POLICY, PROGRAM, AND OPERATIONAL LEARNINGS REPORT OF ICCM/CMAM INTEGRATION

MOMENTUM Country and Global Leadership

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ABBREVIATIONS

BASICS	Basic Support for Institutionalizing Child Survival
CHW	Community health worker
CMAM	Community-based management of acute malnutrition
ComPAS	Combined Protocol for Acute Malnutrition Study
CTC	Community therapeutic care
DHIS	District health information system
HEW	Health Extension Worker
iCCM	Integrated community case management
IMAM	Integrated management of acute malnutrition
IRC	International Rescue Committee
LHW	Lady Health Worker
MAM	Moderate acute malnutrition
MCSP	Maternal and Child Survival Program
MOH	Ministry of Health
MUAC	Mid-upper arm circumference
NGO	Nongovernmental organization
OptiMA	Optimizing treatment for acute malnutrition
QoC	Quality of care
RUF	Ready-to-use food
RUTF	Ready-to-use therapeutic food
SAM	Severe acute malnutrition
UNICEF	United Nations Children's Fund
WFP	World Food Programme
WHO	World Health Organization
WHZ	Weight-for-height z-score

EXECUTIVE SUMMARY

INTRODUCTION AND PURPOSE

Severe wasting management has evolved over the past two decades from facility-based to outpatient, community-based management of acute malnutrition (CMAM) where treatment is provided by trained community health workers (CHWs). CMAM is proven effective for treating children with uncomplicated cases of severe acute malnutrition (SAM) or severe wasting in the community; however, only about one-third of children with SAM are able to access treatment. Integrated community case management (iCCM) is a strategy that equips CHWs with necessary skills such as nutrition assessment and counseling for sick children of families with limited access to health facilities, in order to treat and prevent common childhood illnesses. Prior reviews and country experiences demonstrated that integrating the treatment of uncomplicated severe wasting with iCCM improves treatment coverage and cure rates of severe wasting. The reviews also identified implementation challenges, such as increased workload of CHWs and supply chain management of ready-to-use therapeutic food (RUTF)[1] including procurement, stock-outs, community storage, and distribution. These and other policy and programmatic concerns warranted further review of existing and new evaluations/country experiences to inform countries on the policy and programmatic issues to consider when scaling up or integrating treatment of severe wasting/CMAM as part of iCCM.

METHODS

We conducted a literature review of peer-reviewed articles, non-peer-reviewed papers, and gray literature such as program technical documents and reports, consultative meeting proceedings, learning reports, and global and national guidelines that mainly focus on integration of treatment of SAM or severe wasting or CMAM in iCCM.

KEY FINDINGS

The findings are grouped under two broad categories: programmatic considerations and policy considerations. Programmatic findings include workload of CHWs, RUTF supply management, and simplified protocols/approaches considerations. Policy findings included antibiotic use, quality of care (QoC), human resource capacity development, and financing considerations.

PROGRAMMATIC CONSIDERATIONS

Several key programmatic challenges with iCCM/CMAM integration were noted, the first being the increased workload of CHWs as a result of the integration and inclusion of SAM treatment into their services. Despite the increased workload, results from multiple studies demonstrate that CHWs continue to provide quality care, and are often empowered by the additional skills. However, CHWs report managing the workload and maintaining the quality of service delivery by decreasing time with their families, which is not sustainable without appropriate remuneration or incentives. The ratio of CHWs to households in their catchment area is affected by workload and performance.

[1] U.S. Agency for International Development/Maternal and Child Survival Program Symposium on "Improving Nutrition Services in the Care of the Ill and Vulnerable Newborn and Child," held in Ghana in late 2018. Ethiopia, Mali, DRC, Ghana, Kenya, Mozambique, and Nigeria.

Community engagement is one pillar of the CMAM approach, and includes community sensitization and outreach to ensure ownership and involvement of the community at all stages. Lack of community engagement is seen to contribute or lead to significant barriers in service access and coverage, and addressing these through community engagement can help to remove them.

RUTF supply management provides unique programmatic challenges. Community management of severe wasting/CMAM is dependent on RUTF for treatment, therefore, integration of RUTF into national supply chains and essential drug lists, supply and logistics planning, and monitoring is essential to ensure consistent supply and minimal stock-outs. This also poses a capacity challenge for CHWs to manage RUTF storage and inventory within the community. Some evidence shows they can manage with sufficient training and supervision, or other innovative approaches, such as digital and low-literacy tools for monitoring and reporting, where applicable, although further evidence is needed.

Simplified approaches and adaptations to CMAM provide the opportunity to facilitate an integration of CMAM into iCCM. Multiple approaches are currently being tested and reviewed, such as:

- The use of only one therapeutic product.
- Family-led mid-upper arm circumference (MUAC) screening, using one MUAC cutoff point.
- MUAC-only admission criteria.
- Modified dosage of RUTF.

Simplified tools, such as adjusted MUAC tapes linked to dosage look-up tables, field patient simple registers, and others, show that they can assist with program implementation conducted by CHWs with low literacy; however, simplified approaches and adaptations will likely vary and be country specific. This also demonstrates that simplification can be explored for other system aspects.

POLICY CONSIDERATIONS

Policy-level considerations for integration of CMAM into iCCM include the human resource implications of using CHWs for treatment of SAM/severe wasting and antibiotic administration, as well as the financing of CMAM and high cost of RUTF. Ensuring a consistent and skilled workforce of CHWs who are trained and well supervised to provide SAM treatment as part of integration with iCCM has implications for health systems policy and strategy. In addition to having a community policy or strategy in place with defined parameters for standardized training curriculum and certification of CHWs, this review concluded that remuneration/incentives and supportive supervision are key factors for effective integration with iCCM. Success factors for integration of CMAM into iCCM include training and supervision, good community engagement, and a functional referral system. The evidence showed that CHWs who receive adequate supervision and training are capable of providing antibiotics correctly. Evidence clearly states that remuneration for CHWs is necessary for motivation, which leads to quality service delivery, recruitment, and retention, as well as transparency and follow-through.

Financing CMAM/RUTF is perhaps the greatest challenge and limiting factor a country will face when integrating iCCM/CMAM. This is primarily due to the high cost of RUTF, which is necessary but accounts for a significant proportion of the cost of treatment. Where governments have assumed costs of SAM treatment, key influencing factors include high-level political commitment and having costed operational plans. Various measures, such as establishing local production, engagement with the private sector, tax exemptions, shifting to plant-based protein RUTF formulations, and only integrating the SAM treatment component into areas of high SAM prevalence, may provide cost-effective solutions. High-level advocacy and ownership and establishing

a progressive plan toward increasing government commitment over time will be important factors for successful integration and scale-up.

RECOMMENDATIONS

PROGRAM: CHWs can provide quality service delivery; however, maintaining this requires a consistent and skilled workforce of CHWs who are adequately trained, supervised, and remunerated. Their workload needs to be managed through adequate ratios of CHWs to population. A consistent supply of RUTF and other CMAM supplies needs to be ensured for reliable service delivery, through full integration of supplies into national health supply chain systems. CHWs need to also be trained on supply management and provided with supervision. Simplified approaches, adaptations, and tools for CMAM, such as simplified protocols, low-literacy tools and digital technologies, could facilitate integration, guided by country-specific consideration and review. More research is needed on the workload of CHWs due to integration of SAM treatment into iCCM as well as the impact of SAM integration on iCCM's other services. In addition, countries are expected to conduct more research on the simplified CMAM approaches and adaptations to guide country-specific integration of CMAM and iCCM.

POLICY: All aspects of the CMAM component will need to be integrated into the national health/iCCM strategies, including costed operational plans and clear guidance for administration of antibiotic by CHWs. This approach will be facilitated by high-level advocacy and ownership, including a progressive plan toward increasing government commitment. There should be a community health policy or strategy in place for CHW training, certification, and remuneration. Context-specific reviews will be important to determine potential cost-saving measures, such as local production, engagement with private sector, and use of plant-based RUTF formulation. Countries should only consider integrating the SAM treatment component, along with screening, referral, and home follow-up, in areas of high SAM prevalence, given that it is not cost efficient to include treatment in areas of low prevalence. Further study is need on cost-saving measures, such as local production of RUTF and plant-based RUTF formulations, as well as on the needs of health systems to consider incorporating cost-effective and/or innovative approaches into national systems at scale.

INTRODUCTION

Nearly half of all deaths in children under five are attributable to undernutrition.[2] Wasting is a life-threatening form of undernutrition.[3]. According to the latest child malnutrition estimates, 45.4 million (6.7 percent) children under five years of age (0–59 months) worldwide are suffering from wasting, while 14.3 million suffer from severe wasting,[4] which is indicative of a major public health problem. In 2020, the United Nations Children's Fund (UNICEF) estimated that an additional 6.7 million children may suffer from wasting due to COVID-19.[5] Children with severe wasting face an increased risk of mortality,[6] given that they are 11.6 times more likely to die than a well-nourished child.[7] Current estimates suggest that about one million children die every year from severe wasting.

The management of severe wasting has historically been carried out in health facilities as inpatient treatment but evidence shows that about 80 percent of children with severe wasting can be treated at home. Over the past couple of decades, the treatment of severe wasting has undergone a shift toward outpatient treatment, implemented within communities by community extension or health workers, evolving from community therapeutic care (CTC) developed in 2001,[8] to what is now commonly referred to as community-based management of acute malnutrition (CMAM). In the CMAM approach, children with uncomplicated severe wasting or SAM receive ready-to-use therapeutic food (RUTF) and routine drugs for treatment at home. CMAM increased access to treatment of severe wasting and achieved success in regards to clinical outcomes, noting cure rates[9] of 84 percent for the period of 2007 to 2013 in a global review. Although CMAM increased the coverage of treatment services, only one-third of children with wasting are accessing treatment.[10]

Integrated community case management (iCCM) is a strategy to train, support, and supply community health workers (CHWs) to provide diagnostics, treatment, and follow-up care for multiple illnesses, specifically pneumonia, diarrhea, and malaria, among children under five. iCCM also promotes preventive messages, including nutrition for sick children of families with limited access to case management at health facilities.[11] Countries have scaled up iCCM over the last decade. The World Health Organization's (WHO) CHW manual *Caring for the sick child in the community* includes screening for malnutrition and referring children with SAM

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[2] United Nations Children's Fund (UNICEF), World Health Organization (WHO), International Bank for Reconstruction and Development/The World Bank. 2020. *Levels and trends in child malnutrition: Key Findings of the 2020 Edition of the Joint Child Malnutrition Estimates.* Geneva: World Health Organization.

[3] Wasting in children is defined as weight-for-height z-score (WHZ) < −2 or MUAC < 125 millimeters, or the presence of bilateral pitting edema, or both. Severe wasting is defined as WHZ < −3 or MUAC < 115 millimeters, or the presence of bilateral pitting edema, or both, and moderate wasting is WHZ between −2 and −3 or MUAC between 115 millimeters and < 125 millimeters The term wasting within this review includes severe acute malnutrition (SAM) and moderate acute malnutrition (MAM). Severe wasting refers to SAM and moderate wasting refers to MAM. We are using the term wasting to align with the UN Global Action Plan on Wasting.

[4] UNICEF, WHO, International Bank for Reconstruction and Development/The World Bank. 2021. *Levels and trends in child malnutrition: key findings of the 2021 edition of the joint child malnutrition estimates.* New York: UNICEF.

[5] UNICEF. 2020. An additional 6.7 million children under 5 could suffer from wasting this year due to COVID-19. https://www.unicef.org/press-releases/unicef-additional-67-million-children-under-5-could-suffer-wasting-year-due-covid-19

[6] SAM: defined as WHZ < −3 or MUAC < 115 millimeters, or the presence of bilateral pitting edema, or both (WHO 2013).

[7] Olofin, I et al. 2013. "Associations of Suboptimal Growth with All-Cause and Cause-Specific Mortality in Children under Five Years: A Pooled Analysis of Ten Prospective Studies." *PLoS ONE* 8(5): e64636. https://doi.org/10.1371/journal.pone.0064636.

[8] Collins, S. 2004. "Community-Based Therapeutic Care: A New Paradigm for Selective Feeding in Nutritional Crisis." Humanitarian Practice Network Paper 48. Overseas Development Institute.

[9] Cure rate refers to when the child is discharged from treatment for acute malnutrition (as recovered), based on WHO protocol: "Criteria for discharging children from treatment: Children with severe acute malnutrition (severe wasting) should only be discharged from treatment when their: weight-for-height/length is ≥–2 Z-scores and they have had no edema for at least 2 weeks, or mid-upper-arm circumference iMUAC is ≥125 mm and they have had no edema for at least 2 weeks."

[10] Guerrero, S and Rogers, E. 2013. Access for All, Volume 1: Is community-based treatment of severe acute malnutrition (SAM) at scale capable of meeting global needs? Coverage Monitoring Network, London.

[11] WHO/UNICEF Joint Statement. 2012. Integrated Community Case Management (iCCM): An equity-focused strategy to improve access to essential treatment services for children.

to the appropriate health facility for further assessment and treatment.[12] Based on the WHO guidance and manual, national iCCM packages adopted screening and referrals of SAM cases. Integrating treatment of uncomplicated severe wasting with iCCM has the potential to improve the effectiveness and coverage of treatment as well as enhance the holistic approach toward overall child health in the community. A report by Friedman and Wolfheim, which links nutrition with iCCM, stated that iCCM is a missed opportunity as it is the logical platform for increasing the reach and coverage of treating malnourished children, and potentially for preventing malnutrition.[13]

Countries have made efforts to integrate treatment of severe wasting in iCCM. There are eight country references (Angola, Bangladesh, Ethiopia, India, Malawi, Mali, Pakistan, and South Sudan) where CMAM has been integrated into iCCM. Ethiopia is the only example of this integration being accomplished at scale. Prior reviews demonstrate that integration improves treatment coverage and cure rates of SAM, and lowers the opportunity costs to households. The U.S. Agency for International Development (USAID)-funded Maternal and Child Survival Program (MCSP) review of guidelines related to the nutrition of ill and undernourished children at the primary health care level identified CHW workload and lack of inclusion of RUTF in essential drug lists as major challenges to integrating CMAM into iCCM. Only Malawi and Ethiopia integrated CMAM into iCCM during the time of the review. Ethiopia, Mali, and Malawi shared their experiences of integrating CMAM into an existing iCCM platform during the USAID symposium "Improving Nutrition Services in the Care of the Ill and Vulnerable Newborn and Child," held in Ghana in late 2018. Most of the participating countries indicated plans to scale up integration of CMAM into iCCM or to include components of CMAM in iCCM. However, recent evaluations and country experiences point to particular programmatic and policy challenges and concerns. These challenges and concerns need further review to inform future scale-up and integration of CMAM into iCCM in national health systems.

The programmatic- and policy-related challenges and concerns discussed in this report include:

- CHWs' workload with inclusion of SAM treatment services.
- Simplified approaches to facilitate iCCM/CMAM integration.
- Antibiotic administration, treatment outcomes and quality of care (QoC).
- CHWs and human resources implication (training, supervision, remuneration).
- Financing and supply chain management of RUTF.

This review will focus on these challenges and recent study findings to explore new insights into CMAM and iCCM integration.

[12] UNICEF/WHO.2011. Caring for the sick child in the community. A Training Course for Community Health Workers.

13 Friedman, L and Wolfheim, C. 2014. Linking Nutrition and (integrated) Community Case Management (iCCM/CCM): A Review of Operational Experiences (London).

METHODOLOGY

MOMENTUM Country and Global Leadership reviewed peer-reviewed articles, non-peer-reviewed papers, and gray literature such as program technical documents and reports; consultative meeting proceedings; and global and national guidelines that mainly focused on CMAM, severe wasting, iCCM, and integration of treatment of SAM or severe wasting or CMAM in iCCM. MOMENTUM Country and Global Leadership reviewed literature produced from 2000 to 2020. The literature search was conducted in PubMed, African Index Medical, and Google Scholar using the following search terms: iCCM, CMAM, integrated management of acute malnutrition (IMAM), SAM screening and treatment, nutrition screening and treatment in iCCM, CMAM and health system, CMAM commodity or supply integration, and outpatient treatment of SAM (see Annex 1 for the complete list). A total of 45 peer-reviewed articles, four non-peer-reviewed papers, seven unpublished papers, 10 program technical documents, and 28 reports were reviewed. RUTF's supply chain management system, such as reviewing monitoring systems and logistics, and the cost-effectiveness of the treatment of SAM by CHWs compared to facility-based management were beyond the scope of this review.

KEY FINDINGS

PROGRAM CONSIDERATIONS

CHW WORKLOAD INCLUDING SAM TREATMENT SERVICE

Incorporating the treatment of SAM into routine CHW tasks raises the concern that CHWs may be overloaded with treatment services. In addition to treatment, CHWs may also have numerous preventive services they provide related to infant and young child nutrition. The question of how many services CHWs can provide goes back at least to the early 2000s.[14] The report by Friedman and Wolfheim (2014) on linking nutrition and iCCM identified that a disadvantage of integration of SAM treatment with iCCM at the community level is the additional time and workload burden on CHWs. In spite of the increasing discussion on integrating services and studies on CHW performance, there is little data assessing the workload of CHWs as a result of integration.[15]

A study from southern Bangladesh in 2010 assessed specifically the effect of CHW workload on their QoC, both preventive and curative.[16] Looking at two groups, the first group provided iCCM services, along with preventive health and nutrition counseling, while the second group also provided treatment for SAM. They found that the second group of CHWs who were treating SAM worked about three hours more per week, but still maintained QoC. The CHWs providing SAM treatment also expressed more confidence in their ability, and these feelings of self-efficacy were a motivating factor. The first group of CHWs, who did not treat SAM and did not respond to nutrition counseling, mentioned their inability to treat children who presented to them with malnutrition as a challenge. However, the group treating SAM mentioned being unable to spend adequate time with their own families, as they stretched their work hours to meet the demand. Researchers noted that this extra workload may not be sustainable without additional incentives. Another important finding to note is that the CHWs treating

[14] Bhattacharyya, K et al. 2001. *Community Health Worker Incentives and Disincentives: How They Affect Motivation, Retention, and Sustainability*. Published by the Basic Support for Institutionalizing Child Survival Project (BASICS II) for the USAID. Arlington, Virginia.

[15] Friedman, L and Wolfheim, C. 2014. Linking Nutrition and (integrated) Community Case Management (iCCM/CCM): A Review of Operational Experiences (London).

[16] Puett, C et al. 2012. "Does greater workload lead to reduced quality of preventive and curative care among community health workers in Bangladesh?" *Food and Nutrition Bulletin* 33(4): 273-87.

SAM achieved higher-quality performance on routine preventive tasks, including counseling and negotiating with caretakers, compared with the CHWs who did not treat SAM. This finding challenges the perception that attention to preventive care tasks would diminish with the addition of additional curative activities.

A study from Pakistan assessed the QoC for Lady Health Workers (LHWs) who provide treatment for SAM. They found that LHWs were not accurately providing key counseling messages to the majority of cases, which program staff reported was due to their perceived high workload. They also noted this could equally be due to insufficient training on this component, and that the LHWs had expected remuneration for the additional task added to their workload, which was not provided. 59

In Ethiopia, Health Extension Workers (HEWs) are responsible for delivering 16 packages of preventive, promoted, and basic curative services including SAM screening and treatment, which is integrated into iCCM. A study in Ethiopia observed 44 HEWS for 21 consecutive days to look at the HEWs' use of work time on duty, and captured time and motion data.[17] They found that HEWs were on duty for 15.5 days out of the 21 days of the observation period, and, on average, stayed on duty for about six hours per day. Out of the total observed work time, the percentages of total time spent providing health education or services was only 12.8 percent, 15.5 percent for travel, and 25 percent waiting on clients at the health post. [18] Only 5.5 percent of their workload was dedicated to nutrition tasks, balanced between curative and preventive. Despite the high workload of services, only a small percentage of HEWs' time is spent conducting nutrition activities. These findings indicate that along with assessing workload, time spent on duty could be better assessed to determine ways to increase efficiency, for example, by identifying or developing tools that could simplify or reduce time.

Studies in Mali, Pakistan, Niger, Mauritania, Bangladesh, Ethiopia, India, Malawi, and South Sudan have shown that SAM treatment delivered in the community by CHWs improves treatment coverage and cure rates, decreases the numbers of defaulters, and lowers opportunity costs to households.

Two meta-reviews of iCCM implementation from 16 sub-Saharan African countries, not specific to integration with CMAM, but useful for understanding the workload of CHWs, found that the existing workload from just the iCCM package was noted by some CHWs as "heavy" and unmanageable, sometimes leading to attrition, and that the ratio of CHWs to population was also a challenge to program implementation.[19],[20] A Uganda study also found that the ratio of CHWs to households affected performance, and that quality of treatment suffered, particularly for pneumonia, if they also had to manage other illnesses. [21]

There remains a significant knowledge gap regarding the assessment of CHW workload and the impact of adding SAM treatment to a CHW's routine iCCM services, and, specifically, how this affects the CHW's responsibilities or impacts their quality of service for other childhood illnesses. Only one study from Bangladesh showed CHWs managing cases of SAM worked significantly more hours than the other group, but maintained QoC on

[17] Workie, NW and Ramana, GNV. 2013. The health extension program in Ethiopia. Universal Health Coverage Studies Series No. 10. Human Development Network, World Bank Group.

[18] Mangham-Jefferies, L et al. 2014. "How do health extension workers in Ethiopia allocate their time?" *Hum Resour Health* 12: 61. https://doi.org/10.1186/1478-4491-12-61.

[19] The Global Fund. 2018. Integrated Community Case Management (iCCM) in Sub-Saharan Africa: Successes & Challenges with Access, Speed and Quality, Thematic Review Report.

[20] Wharton-Smith, A, Counihan, H, Strachan, C. 2014. Implementing integrated community case management: stakeholder experiences and lessons learned in three African countries. www.malariaconsortium.org/learningpapers.

[21] Wanduru, P et al. 2016. "The performance of community health workers in the management of multiple childhood infectious diseases in Lira, northern Uganda – a mixed methods cross-sectional study." *Glob Health Action* 9: 33194. doi: 10.3402/gha.v9.33194.

curative and preventive work tasks.[22] Additionally, more knowledge is needed on mechanisms or innovations to streamline CHW tasks (not limited to SAM treatment), which would increase efficiency and potentially reduce the workload or time, such as using mobile phone technology or mHealth solutions,[23] while taking into consideration low-literacy rates of CHWs.[24]

COMMUNITY ENGAGEMENT

The CMAM approach includes community sensitization and outreach to ensure community ownership and involvement at all stages, such as knowledge of the program/treatment, active case finding, and home follow-ups. The weakness of national health systems to implement this community component has been well-documented as a contributing factor to poor coverage of treatment.[25] Community engagement has positive outcomes for SAM management and leads to increased service coverage, as well as improved health outcomes.[26] Studies show community engagement has additional benefits, such as improved cost effectiveness, improved sustainability, increased equity of services, and strengthened accountability.[27]

Lack of community engagement can contribute or lead to barriers in service access and coverage. For example, lack of knowledge about causes and symptoms of malnutrition, lack of knowledge of the treatment and program, and a poor understanding between the case admission definition and community understanding of the problem.[28,29] The Coverage Monitoring Network supported over 200 CMAM coverage assessments between 2012 and 2015, and identified low decision-making power among women and poor community outreach as barriers to CMAM.[30] The coverage surveys also showed that there was poor community engagement and awareness, but that most of the barriers were socio-cultural factors that could be addressed through community engagement. Therefore, for countries planning to integrate CMAM into iCCM and seeking to increase coverage of SAM treatment services, support for community-level engagement must be a priority.

Community engagement with CMAM increases coverage and improves outcomes as well as sustainability.

In Angola, a 2013 coverage assessment achieved an estimated treatment coverage of 82.1 percent. Community engagement played a key role in this, particularly through coordination and collaboration with local groups, including mothers, community leaders, and churches.

CMN. Coverage assessment: Huambo Province, Angola. 2013 June. London: CMN; 2013.

[22] Puett, C et al. 2012. "Does greater workload lead to reduced quality of preventive and curative care among community health workers in Bangladesh?" *Food and Nutrition Bulletin* 33(4): 273-87.

[23] Feroz, A, Jabeen, R and Saleem, S. 2020. "Using mobile phones to improve community health workers performance in low-and-middle-income countries." *BMC Public Health* 20(1): 49. https://doi.org/10.1186/s12889-020-8173-3.

[24] Van Boetzelaer, E et al. 2019. "Performance of low-literate community health workers treating severe acute malnutrition in South Sudan." *Matern Child Nutr* 15(S1): e12716. https://doi.org/10.1111/mcn.12716.

[25] Gray, N et al. 2014. Community Engagement: the 'C' at the heart of CMAM. CMAM Forum Technical Brief.

[26] Collins, S et al. 2006. "Management of severe acute malnutrition in children." *The Lancet* 368(9551): 1992-2000.

[27] Gray, N et al. 2014. Community Engagement: the 'C' at the heart of CMAM. CMAM Forum Technical Brief.

[28] Gray, N et al. 2014. Community Engagement: the 'C' at the heart of CMAM. CMAM Forum Technical Brief.

[29] Guevarra, E et al. 2012. Assessment of coverage of community-based management of acute malnutrition. CMAM Forum Technical Brief.

[30] Dessie, M et al. 2015. Technical Brief: Community Engagement for CMAM, Coverage Monitoring Network.

SUPPLY CHAIN MANAGEMENT OF RUTF

Integrating CMAM into iCCM requires an assessment of CHWs and aspects of their quality service delivery, coverage, workload, etc., an assessment of the CMAM supply chain integration, and, more specifically, RUTF. WHO/UNICEF's report *Institutionalizing integrated community case management (iCCM) to end preventable child deaths*, though not specific to CMAM, highlights that inadequate supply chain management leads to inconsistent availability and accessibility of diagnostics, medicines, equipment, and other essential supplies for use by health workers in communities.[31] Further, stock-outs of medicines and supplies are a major impediment to implementing iCCM, which has implications for health status of children and undermines community trust in the health system and in CHWs. Based on this, full supply integration into national supply management systems, inclusive of medicines, diagnostics, and logistics to community level, is a key recommendation of the report. This synthesis will focus on available information on the management of RUTF (or by proxy, other supplies) by an integrated system and/or CHWs' management of supply.

Common issues with a supply chain system that can lead to stock-outs include inadequate financing, insufficient or poor-quality data and reporting, weak distribution, and lack of transport to take commodities to CHWs or for CHWs to pick them up.[32] These challenges are applicable to all levels of a health system, from national to community levels. At the local level, CHWs must be able to manage RUTF and other supplies, including reporting quantities used and needed, and ensuring that stock-outs do not occur in their communities.

The review of integrating SAM into iCCM in South Sudan by the Malaria Consortium assessed stock and supply management, with the one aim of avoiding stock-outs. [33] They reported occurrences of stock-outs of RUTF due to limited storage space in the community and CHWs experienced significant challenges in reporting stock levels, given that they were not trained and received limited supervision. Their recommendation for mitigating the stock-outs was to ensure adequate storage space within communities to accommodate buffer stock, as well as timely and accurate reporting using a district health information system (DHIS) and reporting tools complemented with supportive supervision and training. These actions improved stock-outs at the community level. These capacity limitations would be compounded if the community supply system is being implemented by low-literate CHWs.

The Malaria Consortium iCCM learning paper, which looked at lessons learned from three African countries, states that ideally, commodities should be fully integrated into the public sector supply chain.[34] In the early stages of implementation, however, supplies were delivered by the project to the lower levels of the health system, and in South Sudan, delivered directly to CHWs

Further study and knowledge generation will be needed to consider cost-effective and/or innovative approaches for integration into national systems at scale. Countries could consider:

- Innovative ideas to mitigate the high cost of RUTF.
- Overall health systems strengthening, such as integrated trainings and supportive supervision.
- Using the growing evidence for advocacy that integration of CMAM and iCCM ultimately increases coverage and outcomes of SAM treatment, thus increasing the number of children's lives saved.

[31] WHO/UNICEF. 2020. Institutionalizing integrated community case management (iCCM) to end preventable child deaths: a technical consultation and country action planning, 22–26 July 2019, Addis Ababa. Geneva. License: CC BY-NC-SA 3.0 IGO.

[32] Du Châtelet, A, Webb, M and Israël, A-D. 2019. *Process and impact of integration of ready-to-use therapeutic foods in national essential medicines lists*. In: WHO technical consultation: Nutrition-related health products and the *WHO Model List of Essential Medicines* – practical considerations and feasibility. Geneva, Switzerland.

[33] Keane, E. 2013. *Integrating severe acute malnutrition into the management of childhood diseases at community level in South Sudan Malaria consortium learning paper series*. www. malariaconsortium.org/media.

[34] Wharton-Smith, A, Counihan, H and Strachan, C. 2014. *Implementing integrated community case management: stakeholder experiences and lessons learned in three African countries*. www.malariaconsortium.org/learningpapers.

in the absence of a national supply chain. Stock-outs in each country led to negative perceptions from the community, reducing CHW motivation and causing them to drop out. The key lessons learned, similar to their assessment of South Sudan nutrition integration, were to allocate sufficient time for procurement, integrate supplies into national supply chains, and minimize stock-outs by basing estimates on consumption data while maintaining buffer stock. Political will was found to be necessary for sustained procurement and distribution via national supply chains, including mHealth systems. For the last two points regarding integration into national health systems, there is a potentially significant barrier in which political will is needed at a national decision-making level to ensure a dedicated and consistent budget, as well as inclusion of RUTF into national essential drug lists and supply chain systems.

The report by Friedman and Wolfheim (2014) also identified that maintaining supply of RUTF at the community level poses particular challenges related to distribution, stock-outs, pre-positioning, security, and stock management, noting that many of these issues already exist with distribution to health facilities.[35] They noted inconsistent supply as a major constraint in Angola, and the need for a parallel supply system in Ethiopia to maintain distribution. The report identified that a disadvantage of integration of SAM treatment with iCCM at the community level is the logistics of RUTF supply, which identifies that information on supply chain management is a key need for an initial consideration for integration. Additionally, it was noted by key informants in the report that a knowledge gap remains for means of ensuring consistent supply and positioning of RUTF.

Supply chain management of RUTF has also been a key challenge in institutionalizing the CMAM program, specifically, integration into national supply chains, with insights from evidence also applicable to assess integration of CMAM into iCCM. The prevailing procurement and distribution channels of the key nutritional supplies (RUTF, F75/100, ReSoMal [rehydration solution for malnutrition], antibiotics, deworming medication, and anthropometric equipment—although not all for use in outpatient care) for CMAM are supply systems that are parallel to, or utilize some aspects of national systems. They often involve UNICEF and/or government and nongovernmental organizations (NGOs). Lopez-Ejeda et al. documented that in six out of the eight countries integrating CMAM/iCCM, RUTF was provided by UNICEF, with the other two countries locally producing RUTF. Ethiopia is the only country that had a national program, while the other seven countries had sub-national small-scale projects, supported mainly by partners.[36] In general, public health supply chains, which include the community level, are noted to face chronic challenges in the areas of human resource capacity and skills, general management/management of processes, communication among levels, budget planning, physical infrastructure and capabilities, and resources (including storage and distribution capacity), availability and use of data for management decisions, commitment and motivation, and accountability.[37]

A study evaluating the integration of SAM commodities into national supply chain systems in Kenya noted that the distribution of RUTF through parallel (UNICEF) systems resulted in no traceability, and limited accountability or ownership, and was not viewed as essential medicines by national health systems, rather as a UNICEF donation.[38] Further to this review, a 10-week pilot study in Kenya was carried out in two counties looking at the cost of integrating the SAM nutrition supply chain into the national Kenya Ministry of Health (MOH) supply chain for medical commodities.[39] Upon doing so, they found 14 percent cost savings, increasing to 37 percent when

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[35] Friedman, L and Wolfheim, C. 2014. Linking Nutrition and (integrated) Community Case Management (iCCM/CCM): A Review of Operational Experiences (London).

[36] Lopez-Ejada, N et al. 2019. "Can community health workers manage uncomplicated severe acute malnutrition? A review of operational experiences in delivering severe acute malnutrition treatment through community health platforms." *Matern Child Nutr* 15(2): e12719.

[37] Schopperle, A. 2013. *Analysis of challenges of medical supply chains in sub–Saharan Africa regarding inventory management and transport and distribution*. London: University of Westminster Business School. http://iaphl.org/wp-content/uploads/2016/05/Medical-Supply-Chain-Challenges.Masterthesis.ASchoepperle.pdf.

[38] Deloitte Consulting Ltd. 2014a. *Assessment of parallel nutrition logistics chain for integration into GoK National SCM system*. Deloitte Report. Nairobi, Kenya.

[39] Eby, E et al. 2019. "Integration of the UNICEF nutrition supply chain: a cost analysis in Kenya." *Health Policy and Planning* 34(3): 188-196. doi: 10.1093/heapol/czz007.

extrapolated to one year, where one-time investments in capacity-building spread over a longer period. When they looked at recurrent costs only, and removed the one-time costs such as capacity development, the cost savings increased to 42 percent. Given the high cost of RUTF, which accounts for 30 to 40 percent of costs for CMAM programs,[40] this level of cost savings warrants attempts to replicate findings. In addition to the cost savings, they also noted that integration increased the reliability of forecasting, reporting, communication, and coordination, leading to decreased stock-outs and strengthened the capacity of the health system.

Local production and procurement of RUTF has increased supply chain cost efficiency, reduced delivery lead times, and facilitated integration of RUTF into supply chain system of governments. Local producers in countries with high burden of acute malnutrition—including Burkina Faso, Ethiopia, Kenya, Malawi, Niger, and Sudan—have started to supply RUTF to UNICEF. The number of UNICEF RUTF suppliers has increased from one supplier in 2007 to 21 suppliers as of May 2020, of which 18 (86 percent) are suppliers based in countries with high concentrations of malnutrition.[41, 42]

Countries that have tried to integrate RUTFs into their essential drug lists and supply chains to address availability issues include Burkina Faso, Zimbabwe, Kenya, and Ethiopia. In Burkina Faso and Zimbabwe, the integration increased funding for procurement and distribution of RUTF.[43] However, it may not be realistic to expect governments to cover the entire cost of RUTF procurement and distribution in the early stages of integration. As part of the initial strategy development, a progressive plan could be implemented so that donor funding for the CMAM supply gap decreases over time, as governments gradually increase ownership and their share of resources to procure and distribute RUTF for non-emergency and integrated iCCM/CMAM supply systems.

SIMPLIFIED APPROACHES AND TOOLS TO FACILITATE INTEGRATION

Depending on country context, the current CMAM approach can be resource intensive, complicated for both service providers and caregivers, and may not address the continuum of care for acute malnutrition. These can be significant barriers to improving the QoC and increasing coverage of treatment for SAM, thus possibly integrating with iCCM. Country evaluations, such as that for Sudan, have even noted that simplified tools and protocols are needed to treat early-stage SAM in the community, providing simple doable actions.[44] Simplified approaches for the treatment of uncomplicated acute malnutrition are adaptations to current protocols and/or programs that aim to address some of these barriers and reduce costs while improving or maintaining service quality and increasing coverage. Multiple approaches are being tested globally, with the global evidence growing and being documented.[45, 46] UNICEF has noted that a one-size-fits-all approach is not feasible, considering the numerous variances in each country and health system (see simplified approaches in text box).

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[40] Lopez-Ejada, N et al. 2019. "Can community health workers manage uncomplicated severe acute malnutrition? A review of operational experiences in delivering severe acute malnutrition treatment through community health platforms." *Matern Child Nutr* 15(2): e12719.

[41] UNICEF. 2021. *Ready-to-Use Therapeutic Food: Market Outlook*.

[42] Segrè, J, Liu, G and Komrska, J. 2017. "Local versus offshore production of ready-to-use therapeutic foods and small quantity lipid-based nutrient supplements." *Matern Child Nutr* 13(4): e12376. doi: 10.1111/mcn.12376.

[43] Du Châtelet, A, Webb, M and Israël A-D. 2019. *Process and impact of integration of ready-to-use therapeutic foods in national essential medicines lists*. In: WHO technical consultation: Nutrition-related health products and the *WHO Model List of Essential Medicines* – practical considerations and feasibility. Geneva, Switzerland.

[44] Daniel, T et al. 2017. *Scaling up CMAM in protracted emergencies and low resource settings: experiences from Sudan*. Field Exchange 55, July 2017. p74. www.ennonline.net/fex/55/cmamexperiencessudan.

[45] https://acutemalnutrition.org/en/research-landscape.

[46] UNICEF. 2020. *Treatment of wasting using simplified approaches – A rapid evidence review*.

Broadly, the benefits considered helpful to facilitate integration with iCCM are cost reduction (RUTF modified dosage) and simplified screening/treatment (MUAC-only admission) and single product for treatment, for the consideration of moving SAM treatment to CHWs (also a simplified approach).

Simplified Approaches to Treatment of Uncomplicated Acute Malnutrition

The following adaptations hold promise and are being researched for use:

- Use of one product – RUTF – to treat wasting, including both moderate and sever acute malnutrition
- Family led malnutrition screening using special MUAC tape
- Management of acute malnutrition by CHWs
- Admission and discharge for all children with MUAC 125mm
- MUAC-only admission
- Modified dosage of RUTF (including reduction over the course of recovery)
- Reduced visits to health facility during treatment

The Combined Protocol for Acute Malnutrition Survey (ComPAS) and Optimizing Treatment for Acute Malnutrition (OptiMA) are two examples of strategies used to test simplified approaches and protocols in several countries over the past five years, primarily modified dosage and screening protocols. The International Rescue Committee (IRC) tested ComPAS, a simplified, combined approach to treat uncomplicated SAM and MAM through one protocol in the community, across multiple countries in Africa. It used a single product, RUTF, at doses tested to optimize growth and minimize cost, where dosage corresponds to a fixed amount according to MUAC. It also used MUAC (and edema) only for admission, progress monitoring, and discharge.[47] The ComPAS study carried out by IRC in South Sudan and Kenya demonstrated results that were lower than the SPHERE[48] standards for recovery rates for severely malnourished children, yet within national standards. The approach was also more cost-effective than standard treatment, thus noting that the low recovery rate cannot be explained by the difference in protocol.[49]

The OptiMA approach trains mothers to use MUAC for screening for earlier detection of wasting. It uses one therapeutic food at a gradually reduced dose based on weight and MUAC, and uses only MUAC for admission and discharge, with the aim to make the process more understandable for families and service providers. By gradually reducing the dose, the assumption is that more children can be treated with a fixed amount of RUTF and no decrease to recovery rate, thus improving cost-efficiency.[50] Study findings for OptiMA trials had satisfactory outcomes (treatment of SAM not by CHWs) exceeding national Burkina Faso and SPHERE standards, except for severely malnourished children (SAM: MUAC<11.5cm), who showed poor recovery rates and non-response rates (below SPHERE standards).[51] It was noted that there was also a substantial reduction in RUTF rations compared with standard SAM treatment.

In March of 2019, nutrition teams from the United Nations High Commissioner for Refugees, UNICEF, World Food Programme (WFP), and WHO met to review the available evidence on simplified approaches for early detection and treatment of children with acute malnutrition. The main conclusions from this meeting were that the findings were promising but limited in scope and context specific; findings were conducted on a relatively small scale, so the potential to improve efficiencies at scale with impact on population outcomes and cost is

[47] Marron, B et al. 2019. *ComPAS trial in South Sudan and Kenya: Headline findings and experiences*. Field Exchange Issue 60. www.ennonline.net/fex.

[48] Minimum Standard in Humanitarian Response standards for Cure, Death and Defaulter rates.

[49] International Rescue Committee. 2020. *Simplified Protocol for Acute Malnutrition*. https://resources.acutemalnutrition.org/IRC%20Simplified%20protocol%202%20pager_23%20April%202020.pdf.

[50] Integrated Treatment Protocol for Acute Malnutrition: A Non-Inferiority trial in Burkina Faso (MUAC-only).

[51] Daures, M et al. 2020. "New approach to simplifying and optimizing acute malnutrition treatment in children aged 6-59 months: the OptiMA single-arm proof-of-concept trial in Burkina Faso." *British Journal of Nutrition* 123: 756-767.

unknown; the potential during exceptional circumstances warrants further investigation; not all elements align with WHO normative guidelines, and the evidence available to date (2019) does not yet warrant a change in global recommendations. However, the reviews suggested that country context will play a role in determining what adaptations are feasible in facilitating the integration of CMAM with national health systems. If considered, this should include a comprehensive review of current research on findings related to aspects such as achievement of nutritional outcomes for any proposed approach, combined with a contextual pilot or operational research noting that two of the simplified protocol approaches discussed did not meet SPHERE standards for recovery rates of children with SAM. Further study and knowledge generation will be required to address the needs of health systems and consider cost-effective and/or innovative approaches for integration into national systems at scale

In addition to simplified approaches (modified protocols), simplified tools may also be considered for facilitating integration of CMAM into iCCM, depending on the country context. One example would be the utilization of low-literate CHWs for SAM treatment. IRC showed positive results in this regard in its work in South Sudan.[52] They studied the deployment of a toolkit of resources, including adjusted MUAC tapes linked to dosage look-up tables, scales adapted to assist with identifying correct amounts of RUTF for dosing, and field patient registers to allow low-literate CHWs to track progress, treatment outcomes, log the treatment, calculate indicators, and identify the child within the registers. This application of a human-centered design approach could be applied more widely to simplify the process and improve levels for ease of use. For example, changes could include simplified reporting on the continuum of care, instead of partner-driven complicated separate reporting mechanisms that add considerable time and complexity to the workload of CHWs, and can be agency driven. Table 1, below, summarizes key programmatic considerations and findings based on best practices and challenges to integrating CMAM into iCCM.

Further study and knowledge generation will be required to address the needs of health systems and consider innovative approaches, such as the simplified SAM management approach, user-friendly tools for CHWs, and integrating of trainings and supportive supervisions with iCCM, to facilitate integration into national systems at scale.

Countries could consider innovative approaches to mitigate stock-out and high cost of RUTF. For example: integrating RUTF into national health commodities supply chain system; supporting local production of RUTF (especially countries with high burden of SAM); and maintaining supply at the community level (pre-positioning of RUTF in communities with high caseloads, building capacity of CHWs on RUTF stock management, and using mobile technologies for RUTF reporting).

[52] Van Boetzelaer E et al. 2019. "Performance of low-literate community health workers treating severe acute malnutrition in South Sudan." *Matern Child Nutr* 15(S1): e12716. https://doi.org/10.1111/mcn.12716.

TABLE 1: SUMMARY OF KEY PROGRAM CONSIDERATIONS AND FINDINGS BY STUDY/ARTICLE

Summary of Key Program Considerations	Findings	Level of study/Article
CHW workload with inclusion of SAM treatment service	• CHWs with added SAM treatment workload maintained QoC and had higher quality performance on routine preventive tasks than CHWs with no SAM treatment. • Incentives needed for sustainability and motivation. • Ratio of CHWs to household/population noted as a challenge if too many.	Multiple countries
Community engagement	• Community engagement has led to an increase in service coverage and improved health outcomes, improved cost-effectiveness, sustainability, equity of services, and strengthened accountability. • Barriers to services that are socio-cultural can be addressed through community engagement.	Global
Supply chain management of RUTF	• Key recommendation for institutionalizing iCCM is full supply integration into national supply management systems. • Common issues with supply chain are financing, data and reporting, distribution, and transport to communities. • Challenges with CHWs recording, and reporting due to limited training/supervision; recommendation for storage, tools, and training for reporting (DHIS) and supportive supervision. • Local production has shown increased supply chain efficiency, reduced delivery lead times, and facilitated integration into national systems.	Global, multiple countries
Simplified approaches and tools to facilitate integration	• Multiple approaches being tested that could facilitate integration: one product for MAM and SAM, family-led MUAC, management of SAM by CHWs, admission and discharge MUAC of 125 mm, MUAC-only admission/discharge, modified dosage of RUTF, reduced visits to health facility, and low-literacy tools for CHWs. • There is no one-size-fits-all approach, country context needs to be considered for adaptations.	Global

POLICY CONSIDERATIONS

ANTIBIOTIC ADMINISTRATION, TREATMENT OUTCOMES, AND QOC

There is growing recognition that CHWs and other types of community-based health workers are effective in delivering a range of preventive, promotive, and curative health services that can contribute to reducing inequities in access to care.[53] Since CHWs typically reside in the community they serve, they have the ability to deliver information and services where it is needed most. They can reach community members where they live, eat, and work. CHWs are frontline agents of change, helping to reduce health disparities in hard-to-reach and marginalized communities. They have been at the core of both the CMAM and iCCM strategies, and are also a critical component of a health system that integrates CMAM, or more specifically, the treatment of SAM into iCCM.

[53] WHO. 2018. *WHO guideline on health policy and system support to optimize community health worker programmes*. Geneva: WHO. License: CC BY-NC-SA 3.0 IGO.

There are multiple aspects that need to be assessed to determine the capability of CHWs to provide SAM treatment within the community, such as treatment outcomes, service coverage, service quality, workload, and cost-effectiveness. The study by Lopez-Ejada, et al. (2018) reviewed clinical outcomes of SAM treatment by CHWs.[54] The study noted positive outcomes for cure rates in most countries (see text box below). They also noted that the findings are consistent with previous findings from a review of 12 countries, where the aggregate cure rate of combined children was 82.5 percent.[55] The evidence suggests that CHWs are capable of producing positive treatment outcomes for the treatment of uncomplicated SAM. However, the question has been raised about the policies for CHWs administering antibiotics, a part of SAM treatment, which would be assessed as a QoC component.

A study by Lopez-Ejada et al. (2018) reviewed clinical outcomes in eight countries (Angola, Bangladesh, Ethiopia, India, Malawi, Mali, Pakistan, and South Sudan). The authors noted that all countries except India exceeded the standard for cure rate (75 percent cured), ranging from 63.0 percent to 95.2 percent (Mali).

These findings were consistent with other studies, which demonstrates the ability of CHWs to produce positive treatment outcomes for uncomplicated SAM.

The 1999 WHO's *Management of severe malnutrition: a manual for physicians and other senior health workers* calls for administration of antibiotics for uncomplicated cases of SAM.[56] Further, the 2013 WHO *Guideline Updates on severe acute malnutrition in infants and children* addressed questions regarding this practice and carried out a systematic review, which examined the clinical safety and efficacy of antibiotic intervention in uncomplicated cases of SAM.[57] The recommendation for use of antibiotic was confirmed for uncomplicated cases of SAM, with the provision of an oral antibiotic.

When reviewing policies for CHWs administering antibiotics, the capacity and knowledge of CHWs to administer them correctly and QoC should be considered. Their capacity can vary based on factors such as training, supervision, and literacy. Several studies have assessed the QoC provided by CHWs, and more specifically, the administration of antibiotics. In Mali, a study was carried out in 2015, monitoring and collecting data on 17 CHWs over a two-week period by health professional observers.[58] The observers assessed tasks using a checklist, with technical competence of the CHWs determined based on SAM screening and diagnosis, provision of antibiotics, vitamin A, deworming medication, and delivery of RUTF until the child had recovered. The study found that CHWs in 75 percent of cases correctly administered medical treatment with amoxicillin, albendazole, and vitamin A for SAM cases. Additionally, the composite indicator, which provided assessment for all tasks necessary for high-quality treatment, was achieved by 79.5 percent of all cases.

A similar study in Pakistan in 2016 included QoC observation of 17 LHWs.[59] Data were collected by independent enumerators who observed LHWs perform specific tasks. Out of 61 SAM cases observed, 12 were new and assessed for correct administration of antibiotics. Only eight of the 12 cases were administered antibiotics according to protocol. Out of all uncomplicated cases of SAM, 68 percent received the required medical and

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[54] The Sphere Project. 2011. *Minimum standards in food security and nutrition. In: Humanitarian charter and minimum standards in humanitarian response*. Sphere Handbook. http://www.spherehandbook.org/.

[55] Save the Children. 2015. *Review of current community management of acute malnutrition (CMAM) practice and outcomes in 12 countries using the minimum reporting package*. https://www.elrha.org/wp-content/uploads/2015/01/Appendix-1-MRP-analysis-report-2015-Final.pdf.

[56] WHO. 1999. *Management of severe malnutrition: a manual for physicians and other senior health workers*. Geneva: WHO. http://www.who.int/nutrition/publications/severemalnutrition/9241545119/en/.

[57] WHO. 2013. Guideline: *Updates on the management of severe acute malnutrition in infants and children*. Geneva: WHO. http://www.who.int/nutrition/publications/guidelines/updates_management_SAM_infantandchildren/en/.

[58] Alvarez Morán, JL et al. 2018. "Quality of care for treatment of uncomplicated severe acute malnutrition delivered by community health workers in a rural area of Mali." *Maternal Child Nutr* 14: e12449. https://doi.org/10.1111/mcn.12449.

[59] Rogers, E et al. 2017. "Quality of care of treatment for uncomplicated severe acute malnutrition provided by lady health workers in Pakistan." *Public Health Nutrition* 21(2): 385-390. doi:10.1017/S1368980017002610.

nutrition treatments (antibiotics, folic acid, RUTF) according to protocol, noting health system challenges and LHW motivation as potential factors.

In Bangladesh, trained surveyors assessed the performance of 55 CHWs with a QoC checklist during observation of management of a case of SAM.[60] They found that for the cases of uncomplicated SAM, 89.1 percent of CHWs provided antibiotics according to protocol, with a majority of CHWs (89 percent) achieving 90 percent or higher error-free case management.

A QoC study on HEWs in Ethiopia in 2012, however, did not assess specifically antibiotic administration as part of CMAM, but as part of overall iCCM.[61] Trained enumerators collected data of sick children from registers and conducted direct observations of HEWs. They found that only six percent of children received antibiotics when it was not indicated, and only 59.4 percent of children with malnutrition were correctly treated.

The researchers from the Mali QoC study noted key differences among the four countries and the results of the QoC. Notably Bangladesh and Mali, which performed well on antibiotic administration and overall QoC, and Ethiopia and Pakistan, which did not perform well.[62] They commented that the interventions in Bangladesh and Mali were conducted solely by NGOs, with paid CHWs who received close supervision. This was not the case for Ethiopia and Pakistan, where the human and financial resources were shared between the NGO and government, and stock-outs of antibiotics were noted. Additionally, Pakistan reported poor motivation among the LHWs, due to not being paid an additional sum for the "new" activity of SAM treatment that was added.[63]

The indication from these QoC studies, although few in number, is that CHWs can safely and properly administer antibiotics according to protocol for uncomplicated cases of SAM, as well as achieve overall QoC for SAM treatment. However, particular attention will need to be paid to each country context, noting that proper training and supervision were linked to better QoC in regards to these studies, and have also been noted to motivate CHWs. Attributes of the health system, such as supply chain management for essential drugs, stock-outs, and remuneration for CHWs (motivation), may also need to be considered for integrating CMAM and iCCM at scale.

CHW AND HUMAN RESOURCES IMPLICATION (TRAINING, SUPERVISION, REMUNERATION)

There is considerable global evidence supporting the value of utilizing CHWs, affirming that they can deliver a wide range of services and help to improve coverage. Likewise, there are WHO guidelines for CHW policy and system support, as well as for investment cases and financing recommendations, which outline core principles for implementation and provide guidance on financing modalities.[64, 65] In a report on country consultations and the institutionalization of iCCM, the WHO made a key recommendation that a national community health strategy should be in place. The strategy should clearly define CHW roles and responsibilities, as well as working conditions and remuneration, and budgeting for supportive supervision and mentoring to improve

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[60] Puett, C et al. 2012. "Does greater workload lead to reduced quality of preventive and curative care among community health workers in Bangladesh?" *Food and Nutrition Bulletin* 33(4): 273-87.

[61] Miller, N. 2014. "Integrated community case management of childhood illness in Ethiopia: implementation strength and quality of care." *Am. J. Trop. Med. Hyg.* 91(2): 424–34. doi:10.4269/ajtmh.13-0751. https://www.ajtmh.org/content/journals/10.4269/ajtmh.13-0751.

[62] Alvarez Morán, JL et al. 2018. "Quality of care for treatment of uncomplicated severe acute malnutrition delivered by community health workers in a rural area of Mali." *Maternal Child Nutr* 14: e12449. https://doi.org/10.1111/mcn.12449.

[63] Rogers, E et al. 2017. "Quality of care of treatment for uncomplicated severe acute malnutrition provided by lady health workers in Pakistan." *Public Health Nutrition* 21(2): 385-390. doi:10.1017/S1368980017002610.

[64] WHO. 2018. *WHO guideline on health policy and system support to optimize community health worker programmes*. Geneva: WHO. License: CC BY-NC-SA 3.0 IGO.

[65] WHO. 2015. *Strengthening primary health care through community health workers: Investment case and financing recommendations*. Geneva: WHO.

quality.[66] The WHO country consultation referenced the Rapid Access Expansion Programme (Global Malaria Programme), which assisted five African countries to address malaria, pneumonia, and diarrhea through iCCM and CHWs. It identified that the success of the iCCM strategy depended on the availability of trained, supplied, and supervised CHWs, along with good community engagement and a functional referral system.

Institutionalizing CHWs for service delivery has brought some challenges and lessons learned in policy implications to the forefront. Reports from five other African countries during the WHO country consultation identified particular challenges faced in scaling iCCM in regards to CHWs. Regarding the human resource component, there were insufficient numbers of CHWs and lack of a regulatory framework for volunteer work, affecting the supervision and general QoC. Among all five countries, retaining CHWs proved difficult due to heavy workloads without financial incentives or professional development opportunities. Supervisors of CHWs also had high workloads and thus poor motivation, and with CHWs often located in remote areas, sometimes with difficult terrain, insecurity, or lack of transport, this led to poor supervision and poor coordination.[66]

Studies in Pakistan and Bangladesh found that CHWs could identify SAM, but their ability to maintain an acceptable level of care was not guaranteed. As a result, policy implications for CMAM integration should focus on the integration of the CHW workforce as an integral part of health system strengthening, with subsequent implications for revision of trainings (including time added), training materials, training curriculum, as well as the added complexity and revision of competencies.

Other studies assessing integration of CMAM into iCCM confirm that training and supervision are critical for successful implementation of SAM treatment in the community, including maintaining QoC and motivation. The systematic review by Lopez-Ejeda et al. examined studies on CHW capacity to manage uncomplicated SAM.[67] From nine country examples, the authors concluded that CHWs who receive adequate training and supervision can deliver high-quality treatment for SAM at the community level. Regarding implications for policy, they suggest that in scaling up the management of SAM through CHWs requires that key issues regarding training, supervision, motivation, and supply chain be adequately considered in the design. The Malaria Consortium's South Sudan Learning Paper noted key lessons learned are to have well-trained and experienced staff at all levels, and hold regular refresher trainings to improve compliance with protocols.[68]

Friedman and Wolfheim suggested that there is a need to review workable combinations of existing country contexts to advise on integration, while noting the CHW spectrum varies There is the paid, literate CHW with a small catchment area and substantial training, versus the volunteer low-literate CHW with minimal training and a large number of households to cover.[69] They also note that implementation of effective CHW programs requires solid support in the form of supervision, training, supply and logistics, and functional referral systems.

The QoC study from Pakistan found that although the CHWs could identify SAM, their ability to maintain an acceptable level of care was not assured and noted that additional evidence on the impact of supervision and

[66] WHO/UNICEF. 2019. Institutionalizing integrated community case management (iCCM) to end preventable child deaths: a technical consultation and country action planning, 22–26 July 2019, Addis Ababa. Geneva. License: CC BY-NC-SA 3.0 IGO.

[67] Lopez-Ejada, N et al. 2019. "Can community health workers manage uncomplicated severe acute malnutrition? A review of operational experiences in delivering severe acute malnutrition treatment through community health platforms." *Matern Child Nutr* 15(2): e12719.

[68] Keane, E. 2013. *Integrating severe acute malnutrition into the management of childhood diseases at community level in South Sudan Malaria a consortium learning paper series*. http://www. malariaconsortium.org/media.

[69] Friedman, L and Wolfheim, C. 2014. Linking Nutrition and (integrated) Community Case Management (iCCM/CCM): A Review of Operational Experiences (London).

training is required.[70] Similarly, in Bangladesh, Pruett, et al. reported that strong management, supervision, and refresher trainings were believed to be key factors of the program's success.[71] Another study from Bangladesh also concurred, stating that training of health facility and CHWs for outpatient management of severe acute malnutrition cases, and ensuring uninterrupted supply of medicines and logistics to the functional facilities should be the immediate priorities in consideration of integration.[72] The study by Moran in Mali, however, concluded that CHWs with minimal training were able to treat SAM in the community.[73] The policy implication for CMAM integration is that the integration of the CHW workforce needs to be considered as an integral part of health system strengthening, with subsequent implications for revision of trainings (including time added), training materials, training curriculum, as well as the added complexity and revision of competencies.

There is no evidence in the literature reviewed indicating that there is a barrier to the acceptability of CHWs providing SAM treatment by higher-level cadres of providers or among caregivers. There is evidence that the communities are accepting of the service. Moran et al. noted that the community-based SAM treatment model was positively received by the community, with an increased number of self-referrals to treatment seen in the intervention group.[74]

The 2018 *WHO Guideline on health policy and system support to optimize community health worker programmes* recommends: 1) Remunerating CHWs with a financial package commensurate with the job demands, complexity, number of hours, training, and roles that they undertake; and 2) Not paying CHWs exclusively or predominately according to performance-based incentives.[75] Remuneration or incentives are considered of significant importance to contributing to quality service delivery by CHWs through the pathway of motivation, along with training, supervision, and consistent supply.[76] Conversely, lack of remuneration has also been noted as a cause for poor retention of CHWs.[77] Puett et al. found that among two groups of CHWs studied in Bangladesh, both felt their salary was inadequate for their workload, with some expressing personal shame as a result of the low salary. The qualitative study from Bangladesh by Ireen et al. found dissatisfaction among the current cadre of CHWs (Health Agents/Family Welfare Assistants), when a new cadre of Community Health Care Providers was hired who were trained to treat uncomplicated cases of SAM, and were being paid more than the Health Agents/Family Welfare Assistants.[78] Community support for CHWs can also be an important incentive, providing motivation and instilling a sense of pride in CHWs, manifesting as the use of their services, verbal thanks, recognition, and tokens of appreciation.[79]

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[70] Rogers, E et al. 2017. "Quality of care of treatment for uncomplicated severe acute malnutrition provided by lady health workers in Pakistan." *Public Health Nutrition* 21(2): 385-390. doi:10.1017/S1368980017002610.

[71] Puett, C et al. 2012. "Does greater workload lead to reduced quality of preventive and curative care among community health workers in Bangladesh?" *Food and Nutrition Bulletin* 33(4): 273-87.

[72] Ireen, S et al. 2018. "Challenges and opportunities of integration of community based management of acute malnutrition into government health system in Bangladesh: a qualitative study." *BMC Health Services Research* 18: 256 https://doi.org/10.1186/s12913-018-3087-9.

[73] Moran, A et al. 2018. "The effectiveness of treatment for Severe Acute Malnutrition (SAM) delivered by community health workers compared to a traditional facility based model." *BMC Health Services Research* 18: 207 https://doi.org/10.1186/s12913-018-2987-z.

[74] Moran, A et al. 2018. "The effectiveness of treatment for Severe Acute Malnutrition (SAM) delivered by community health workers compared to a traditional facility based model." *BMC Health Services Research* 18: 207 https://doi.org/10.1186/s12913-018-2987-z.

[75] WHO. 2018. *WHO guideline on health policy and system support to optimize community health worker programmes*. Geneva: WHO. License: CC BY-NC-SA 3.0 IGO.

[76] Lopez-Ejada, N et al. 2019. "Can community health workers manage uncomplicated severe acute malnutrition? A review of operational experiences in delivering severe acute malnutrition treatment through community health platforms." *Matern Child Nutr* 15(2): e12719.

[77] Bhattacharyya K et al. 2001. *Community Health Worker Incentives and Disincentives: How They Affect Motivation, Retention, and Sustainability*. Arlington, Virginia: Published by BASICS II for USAID.

[78] Ireen, S et al. 2018. "Challenges and opportunities of integration of community based management of acute malnutrition into government health system in Bangladesh: a qualitative study." *BMC Health Services Research* 18: 256 https://doi.org/10.1186/s12913-018-3087-9.

[79] Bhattacharyya K et al. 2001. *Community Health Worker Incentives and Disincentives: How They Affect Motivation, Retention, and Sustainability*. Arlington, Virginia: Published by BASICS II for USAID.

A study by Ormel et al. reviewed six qualitative studies looking at factors influencing CHW performance and differences between salaried and volunteers, using a model that looked at intrinsic/extrinsic (financial, non-material, material) factors influencing motivation, which then influences recruitment, retention, and performance.[80] The study found that the mode of employment (volunteer versus salaried) influenced how various forms of incentives affected motivation, particularly how motivation was negatively influenced by expectation gaps (i.e., lower-than-expected financial incentives, late payments, fewer-than-expected material incentives). For salaried employees, intrinsic motivational factors did not compensate for the demotivation derived if there was a perceived low level of financial reward, similar to the situation described in Bangladesh. They, like those in the report from Uganda, found that incentives could cause friction for the interface role of CHWs between communities and the health sector. They conclude that overall, introducing and sustaining a form of financial incentive seems to be the key to strengthening CHW motivation, along with adequate management of expectations to prevent dissatisfaction.

Based on the evidence described previously on the capacity and performance of CHWs, countries should consider the following context-specific issues in their decision to integrate CMAM into iCCM:

- If iCCM is already functional with CHWs, what is the perspective of the CHWs for the additional work from CMAM?
- Are the CHWs already remunerated, and, if so, what are the expectations of adding CMAM to their services?
- Would the level of remuneration be different for CHWs who provide CMAM services compared to CHWs who do not?

The summary guidance from available evidence first indicates the definite need to have a community health policy or strategy in place that defines the parameters for CHWs. These parameters need to include training, supervision, and remuneration or incentive, all of which the evidence shows to be critical to ensuring CHW quality service delivery, through motivation. If CMAM is being integrated into iCCM, then it is possible that a community health policy or strategy is already in place. In this case, it would be necessary to ensure an enabling environment for CMAM to include the additional tasks and clearly define the new parameters and CHWs' roles and responsibilities.

Evidence also indicates that implementation of training and quality supportive supervision are necessary to ensure and maintain quality service delivery, as well as provide some measure of motivation for CHWs. There is also strong evidence that indicates some type of intrinsic/extrinsic factor is needed for motivation, leading to quality service delivery/retention/recruitment. The failure to provide remuneration or incentives, or give less than expected, can be worse than no provision at all. Clear communication about remuneration, such as what would be provided in a policy/strategy, is considered necessary. Community trust, especially from leaders, can influence how communities support CHWs, and was also found to be important for CHW motivation.[81]

[80] Ormel, H et al. 2019. "Salaried and voluntary community health workers: exploring how incentives and expectation gaps influence motivation." *Human Resources for Health* 17: 59 https://doi.org/10.1186/s12960-019-0387-z.

[81] Kok, M et al. 2015. "Which intervention design factors influence performance of community health workers in low- and middle-income countries? A systematic review." *Health Policy and Planning* 30: 1207-27.

FINANCING OF CMAM AND RUTF

Perhaps what may be the main limiting factor to integration of CMAM into iCCM is the high cost associated with CMAM, and, particularly, RUTF. Unit costs (per child) of interventions to treat SAM, as noted by the World Bank, range from lower estimates of $57 (East Asia and Pacific) to higher estimates of between $107 to $218 (South Asia and sub-Saharan Africa). They attribute this to the intensive curative aspects of the intervention, which require a significant amount of time spent with service providers (assessment, treatment, counseling, and follow-up).[82] RUTF, a necessary component of SAM treatment in the current CMAM approach, is a high cost commodity compared to other nutrition and health interventions, which includes the associated costs of procurement and distribution due to its high bulk and weight. The cost of RUTF as a percentage to overall SAM treatment varies, with some reported estimates from 33 percent to 44 percent of SAM treatment.[83, 84, 85, 86] The World Bank has estimated that the overall cost per child treatment in 10 years- could be between $90 to $110, with the cost savings coming from improvements in RUTF and more efficient service delivery.[87]

A 2015 UNICEF report noted that there were few examples of significant incorporation of SAM management into regular government budget programming, with some governments purchasing therapeutic milk for inpatient treatment and routine drugs.[88] The authors observed that further evaluations carried out showed a portion of capital and recurring costs were being met domestically in Malawi, Chad, Ethiopia, Kenya, Nepal, and Pakistan; however, only in Malawi had RUTF been purchased directly by the government. The government committed to take over the financing of the CMAM program by developing a costed CMAM operational plan for integrating the approach into MOH services.[89] Noted factors for Malawi's successful CMAM model are increased political commitment, the Office of the President assuming responsibility of CMAM, and advocates for CMAM within the MOH from the beginning. Additionally, they established a facility for local production, reducing the associated costs of RUTF. Informal communications with in-country sources confirm that the government did procure RUTF for 2016/2017, but it has been supported by the World Bank since, while an advocacy strategy for domestic resource allocation is being developed for the coming years.

In Malawi, the government directly purchased RUTF as part of its commitment to financing CMAM programs and developing an operational plan for integrating the approach into MOH services. This success is attributed to the increased political commitment and advocacy, as well as local RUTF production.

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[82] Shekar, M et al. 2017. *An Investment Framework for Nutrition: Reaching the Global Targets for Stunting, Anemia, Breastfeeding, and Wasting*. Directions in Development—Human Development. Washington, DC: World Bank. https://openknowledge.worldbank.org/handle/10986/26069 License: CC BY 3.0 IGO.

[83] Puett et.al. 2013. "Cost-effectiveness of the community-based management of severe acute malnutrition by community health workers in southern Bangladesh." *Health Policy and Planning* 28: 386-99.

[84] Isanaka, S et al. 2017. "Cost analysis of the treatment of severe acute malnutrition in West Africa." *Matern Child Nutr* 13(4): e12398. https://doi.org/10.1111/mcn.12398.

[85] Tekeste, A et al. 2012. "Cost effectiveness of community-based and in-patient therapeutic feeding programs to treat severe acute malnutrition in Ethiopia." *Cost Eff Resour Alloc*10:4. https:// doi: 10.1186/1478-7547-10-4

[86] Makinen, M et al. 2015. *Costs, Cost-Effectiveness, and Financial Sustainability of Community-based Management of Acute Malnutrition in Northern Nigeria*. Results for Development Institute.

[87] Shekar, M et al. 2017. *An Investment Framework for Nutrition: Reaching the Global Targets for Stunting, Anemia, Breastfeeding, and Wasting*. Directions in Development—Human Development. Washington, DC: World Bank. https://openknowledge.worldbank.org/handle/10986/26069 License: CC BY 3.0 IGO.

[88] UNICEF. 2015. *Management of severe acute malnutrition in children: Working towards results at scale*.

[89] Gillespie, S et al. 2016. *Nourishing Millions: Stories of Change in Nutrition*. Washington, DC: International Food Policy Research Institute.

Another report on financing CMAM scale-up provided case studies on Kenya and Nepal.[90] In Nepal, the review reported budget allocations for nutrition increased during the time of reporting (2013–2016); however, development partners contributed 75 percent of all funds for nutrition, while the government funded 25 percent, which is 1.1 percent of the total government budget. Data from Nepal's Scaling Up Nutrition Civil Society Network showed only US$3 million was allocated to the management of acute malnutrition, out of the US$13 million annual budget needed for acute malnutrition during the period 2015–2016. In Kenya, the Scaling Up Nutrition data showed only $US8.4 million was allocated for nutrition interventions and IMAM, out of the annual budget of US$364 million, for the period 2014–2015.[91] Since 2014, following decentralization, there was a significant increase in county health budgets, with most health functions transferred to county governments.[92] A review of the 47 county social sector budgets from 2014/15 to 2017/18 found at least eight counties had no financial commitment to nutrition, while the other county budgets varied; however, no detail was provided regarding type of nutrition expenditure.[93] Informal communication also noted that the Kenyan MOH centrally has been in negotiation with the Treasury to access match funding, where a stakeholder (e.g., UNICEF) would match funding to incentivize the government to invest in nutrition, a similar model to the vaccine independence initiative.

For long-term planning, countries should use available, contextual evidence to identify cost-reducing options including private sector partnerships, tax exemption, and local RUTF production.[94, 95] A 2016 study reviewing local versus offshore RUTF production noted that the cost of locally produced RUTF, which was previously more expensive, now has a disparity of less than 5 percent and lower shipping costs.[96] One study from India identified opportunities for local production including local availability of ingredients with pre-existing distribution channels, appropriately equipped domestic food processing channels, and a pharmaceutical manufacturing sector to source locally produced composite minerals and vitamins.[97] An RUTF scoping study from 2020 noted that although local production has little impact on the cost of the product itself, it reduces other associated costs such as transport and lead times. Additional benefits include incentivized domestic resource mobilization and increased sustainability.[98] However, quality assurance does pose a challenge for local production, particularly related to sourcing quality milk powder and peanuts that meet product safety testing requirements to prevent microbial contamination of RUTF due to unsafe processing.[99, 100] The review identified few enabling factors to local production of RUTF. It can easily receive government endorsement and support of development partners because it improves local availability, reduces delivery lead times, and contributes to the

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[90] Wijeratna, A et al. 2017. *Financing the sustainable scale-up of CMAM in high-burden countries. With case studies from Nepal and Kenya*. Action against Hunger, International Medical Corps and Global Health Advocates.

[91] World Bank. 2013. Aide-Memoire, Kenya, Kenya Health Sector Support Project (P-74091), Midterm Review and Preparation of Additional Financing, August 13–September 26; Washington, DC, http://bit.ly/2gVQyKY.

[92] Kenya Institute for Public Policy Research and Analysis. 2019. *Policy Brief No. 65/2018-2019, Health Budget Brief*.

[93] https://kippra.or.ke/county-budget-briefs/#.

[94] Emergency Nutrition Network. 2011. *Government experiences of scale-up of community-based management of acute malnutrition (CMAM). A synthesis of lessons*. CMAM Conference, Addis Ababa.

[95] Wijeratna, A et al. 2017. *Financing the sustainable scale-up of CMAM in high-burden countries. With case studies from Nepal and Kenya*. Action against Hunger, International Medical Corps and Global Health Advocates.

[96] Segrè, J, Liu, G and Komrska, J. 2017. "Local versus offshore production of ready-to-use therapeutic foods and small quantity lipid-based nutrient supplements." *Matern Child Nutr* 13(4): e12376. doi: 10.1111/mcn.12376.

[97] Beesabathuni, K and Natchu, U. 2010. "Production and distribution of a therapeutic nutritional product for severe acute malnutrition in India: opportunities and challenges." *Indian Pediatrics* 47: 702-06.

[98] Mates, E and Sadler, K. 2020. *Ready-to-use Therapeutic Food (RUTF) Scoping Study*. www.ennonline.net/rutfscopingstudy.

[99] Segrè, J, Liu, G and Komrska, J. 2017. "Local versus offshore production of ready-to-use therapeutic foods and small quantity lipid-based nutrient supplements." *Matern Child Nutr* 13(4): e12376. doi: 10.1111/mcn.12376.

[100] Duclercq, MP. 2014. *Production of Ready-to-use Food (RUF): An overview of the steps and challenges involved in the 'local' production of RUF*. CMAM Forum Technical Brief.

local economy. In addition, the review identified the following actions that governments and development partners could take to encourage local production:

- Facilitating large procurement measures by donors, governments, and partners to improve the production capacity, shorten the cash conversion cycle for local producers and ensure sustainability. For example, UNICEF's share of RUTF procurement from local producers based in program countries had steadily increased (25 percent in 2013 to 37 percent in 2015 to 48 percent in 2017).[101] In 2017, the two local producers in Ethiopia and Kenya increased their combined RUTF production capacity by 125 percent compared to 2011.[102]
- Waiving value added tax on RUTF inputs to improve competitiveness for local industry.
- Improving forecasting and consistent volume orders to assist production efficiency.
- Improving access to finance and working capital.
- Investing in and improving the process for localized product quality testing.[103, 104, 105]

Countries should conduct feasibility assessments to identify additional enabling factors to support local production specific to the local context. With local production taking place in multiple countries, there is an opportunity, as well as a need, to invest in research and further document enabling factors for local production.

Research shows that plant-based RUTF is as efficient in the treatment of SAM as milk-powder-based RUTF. Milk powder is estimated to account for between 40 and 50 percent of the RUTF input costs and over one-third of the total RUTF manufacturing cost.[106] A recent study mentions potential estimates of 10–25 percent reduction in production costs by replacing animal source proteins with plant-based. Though there are variations in the price of commodities and exchange rates, and though this topic is yet to be published in a peer-reviewed journal, shifting to plant-based protein instead of milk powder in the production of RUTF offers an additional, potential cost-saving mechanism.[107, 108, 109, 110]

Countries looking at integration should also be considering the SAM prevalence in communities, or number of SAM cases per CHW catchment area. It is not cost effective to distribute and store RUTF, which has been noted to be high cost and a key limiting factor for integration of CMAM into iCCM, in communities with a low prevalence or number of SAM cases. In such communities, it may be advisable to integrate screening, referral, and home follow-up components of CMAM into iCCM and avail the treatment component to the nearest communities with high caseloads or health facilities. However, there is no information regarding the level of SAM prevalence or

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[101] UNICEF 2021. RUTF: Market Outlook.

[102] Mulla, J. Influence of RUTF Markets Near Programme Countries in the Horn of Africa, (Ethiopia, Kenya, and Somalia). UNICEF: Copenhagen, 2017. UNICEF: RUTF: Market Outlook. March 2021.

[103] Segrè, J, Liu, G and Komrska, J. 2017. "Local versus offshore production of ready-to-use therapeutic foods and small quantity lipid-based nutrient supplements." *Matern Child Nutr* 13(4): e12376. doi: 10.1111/mcn.12376.

[104] Mates, E and Sadler, K. 2020. *Ready-to-use Therapeutic Food (RUTF) Scoping Study*. www.ennonline.net/rutfscopingstudy.

[105] Duclercq, MP., (2014). Production of Ready-to-use Food (RUF): An overview of the steps and challenges involved in the 'local' production of RUF. CMAM Forum Technical Brief.

[106] Shekar, M et al. 2017. *An Investment Framework for Nutrition: Reaching the Global Targets for Stunting, Anemia, Breastfeeding, and Wasting*. Directions in Development—Human Development. Washington, DC: World Bank. https://openknowledge.worldbank.org/handle/10986/26069 License: CC BY 3.0 IGO.

[107] Bahwere P et al. 2017. "Soya, maize, and sorghum-based ready-to-use therapeutic food with amino acid is as efficacious as the standard milk and peanut paste-based formulation for the treatment of severe acute malnutrition in children: a noninferiority individually randomized controlled efficacy clinical trial in Malawi." *Am J Clin Nutr* 106(4): 1100-12. doi: 10.3945/ajcn.117.156653.

[108] Hossain, MI et al. 2020. "Acceptability and efficacy of ready-to-use therapeutic food using soy protein isolate in under-5 children suffering from severe acute malnutrition in Bangladesh: a double-blind randomized non-inferiority trial." *Eur J Nutr* 59: 1149–61. https://doi.org/10.1007/s00394-019-01975-w.

[109] Sato, W et al. 2021. 2021. "Amino acid-enriched plant-based RUTF treatment was not inferior to peanut-milk RUTF treatment in restoring plasma amino acid levels among patients with oedematous or non-oedematous malnutrition." *Sci Rep* 11(1): 12582. doi: 10.1038/s41598-021-91807-x.

[110] Sato, W et al. 2021. 2021. "Amino acid-enriched plant-based RUTF treatment was not inferior to peanut-milk RUTF treatment in restoring plasma amino acid levels among patients with oedematous or non-oedematous malnutrition." *Sci Rep* 11(1): 12582. doi: 10.1038/s41598-021-91807-x.

number of cases per CHW catchment area to decide whether to integrate all components of CMAM or only identification, referral, or follow-up into iCCM. Countries should analyze case-by-case capacity of their community commodity system and SAM cases per CHW.

Financing CMAM and RUTF, particularly at a national scale, is a critical point for consideration for governments and stakeholders planning to integrate CMAM into iCCM. This will need to be addressed to ensure a consistent, adequate supply of RUTF to ensure reliable service delivery for the treatment of SAM. A key first step will be the inclusion of SAM treatment into iCCM and/or national health strategies, which includes a costed operational plan documenting the resources required for the addition of SAM treatment at all levels, such as, therapeutic food procurement and distribution, drugs, and capacity-related costs. The costed operational plan should also include realistic and agreed-upon milestones for increasing investment by governments, with a progressive plan for governments to ultimately assume financial accountability for the program.[111] Table 2 summarizes key policy considerations and findings related to best practices and challenges in integrating CMAM into iCCM.

TABLE 2: SUMMARY OF KEY POLICY CONSIDERATIONS AND FINDINGS FOR INTEGRATING CMAM INTO ICCM BY STUDY/ARTICLE

Summary of Key Policy Considerations	Finding	Level of Study/Article
Antibiotic administration, treatment outcomes, and QOC	• CHWs providing SAM treatment showed discharge outcomes exceeded SPHERE standards in most countries, treatment with antibiotics and other drugs correctly administered, provided high-quality treatment. • Proper training and supportive supervision linked with better QoC.	Multiple countries
CHW and human resource implication	• Key recommendation that a national community health strategy should be in place clearly defining CHW roles and responsibilities, training curriculum, working conditions and remuneration, and budgeting for supportive supervision and mentoring to improve quality. • Challenges faced in scaling include: insufficient numbers of CHWs, lack of regulatory framework for volunteer work, difficulty retaining CHWs due to heavy workloads without financial incentives or opportunities, poor motivation, and poor supervision. • Strong CHW management, supervision and training required, along with good community engagement and functional referral systems. • Remuneration or incentives noted to be of significant importance to contributing to quality service delivery and motivation of CHWs.	Global, multiple countries
Financing of CMAM and RUTF	• RUTF is a high-cost commodity compared to other health and nutrition commodities. • Some noted factors for successful integration include political commitment and responsibility, high-level advocacy, and ownership. • Considerations for cost reductions include partnerships with private sector, tax exemptions, and local production of RUTF, and shift to plant-based protein in RUTF formulation instead of milk powder. • Countries to consider integrating the SAM treatment component, along with screening and follow-up only in communities with a high prevalence of SAM, given that treatment is not cost-effective in low-prevalence settings. • Countries to consider integrating the SAM treatment component, along with screening and follow-up only in communities with a high prevalence of SAM as treatment is not cost-effective in low-prevalence settings.	Global

[111] Emergency Nutrition Network. 2011. *Government experiences of scale-up of community-based management of acute malnutrition (CMAM). A synthesis of lessons*. CMAM Conference, Addis Ababa.

CONCLUSION

Integrating CMAM into iCCM has been identified as an opportunity for increasing the reach and coverage of treating malnourished children, and potentially for preventing malnutrition. Studies show **that SAM treatment delivered in the community by CHWs improves treatment coverage and cure rates, decreases the numbers of defaulters, and lowers opportunity costs to households**. Despite these positive findings toward integration, questions and concerns remain about CHWs administering antibiotics, effect of added workload of SAM treatment on CHWs, and the considerable task of managing RUTF supplies.

The limited available evidence has shown that, in spite of increases to their workload with SAM treatment, CHWs still provided QoC, and noted that they were empowered by the ability to treat SAM in their community. Important success factors to sustain the QoC and integration are remuneration, appropriate ratio of CHW to catchment area, training, and supervision. There remains a significant knowledge gap on what effect integrating SAM treatment with other iCCM services, which needs further investigation, could have. Efforts need to be made to improve knowledge on how to streamline CHW tasks (not limited to SAM treatment) to increase efficiency, identify tools to simplify or reduce time, including for low literacy, and determine ways to reduce wait times for clients, or other mechanisms to improve efficiency. Integration needs to consider support for community engagement of CMAM, given that it has been shown to increase coverage and improve outcomes, as well as increase sustainability.

Integration will entail considerable assessment, planning, and preparation at a systems level, particularly for the integration of nutrition supplies into national health supply systems, which includes the community level. The CMAM program depends on supply. It will require political will and buy-in for guaranteed and consistent financing, given the high cost of RUTF, but also a supply chain integrated into the national health commodities supply system at all levels. Low-literate CHWs may benefit from tools designed with a human-centered approach. Further study and knowledge generation will be needed to consider cost-effective and/or innovative approaches for integration into national systems at scale. To facilitate integration and scale-up of CMAM/iCCM, countries should consider innovative approaches to mitigate stock-out and high cost of RUTF. These approaches include better integration of RUTF into the national health commodities supply chain system, supporting local production of RUTF, pre-positioning RUTF in communities with high caseloads, and using mobile technologies for RUTF forecasting and reporting.

Another consideration for countries looking at integration should be the prevalence of SAM in communities, given that it is not cost effective to distribute and store RUTF in low-prevalence contexts. Countries should analyze case-by-case capacity of their community commodity system and SAM cases per CHW. Countries should also be encouraged to seriously consider the growing evidence that integrating CMAM and iCCM ultimately improves coverage and outcomes of SAM treatment, thereby impacting the number of children's lives saved.

Global evidence on the possibility of utilizing simplified approaches for CMAM is growing and has shown some positive findings. However, some protocols tested have shown poor results for recovery rates, indicating a need for contextual assessment prior to consideration. Additionally, the UN agencies concluded in 2019 that the evidence available to date did not yet warrant a change in global recommendations (for the CMAM approach). UNICEF noted that a one-size-fits-all approach is not appropriate, given that any adaptation should depend on the context and health system. If countries consider simplified approaches to facilitate integration into iCCM, there should be a comprehensive review of research related to relevant aspects, such as achievement of nutritional outcomes, for any proposed approach, combined with a country contextual pilot or operational research.

This review has provided evidence that shows CHWs are capable of providing antibiotics correctly and delivering quality SAM care as long as they receive adequate training and close supportive supervision. CHWs, in the context of integration, will need to receive considerable training and supportive supervision as part of the system. If a community health strategy is in place, it would need to be revised based on the new treatment protocols to ensure that treatment protocols, training, and supervision are adequately addressed for safe and quality treatment.

Ensuring a workforce capacity of CHWs for the implementation of SAM treatment in the community has human resource implications for health systems policy and strategy. It has been noted for iCCM and CMAM that the success of integration depends on trained, supplied, and supervised CHWs, along with good community engagement and a functional referral system. Evidence is also quite clear that remuneration for CHWs that is clearly communicated and sustained is necessary. Countries should ensure a stable CHW workforce and capacity for service delivery of SAM treatment at the community level. The general recommendations from the collective review are to ensure that a health and/or community policy/strategy is in place, which defines parameters for: remuneration/incentives, standardized training curriculum, certification and assignment of CHWs, supportive supervision and quality checklists, and sensitization of communities and their interactions with CHWs.

The financing of CMAM/RUTF is perhaps the greatest challenge and limiting factor a country will face integrating iCCM/CMAM, primarily because of the high cost of RUTF, a necessary component accounting for about 30–45 percent of the cost of treatment. Cost-saving measures and/or innovative solutions may need to be explored more on a case-by-case basis for iCCM/CMAM integration, looking at potential opportunities such as establishing local production, engagement with the private sector, tax exemptions, and plant-based protein RUTF formulations that may be more cost-effective. Where countries have assumed some of the costs, key factors noted were to increase high-level political commitment and have a costed operational plan. Assumption of financial accountability by governments will likely take considerable high-level advocacy and need to follow a progressive plan toward increasing government commitment over time.

RECOMMENDATIONS

KEY PROGRAM RECOMMENDATIONS

- **Considering the skills and workload of CHWs and incentivizing their work:** CHWs can provide quality care of CMAM as part of iCCM. However, countries must ensure a consistent and skilled workforce of CHWs who are trained, well supervised, and appropriately remunerated for the additional work. It is recommended to manage their workload by ensuring adequate ratio of CHWs to the catchment population so that they provide quality treatment and follow-up care for a manageable number of SAM cases. In addition, it is equally important to have one community engagement strategy for both iCCM and CMAM.
- **Ensuring consistent RUTF supply at the community level:** Availing RUTF to CHWs poses a unique programmatic challenge for integration. Countries should consider integration of RUTF into national health commodity supply chains, including essential drug lists, supply and logistics planning, monitoring, and partial and full financing. Governments need to train CHWs on RUTF community stock management, ensure adequate supportive supervision, and provide simple DHIS RUTF reporting tools. In addition, they can consider innovative approaches such as pre-positioning RUTF in communities with high caseloads, and using mobile technologies for RUTF forecasting and reporting.
- **Using simplified approaches and tools in CMAM:** There are simplified approaches and adaptations to CMAM that provide the opportunity to facilitate the integration of CMAM into iCCM. Countries could select, with context-specific reviews, the right evidence-based simplified screening and treatment protocols and low-literate human-centered designed monitoring and reporting tools. These will help them to easily integrate and scale up management of SAM in iCCM.

KEY POLICY RECOMMENDATIONS:

- Integration of a CMAM component into national health/iCCM strategy, including a costed operational plan.
- Community health policy or strategy in place with defined parameters for standardized CHW training curriculum, certification, and remuneration/incentives.
- Countries to consider integrating screening, treatment, and follow-up of severe wasting as part of iCCM only in communities with a high prevalence of SAM. In low-prevalence areas, countries can integrate only screening, referral, and home follow-up without the treatment component.
- A context-specific review of potential cost-saving measures, such as establishing local production, engagement with private sector, tax exemptions, and a shift to plant-based protein RUTF formulations.
- High-level advocacy and ownership, and establishing a progressive plan toward increasing government commitment over time; identification of a high-level champion/advocate.

KEY AREAS FOR FURTHER STUDY:

- Further study and knowledge generation will be required to address the needs of health systems and consider cost-effective and/or innovative approaches for integration into national systems at scale.
- The various program and system effects of integrating SAM treatment into iCCM services.
- Simplified approaches for SAM treatment linked to facilitation of iCCM integration.
- There is limited evidence on the effect of integration on CHW workload and QoC of other core components of iCCM.
- Cost-saving measures and/or innovative solutions further explored and documented, such as local production of RUTF and its in-country enabling factors, plant-based protein RUTF formulations, evidence of treatment outcomes, and government-integrated supply chain management systems.

ANNEX 1 – LIST OF LITERATURE AND DOCUMENTS REVIEWED

Publication Type			

Publication Type			

Publication Type			

Publication Type			

Publication Type			

Publication Type			

Publication Type	Publication Title	Publication Year	Link or DOI
	Nations System Standing Committee on Nutrition and the United Nations Children's Fund		
Journal Article/Study	Cost analysis of the treatment of severe acute malnutrition in West Africa	2017	https://doi.org/10.1111/mcn.12398
Journal Article/Study	Cost effectiveness of community-based and inpatient therapeutic feeding programs to treat severe acute malnutrition in Ethiopia	2012	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3323427/
Journal Article/Study	Costs, Cost-Effectiveness, and Financial Sustainability of Community-based Management of Acute Malnutrition in Northern Nigeria	2015	https://ciff.org/wp-content/uploads/2019/09/R4D_CMAM_CostEffectiveness_FinancialSustainability_evaluation.pdf
Report	Management of severe acute malnutrition in children: Working towards results at scale, UNICEF 2015	2015	https://reliefweb.int/report/world/management-severe-acute-malnutrition-children-working-towards-results-scale-unicef-2015
Report	Nourishing millions: Stories of change in nutrition	2016	https://www.ifpri.org/publication/nourishing-millions-stories-change-nutrition
Report	Financing the sustainable scale-up of CMAM in high-burden countries: With case studies from Nepal and Kenya	2017	https://www.actioncontrelafaim.org/en/publication/financing-the-sustainable-scale-up-of-cmam-in-high-burden-countries-with-case-studies-from-nepal-kenya/
Report	Kenya Health Sector Support Project (P-74091), Midterm Review and Preparation of Additional Financing	2013	http://bit.ly/2gVQyKY
Brief	Kenya Institute for Public Policy Research and Analysis, Policy Brief No. 65/2018-2019	2018	http://repository.kippra.or.ke/bitstream/handle/123456789/2278/social-protection-budget-brief-pb67.pdf?sequence=1&isAllowed=y
Report	Government experiences of scale-up of Community-based management of acute malnutrition (CMAM). A synthesis of lessons (2012)	2012	https://www.ennonline.net/cmamgovernmentlessons
Brief	Production of Ready-to-Use Food (RUF): An overview of the steps and challenges involved in the "local" production of RUF	2014	https://www.ennonline.net/productionofreadytousefoodruf
Journal Article/Study	Soya, maize, and sorghum-based ready-to-use therapeutic food with amino acid is as efficacious as the standard milk and peanut paste-based formulation for the treatment of severe acute malnutrition in children: a non-inferiority individually randomized controlled efficacy clinical trial in Malawi	2017	https://pubmed.ncbi.nlm.nih.gov/28814393/
Journal Article/Study	Acceptability and efficacy of ready-to-use therapeutic food using soy protein isolate in under-5 children suffering from severe acute malnutrition in Bangladesh: a double-blind randomized non-inferiority trial	2020	https://doi.org/10.1007/s00394-019-01975-w

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