approach

Additional M&E to assess effectiveness of the approach

Early detection	**Median MUAC at admission comparison vs CHWs* or in time (between the start and the end of the project)**	
	Length of treatment (days) comparison vs CHWs	
Coverage	**Point coverage/Period coverage/ Single estimator coverage (coverage comparisons vs CHWs* or comparison in time)**	
Cost-effectiveness	**Cost Comparison Family MUAC versus CHW**	**Cost-Effectiveness comparison with areas where only CHWs are screening (include indicators on early detection + treatment + coverage + costs**

*most relevant comparison

TOOLS

Use coverage surveys (SLEAC/SQUEAC) to assess coverage, barriers and boosters

To support advocacy for the scale up of this initiative in your country program and its prospective inclusion in national guidelines, it is useful for the country team to collect following additional information on effectiveness: cost-effectiveness + coverage + treatment (early detection + shorter stay)

Some remarks

- According to the evidence review, the indicator "Median MUAC at admission" is a relevant indicator when compared to another source of referral (CHW) to assess whether the approach leads to an early detection of malnutrition. It can also be compared in time between start and end of the project, but this would be more striking in terms of advocacy (and more relevant in terms of research) to compare outcomes from 2 different screening mechanisms.

- If possible, to further the comparison with CHWs, the length of treatment between self-referred children and children referred by CHWs should be investigated.

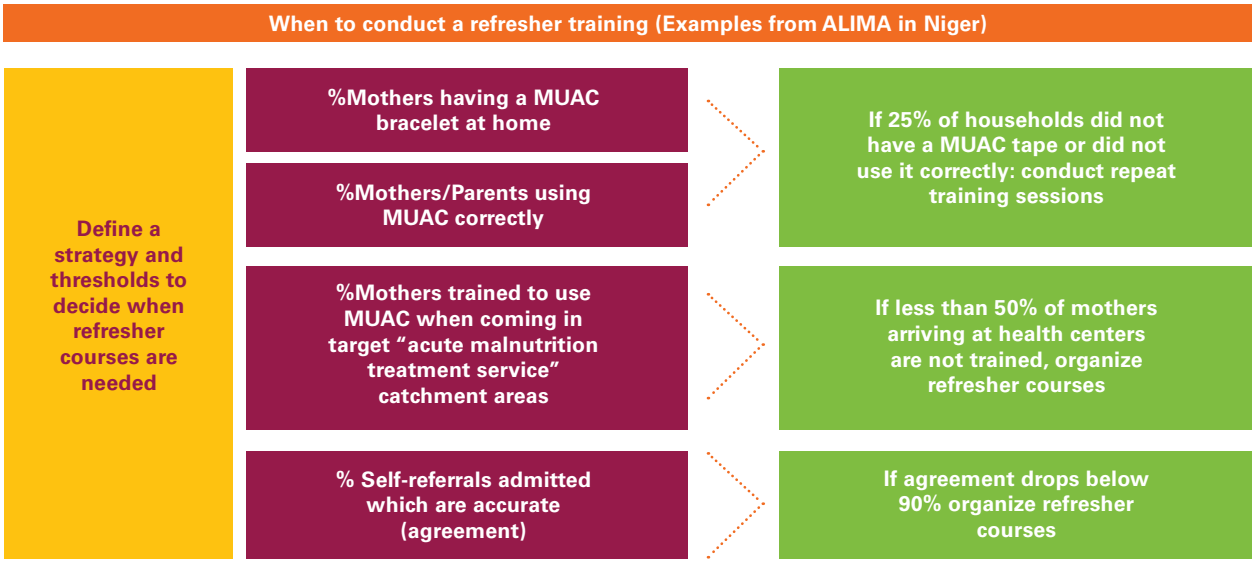
- Regarding coverage, as it remains difficult to explain a variation in terms of coverage (several others external factors/ See B.5), a comparison of coverage between areas covered by CHWs and other covered by mothers would also be a more relevant approach to prove effectiveness correctly and support advocacy.

- Lastly, cost-effectiveness of the approach has also to been compared to other models and should include the indicators which enable the approach to be cost-effective (early detection/ quality of treatment/coverage).

When to find out if a refresher training is needed

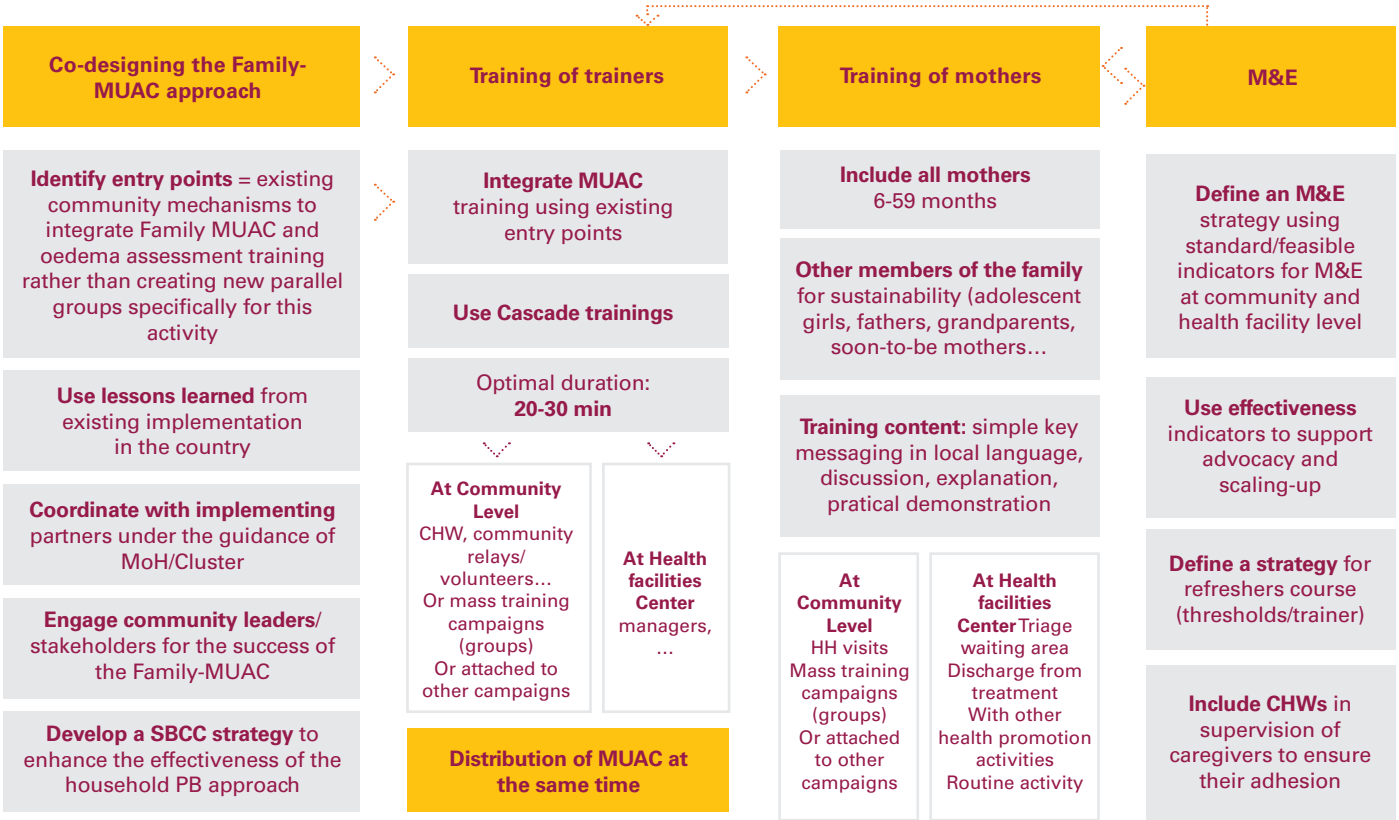
Defining when refreshers are needed is to be included in the M&E strategy since the beginning of the project. There are no guidelines or standards existing but ALIMA has communicated on indicators and possible thresholds used to decide when to conduct refresher trainings. These thresholds must be adapted to the context and the possibilities of the implementer.
This monitoring for refresher need should be done at the community level (community surveys) and at the health facility level.

GRAPH 13. When to conduct a refresher course



Based on the results of the workshops regarding training and related issues and based on the results of the rapid review on effectiveness of the approach and its implementation, some minimum standards (summary of part II) have been developed and gathered in the graph below to support a more effective implementation (Graph 14).

GRAPH 14. Minimum standards for designing the Family-MUAC approach



Main results on M&Ev

- Monitoring and follow-up actions are as important as the training itself. Continuous monitoring is very key throughout the program period in order to realize an impact. The design of the M&E part is crucial to ensure the harmonization, the effectiveness and the sustainability of the approach

- There is no standardized set of indicators/ tools used by organization, but it seems possible to gather a minimal set of reliable, feasible and standard indicators for which reliability has been assessed.

- M&E should be used to verify the sustainability of the approach over time

- M&E should be used to increase evidence on effectiveness of the approach in different contexts

Recommendations

Recommendation: Define a M&E strategy at the community and health center level while considering the proposed set of indicators to facilitate harmonization, coordination and documentation of the approach at country and global level.

Recommendation: Define a strategy for refresher courses to ensure a long-term sustainability of the approach (community surveys/M&E at HC) + adopt a SBCC strategy.

Recommendation: Use indicators of effectiveness (early detection/treatment/ coverage) and comparisons with other standard mechanisms to support advocacy and scaling-up of the approach.

C.4. *Main challenges in implementation and related recommendations*

Implementations is always facing challenges but **what are the main recurring challenges for the implementation of the Family-MUAC approach?**

1. Projects can encounter delays in the procurement of the MUAC tapes

▸ **Ensure sufficient stock of MUAC tapes for initial training and resupply**

Many implementers have experienced a delay in MUAC tape procurement. For instance, in Kenya, Concern Worldwide (Tana River) encountered a delay in procurement of these tapes for close to 3 months which then subsequently contributing to delay in the implementation of pilot activities as nothing could go on as scheduled without the MUAC tapes. Once the tapes were received, refresher trainings were undertaken for the CHVs and the mothers. Moreover, regarding the need of refresher courses, a stock for resupply should be considered before starting the project.

2. Distance to health facilities for self-referrals

▸ **There is need for consideration of CHWs to manage uncomplicated acute malnutrition at community level while shifting the task of screening for acute malnutrition to families**

Distance to health facilities is a recurrent barrier to accessing services. Despite the mothers measuring their children, referral to the facility for treatment remains a challenge due to distance. Actors of the Family-MUAC approach will encounter the same barriers for access to health and services, except if this approach is coupled with other another simplified approach such as the managing of uncomplicated cases of SAM at the community -level by CHWs which will then overcome the most common barrier to health access (distance).

3. There is a poor integration into the health system

▸ **Include the approach into national training plans and/or national community health and nutrition protocols**

This requires that the approach (and the means to adequately conduct it) needs to be included in national training plans, acute malnutrition treatment guidance and community health strategies. The lack of ownership and commitment of health actors and the system constitutes a barrier to implementation and scale-up (Family-MUAC workshop report, Dakar) and this reveals the limited integration of Family-MUAC into the health system. And yet, the sustainability of the approach mainly depends on its integration into the health system to avoid a mechanism which would be in competition with existing systems, especially in terms of M&E.

4. CHWs could have the perception that this approach is in competition with their work

▸ **Include CHWs as trainers and supervisors, consider coupling Family-MUAC with ICCM+**

This challenge indicates again the importance to integrate this approach into the health system. As stated previously, CHWs should be involved as trainers for mothers and as supervisor to monitor the approach. However, it has been reported that some CHWs could complain about having an increased workload with supervision without financial compensation. A poor adhesion of CHW could highly compromise the effectiveness of the approach. Engagement of CHW is therefore a crucial point of the approach. Ideally, coupling Family-MUAC with ICCM + SAM at the community-level could tempered this perception and overall increase effectiveness of the approach (main barrier = distance).

5. Undercounting of self-referral due to seeking of confirmation of screening with CHW before going to the health center

▸ **Raise awareness on that point during training with mothers**

ALIMA highlighted the potential undercounting generating by this indicator which is the main indicator to assess the fact that mothers are screening their children, coming to the health facility and measuring MUAC well (agreement). To overcome this issue, this message should be emphasized during the training for both CHWs and mothers/caregivers (first screening = self-referral even if the CHW is confirming).

C5. *Conclusion on implementation*

There is no standardized implementation of the Family-MUAC approach in the West and Central Africa Region, however certain similarities can be observed in terms of training and the M&E mechanism could be harmonized among implementers to improve visibility on the effectiveness of the approach in different contexts and therefore support the advocacy work and scale-up of this approach.

1. Context. Despite differences in implementation, the selected areas of intervention for this approach look similar among implementers in the region probably because they are linked to the main stated objectives of the approach (earlier detection, improved coverage). Therefore, it has been mostly implemented in rural areas of the West and Central Africa region, known for their high burden of malnutrition, where there is a presence of CMAM services and for which a low coverage has been observed and where late presentation subsequentially occurs.

2. Trainings. Observing implementers in the region, there is no one-size-fits-all approach to teaching mothers how to use and interpret a MUAC tape or check for edema. But it is firmly accepted that the strategy of the Family-MUAC approach must be context-specific to be more effective and sustainable. Therefore, designing a training strategy should consider existing models and lessons learned in the country as well as existing entry points for the training. Selection of entry points will also depend on resources, context and objectives. Key messaging for the content of the training is already semi-standardized as implementers are using the same 12 essential steps which should be recommended. Sustainability of the training is the main big issue as the ability/motivation of mothers and utilization of MUAC seem to decrease over time after the initial training/last refresher course. Implementers should associate a SBCC strategy with the approach and consider that "taking MUAC measurement" needs to be considered as new behavior which needs to be supported over time. Including the training into the health system/national protocols remains the main effective solution to ensure sustainability of the approach. Indicators outcome to measure performance, effectiveness and sustainability of training can be included in a well-defined M&E strategy.

3. M&E mechanism. It is a crucial part of this approach. Monitoring and follow-up actions are as important as the training itself because a continuous monitoring is key throughout the program period in order to realize an impact. First, the M&E mechanism could be harmonized to facilitate coordination between implementers and documentation across contexts. Second, M&E should include a strategy for refresher to regularly assess and ensure the sustainability of the approach. Lastly, the M&E mechanism should be used as a tool to fill missing evidence on the effectiveness of the approach in different contexts. Some important outcomes in terms of early detection and shorter treatment which have yet showed promising results, need however to be further assessed. This would will help to quantify the impact the approach is having on the global burden of acute malnutrition and help promote it as a preventative life-saving intervention.

4. Main challenges in implementation and related recommendations. Half of the challenges related to implementation are linked to the lack of sustainability of the approach and seem to plead for an integration of this approach into the health system/national protocols. Another noticeable challenge is the fact that despite a great empowerment at the community-level, the Family-MUAC approach can face the same barrier as the CMAM services (distance) and it would be therefore relevant to associate this approach to an approach integrating acute malnutrition services at the community-level.

Summary of recommendations

Integration into the health system and into the context

Advocate for integration of the Family-MUAC approach into the health system/national protocols to ensure the sustainability of the approach

The ability/motivation of mothers as well as MUAC utilization tend to decrease over time after the last training/ refresher course (may be reduced by half after one year). Taking MUAC measurement should be considered as a new behavior which cannot be adopted at once.

Identify and use existing community mechanisms (entry points) to integrate Family-MUAC trainings, use lessons learned from existing implementation in the country and coordinate with MoH/partners to ensure sustainability of the approach

Identify and use existing community mechanisms (entry points) to integrate Family-MUAC trainings, use lessons learned from existing implementation in the country and coordinate with MoH/partners to ensure sustainability of the approach.
Priority should be given to what is existing (existing community health platform, others operational experiences of implementers and lessons learned) to ensure a context-specific and sustainable implementation.

Implement the Family-MUAC approach in areas with high burden of malnutrition, with a (minimal) presence of CMAM services displaying a low coverage and late presentation of children affected by malnutrition.

It appears relevant to implement the approach in geographical areas where the population are already accustomed to nutrition programs as the Family-MUAC approach can be viewed as a complementary approach to improve coverage and performance of existing services.

Harmonize and conduct simplified trainings

- **Use the 12 essential and recommended steps for the training**
- **Implement cascade-training and a short duration (20-30min)**
- **Preferentially use a MUAC insertion tape**
- **Include "attractive" tools adapted to low-literacy context (videos, pictures, drawings)**
- **Choose simple and clear words in local language**
- **Consider using either arm and visual ascertainment of midpoint to for MUAC measurement**

  It doesn't influence accuracy of measures and as it can greatly simplify trainings (Blackwell et al, 2015)
- **Strengthen capacity of health staff, CHWs and mothers for detection of edema**

  Detection of edema has been identified as a potential limitation for screening by mothers but can also concern health staff in setting with low prevalence (Ale et al, 2016).
- **Develop a SBCC strategy to ensure the sustainability of the approach**

  This can help support the motivation of mothers/caregivers to adopt and take MUAC measurements and can also involve other members in the family, community.

Design a M&E strategy to ensure sustainability of the approach

Define a strategy for refresher courses to ensure a long-term sustainability of the approach (community surveys/M&E at health center and at community level)

As taking MUAC measurement is a new behavior to adopt, assessment of the sustainability of training and refreshers are needed to avoid a decrease in ability/motivation of mothers and MUAC utilization.
The M&E strategy should include indicators to assess the sustainability of the approach such as:

% of mothers trained to use MUAC (to assess potential coverage of screening)
% of functioning MUAC bracelet in the home (to assess coverage of utilization)
% of correct utilization of the MUAC (to assess sustainability of the training)
% of MUAC utilization in the last 4 weeks (to assess sustainability of the approach)
Community surveys 6 to 12 months after the initial training, regular random checks in the community and qualitative studies (perceptions/boosters/barriers) should be used to monitor sustainability and reorient strategy if needed.

Define a M&E strategy at the community and health center level, considering the proposed set of indicators to facilitate harmonization, coordination and documentation of the approach at country and global level.

According to the context and resources, select indicators belonging to a set of harmonized, standard and feasible indicators. These indicators are based on results from the evidence review (use and limitations noticed by implementers)

At the community level:

- *%Mothers trained taking accurate MUAC measurements*
- *%Mothers trained in the community*
- *Achievements related to trainings (including gender/location/initial training or refresher)*

At the health center level:

- *%Self-referrals presenting at the health facility which are accurate (agreement/quality)*
- *%Mothers trained to use MUAC in catchment areas*

Design a M&E strategy to further assess effectiveness of the approach in different contexts

Use indicators of effectiveness (early detection/quality of treatment/coverage) and comparisons with other standard mechanisms to support advocacy and scaling-up of the approach

It is possible and recommended to use standard and feasible indicators to harmonize collection of data and be able to collect more evidence (which is needed) on the effectiveness of the approach in different contexts.
One effective way to support scaling-up of this approach is to make comparisons between outcomes of the Family-MUAC approach with outcomes from other screening mechanism, and preferentially CHWs screening. This can be striking evidence to use for advocacy and therefore scaling-up.

Early detection/Quality of treatment:

- *Compare median MUAC at admission (children referred through mothers/caregivers vs children referred through CHWs)*
- *Compare number of days of treatment (children referred through mothers/caregivers vs children referred through CHWs)*
- *Compare need for inpatient care (children referred through mothers/caregivers vs children referred through CHWs)*

Coverage:

- *Assess coverage of screening (frequency of screening)*
- *Compare impact on CMAM coverage between areas where mothers are screening and areas where CHWs only are screening*

Cost effectiveness:

- *Compare costs between comparable screenings mechanisms (mothers/caregivers vs CHWs)*
- *Conduct cost-effectiveness analysis including indicators on early detection + quality of treatment + coverage*

Conduct further studies to complement evidence on effectiveness of the approach (especially on cost-effectiveness)

More evidence is required on cost-effectiveness including comparisons with standard protocols and/or other screening mechanism (preferentially CHW screening) in different contexts. Impact on the quality of treatment and on coverage should be also better defined in several contexts to support evidence on cost-effectiveness. (M&E can help build the evidence on effectiveness)

Cost-effectiveness is a crucial tool to enable scale-up and integration of this approach into the health system.

Further studies are needed to assess the ability of mothers in high-prevalence settings (Ale et al, 2016)

Consider improving effectiveness of the Family-MUAC approach by coupling with ICCM + SAM at the community-level

There is need for consideration of CHWs to manage uncomplicated acute malnutrition at community level while shifting the task of screening for acute malnutrition to families

Despite the mothers measuring their children at the household level, referral to the facility for treatment remains a challenge due to distance. Actors of the Family-MUAC approach will encounter the same barriers for access to health and services, except if this approach is coupled with other another simplified approach such as the managing of uncomplicated cases of SAM at the community -level by CHWs which will then overcome the most common barrier to health access (distance).

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