Research

Management of severe acute malnutrition by community health workers: Early results of Action Against Hunger research

By Pilar Charle-Cuellar, Noemi Lopez-Ejeda, Magloire Bunkembo, Abdias Ogobara Dougnon and Hassane Toukou Souleymane

Pilar Charle Cuellar is a medical doctor with a masters degree in public health and a doctorate in epidemiology and public health. She has over 12 years' experience working in humanitarian emergencies and is the focal point for Action Against Hunger (AAH) International on Integrated Community Case Management (iCCM).

Noemí López-Ejeda is research advisor for the health and nutrition department of AAH Spain. She has a PhD in biology, a masters degree in physical anthropology and is part of the research group on nutritional epidemiology (Epinut) of Complutense University, Madrid.

Magloire Bunkembo is a medical doctor with a masters degree in public health and a degree in nutrition epidemiology. She has over 10 years' work experience in humanitarian contexts and has been the health and nutrition coordinator for AAH in Mali.

Abdias Ogobara Dougnon is a medical doctor with a masters degree in public health. He has over nine years 'work experiecne in humanitarian contexts and is the health and nutrition coordinator for AAH Niger.

Hassane Toukou Souleymane has a masters degree in public health and a professional degree in epidemiology and biostatistics and diploma in nutritional epidemiology. He has over ten years' experience working in humanitarian contexts and is the nutrition coordinator for AAH Mauritania.

Community Health Worker in Kita performing the appetite test with children under five, Kita District, Mali, 2016

Location: *Mali, Niger and Mauritania*

What we know: Integrated community case management (iCCM) is a strategy that capacitates community health workers (CHWs) to treat illness in children. Integrating severe acute malnutrition (SAM) treatment should strengthen continuum of care between health and nutrition.

What this article adds: Action Against Hunger is examining a treatment model that utilises CHWs to provide SAM services to children age 6-59 months in the community. Research is recently completed, ongoing and planned in Mali (2014-2016), Niger and Mauritania (2017 to 2019) and Senegal (planned). Phase 1 results from Mali showed cure rates of 94.2% in three intervention health facilities (using 19 CHWs), compared to 88.6% in four control health facilities. Defaulter rates were twice as high in the control group and coverage was twice as high in the intervention group. Quality of care was good, most children were clinically assessed appropriately and the intervention was cost-effective, particularly for beneficiary households. Phase 2 research in Mali compared two different levels of training and supervision of CHWs to standard care (control) to assess inputs needed for scale-up. Preliminary results from phase 2 indicate raised standards of care using the CHW model. Full results, and the Niger and Mauritania studies, are forthcoming in 2019. Implementation challenges included poor treatment availability for moderate acute malnutrition and negative impact of emergencies on both facility and CHW capacities.

Background

Integrated community case management (iCCM) is a strategy that aims to improve access to essential health services by training, supporting and supplying community health workers (CHWs) to diagnose and treat multiple illnesses in children under five years old. iCCM has been described as "a missed opportunity" for the integration and increased coverage of community-based interventions to prevent and treat uncomplicated severe acute malnutrition (SAM) (Friedman and Wolfheim, 2014).

Action Against Hunger is currently implementing a treatment model that integrates the management of SAM into iCCM to increase coverage and treatment quality (also known as the 'C-project'). The model utilises CHWs to provide SAM services in the community, including behaviour change communication, screening and treatment of SAM without medical complications. The approach aims to ensure a continuum of care for each child age 6-59 months with SAM through the management of multiple illnesses (malaria, diarrhoea and pneumonia), alongside acute malnutrition management, between multiple levels (community and hospital/facility). The approach also aims to strengthen existing health systems and build the capacity of Ministry of Health (MoH) personnel on data collection, monitoring and evaluation, and supply chain management, to ensure programme sustainability.

A recent review of current evidence on the effectiveness of CHWs treating SAM included 18 studies, covering pro-

grammes in nine countries where CHWs were reported to have played an active role in the provision of SAM treatment (López-Ejeda *et al*, 2018). Results showed that CHWs have the potential to improve early detection and treatment of SAM, thereby reducing risk of medical complications. However, results were achieved by small projects supported by non-governmental organisations, with little evidence on the implementation of these approaches at scale. Outstanding research questions identified in this and another review (Friedman and Wolfheim, 2014) include:

- What works, for whom, under what circumstances and how?
- How can nutrition best be incorporated into existing governing policies? And how can health systems best be strengthened to support programming?
- How can SAM treatment protocols be simplified to apply to low-literacy CHWs?
- How should MAM cases be managed (since there are no standard protocols for MAM treatment)?
- What is the minimum level of training and supervision required by CHWs to provide SAM treatment and still meet the Sphere quality standards?
- How much work/how many tasks can one CHW absorb and what is feasible for a CHW to do in addition to other iCCM tasks?
- How can the supply of ready-to-use therapeutic food be ensured?
- What remuneration/motivation is needed by CHWs to deliver services and how can this be sustained?

To address these questions, Action against Hunger has developed a research strategy on iCCM and nutrition. The three axes of the strategy are: generation of evidence on the approach; dissemination of results and communication; and advocacy on the basis of findings at national, regional and international levels. This will be achieved through a series of pilot studies, validation of the intervention model and support for scale-up. This article shares research completed, underway and planned, including first and second phase studies in Mali, pilot studies in Mauritania and Niger, and plans for research in Senegal. Experiences are also shared from implementation.

Methods
Pilot studies in Mali, Niger and Mauritania
From 2014 to 2016 ACF implemented an observational, prospective cohort study in partnership with the Ministry of Health (MoH) in Mali, the Institute National de Recherche et Santé Publique (INRSP) and the Innocent Foundation, to explore whether CHWs could successfully treat SAM in Kita, Kayes region, Mali. The study (phase 1) aimed to discover whether SAM treatment delivered through CHWs was as effective (cured, defaulter and death ratios) as SAM treatment delivered at Centre de Santé Communautaire (CSCOM, Community Health Facilities) and whether the model can increase coverage.

Two similar studies were undertaken from 2017 to 2019 in Mayahi district, Niger, in collab-

oration with the MoH and Centre National de Recherche Medical (CERMES), with funding from the USAID Office for Disaster Assistance (OFDA) and in Guidimakha region, Mauritania, funded by the same donor in partnership with the MoH, Institute National de Recherche et Santé Publique and l'Université de Nouakchott Al Asriya.

Details of control and intervention groups for each study are provided in Table 1. For all three studies, children aged 6-59 months were admitted according to national protocols in each country using mid-upper arm circumference (MUAC) < 115cm, or weight-for-height z-score (WHZ) <3, or bilateral oedema and consent given by parents. Children in all three studies were followed up once per week over six to eight weeks until full recovery, reaching discharge criteria of MUAC >125mm or WFZ >1.5 and no oedema during two consecutives visits. In all three sites children identified as having SAM with medical complications before the study, or treatment failure during the study, were referred to the nearest stabilisation centre.

Coverage assessments using SQUEAC methodology were carried out at the start of each study and have been carried out at the end of the studies in Mali and Niger (yet to be undertaken in Mauritania). Quality of care was analysed in Mali through direct observation by trained enumerators using checklists, rediagnosing the cases admitted for treatment, and reviewing admissions cards and registers. Quality of care was defined as the capacity of the CHWs to evaluate, classify and treat cases of uncomplicated SAM, provide nutrition counselling to caretakers of children receiving treatment for SAM, malaria, pneumonia or diarrhoea, and to correctly refer cases of complicated SAM. Cost-effectiveness analysis was undertaken in Mali and will be undertaken in Niger and Mauritania in May/June 2019.

Mali validation model
According to Mali's national policy, the training package for CHWs in the iCCM programme is 18 days, including one day of training in the management of malnutrition. According to the same protocol, CHWs should be supervised monthly by the nurse responsible for each health facility and every three months by the district focal point. To assess how much more training and supervision is needed to scale up implementation successfully, a second study phase was carried out in Mali with the same partners from 2017 to January 2019. A prospective non-randomised implementation study was undertaken to compare outcomes (cured, defaulter and death ratios) for the three different models of training and supervision for CHWs. The study was carried

out in the Kayes region in three districts (Kita, Kayes and Bafoulabe) through 135 health facilities with 169 CHWs. In the control group in Bafoulabe, nurses managed health facilities and CHWs managed SAM with no external support, compared to the intervention groups where support was provided to nurses and CHWs by Action Against Hunger to a moderate level (Kayes) or intensively (Kita). All three groups implemented the community management of acute malnutrition (CMAM) Mali national protocol (with the same admission criteria, discharge criteria and follow-up as phase 1). CHWs used the admission criteria of MUAC and bilateral pitting oedema only.

A cross-sectional study was also carried out over one month to evaluate the use of time and workload of 144 CHWs in each of the three models. A self-administered questionnaire was used to collect information related to curative, preventive and other actions of CHWs. Semi-structured interviews with key actors at district-level and focus group discussions in the community were undertaken to complement the study. A cost-effectiveness analysis of the three models was also undertaken using the same methodology as that in phase 1.

Results to date
Results are available so far from the Mali studies only. During the first phase in Mali, 699 children were admitted to the intervention group and 235 children to the control group. The intervention group reported cure rates of 94.2% compared to 88.6% in the control group (risk ratio 1.07 [95% CI 1.01; 1.13]). Defaulter rates were twice as high in the control group compared to the intervention group (10.8% vs 4.5%; RR 0.42 [95% CI 0.25; 0.71]). Coverage assessment carried out in December 2015 using SQUEAC methodology revealed coverage rates of 86.7% in the intervention group compared to 41.6% in the control (p< 0.0001) (Álvarez Morán *et al*, 2018a).

Results of the quality of care assessment revealed that most children (97.6%) were correctly assessed for the presence of major clinical signs (cough, diarrhoea, fever and vomiting). MUAC circumference was correctly assessed in 96.8% of children and oedema was correctly assessed in 78.4%. The composite indicator, which includes all essential tasks to provide high-quality treatment, was achieved in 79.5% of cases (Álvarez Morán *et al*, 2018b).

The cost-effectiveness analysis found that delivery of treatment by CHWs is a cost-effective intervention. A major benefit of this strategy is the lower cost incurred by the beneficiary household when treatment is available in the community. This study found that weekly costs to beneficiary households for CHW-delivered care were three

Table 1 Overview of control and intervention groups in pilot studies in Mali, Niger and Mauritania

Study	Control group	Intervention group
Mali 2014-2016	4 health facilities	19 CHWs at 3 health facilities
Niger 2017-2019	5 health facilities	10 CHWs at 6 health facilities
Mauritania 2017-2019	6 health facilities	12 CHWs across 14 health facilities

times lower than facility-delivered services (USD0.60 and USD1.70 respectively). Moreover, each visit to the CHW took half the time required for a facility visit (Rogers *et al*, 2018).

In the second phase of the Mali study, more than 1,400 children with SAM were enrolled across the three study arms. Preliminary results show raised standards of care; however, full analyses of effectiveness and coverage are ongoing and will be published in 2019.

Results of the cost-effectiveness analysis and workload of CHWs study will be available in 2020. Results from the Niger and Mauritania studies, including effectiveness, coverage and cost-effectiveness, are also forthcoming.

Implementation experiences

Management of moderate acute malnutrition

In some contexts, due to the inability of the health system to absorb MAM cases, CHW services have been extended to provide a level of care to children with MAM in addition to those with SAM. In Mali, MAM management is under the responsibility of the Nutrition Directorate of the MoH and should be treated using ready-to-use supplementary food (RUSF). However, there are national-level difficulties with RUSF supply, and areas in the north of the country are prioritised so that stock is not available in most of the study areas. As a result, CHWs are required to promote breastfeeding and dietary diversification and request caregivers to return with MAM children in two weeks for follow-up.

In Mauritania, MAM management is under the responsibility of the Ministry of Social, Childhood and Family Affairs (MASEF), distinct from the Health and Nutrition Directorate of the MoH, which is responsible for SAM treatment. MASEF runs nutrition activities that focus on behavioural change communication, but it is unclear to what extent RUSF is available for MAM children. During the study, only a few health facilities had regular supplies of RUSF, resulting in insufficient coverage of MAM treatment. In these cases, CHWs promoted breastfeeding and best practices in complementary feeding to caregivers of MAM children.

Emergency contexts

Another complicating factor in implementing our approach is the emergency context where we carried out our interventions. Humanitarian crises are present in some areas of each of the countries studied, which are marked by severe restrictions on movement due to insecurity. The impact on the health system is dramatic in terms of infrastructure (hospitals, health centres and supply chains), as well as the availability of human resources and community volunteers, who are the bedrock of this approach.

There is increasing evidence on the use of family MUAC, whereby caregivers are trained to used MUAC to detect and refer SAM cases to local health facilities for treatment. Evidence suggests that this approach can enable effective and timely detection of children, to the same level of quality as community volunteers, leading to fewer hospitalisations and greater coverage

(Blackwell *et al*, 2015). This may provide an opportunity to overcome the short supply of community workers who can engage in screening in emergency contexts.

Discussion

Evidence from the first phase of the Mali study demonstrates increased programme effectiveness and coverage for SAM treatment. On this basis, the Mali MoH has since adapted two policies to support programme scale-up: i) integration of SAM treatment into the primary health package (2015. Guide de la mise en œuvre des Soins Essentiels dans la Communauté. (SEC)); and ii) integration of SAM treatment with CHWs into the CMAM protocol (2017. Protocole de Prise en Charge Intégrée de la Malnutrition Aiguë au Mali).

Pilot studies carried out in other countries have also demonstrated effective SAM treatment by CHWs, all attaining above-Sphere Standards of a 75% cure rate. In Angola, 23,865 children were treated in a CMAM programme using CHWs with cured rates of 93.8% (Morgan *et al*, 2015). A prospective cohort study in Bangladesh examining the effectiveness of adding the diagnosis and treatment of SAM to the community case management package delivered by CHWs demonstrated 91.9% cured rates among 724 children (Sadler, 2011). A study in South Sudan of the impact of integrating SAM management into iCCM using CHWs demonstrated 89% cure rates among 3,564 children (Keane, 2013). Ethiopia, the only country implementing this intervention at national level, has demonstrated dramatic increases in the numbers of SAM cases treated annually between 2002 and 2012 (18,000 to 230,000; more than twelvefold), as well as considerable increases in geographic coverage and cure rates among 703,878 children of 82.1% (UNICEF, 2012).

Once published, results from the Niger and Mauritania pilot studies will add to this evidence base and will show how the intervention can be adapted to suit specific contexts with different policies and different profiles of CHWs. For example, in Niger, CHWs are part of the health pyramid, have formal health education and receive regular government salaries; whereas in Mauritania they are volunteers with a lower level of education. Several publications have already shown the importance of regular supervision to contribute to the quality of care and motivation of CHWs. The second phase of the Mali research will help identify the most efficient model for providing this to enable scale-up and identify other research gaps.

More research is needed on options to improve coverage of this programme, such as the improvement of referral systems at community level and the use of family MUAC (known also as MUAC for mothers or mother-MUAC), through which mothers and caregivers are trained to detect early signs of malnutrition in the home. There is evidence that suggests that family MUAC enables effective and timely detection of children, leading to fewer hospitalisations and greater service coverage (Alé *et al*, 2016), but this needs further exploration.

Another important area of research is coverage of MAM in the context of erratic supply of

RUSF in different countries. There is emerging evidence on the integration of SAM and MAM into the same protocol; for example, a study by Morgan *et al* (2015) in Angola that showed that a combined protocol achieved 93.8% recovery. In addition, a randomised control trial at health-facility level in post-conflict Sierra Leone demonstrated 71% coverage and 83% recovery for a combined protocol, compared to 55% and 79% in standard care (Maust *et al*, 2015). SAM children receiving integrated management recovered faster, resulting in lower spend on RUTF (USD36 vs. USD68 per case treated), while the cost for MAM was the same for both standard and integrated care (USD12). Authors recommend this model as an alternative in humanitarian crises where there are time and logistics constraints and because delivery is simplified using MUAC-only criteria. A similar study ('ComPAS') is currently being implemented in South Sudan and Kenya, with results forthcoming (Bailey *et al*, 2018). More research is needed in this area, including the potential for CHWs to expand their remit into MAM as well as SAM treatment and prevention. Irrespective of CHW capacity and time for case management, ensuring availability of RUTF supply for an expanded caseload will be a key determining factor of successful service delivery.

The work of Action against Hunger in the west Africa region continues to focus on tackling systematic peaks of malnutrition, reducing structural vulnerability to undernutrition, and advocating for community and government ownership and commitment. Work continues to generate more evidence related to these issues to contribute to the global evidence base in the fight against malnutrition.

For more information, please contact Pilar Charle-Cuellar at **pcharle@accioncontraelhambre.org**

References

Alé FGB *et al* (2016). *Mothers screening for malnutrition by mid-upper arm circumference is non-inferior to community health workers: Results from a large-scale* pragmatic trial in rural Niger. Arch. Public Heal., 2016. www.ncbi.nlm.nih.gov/pmc/articles/PMC5011948/

Álvarez Morán *et al*. (2018a). *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 (1), 207. www.ncbi.nlm.nih.gov/pubmed/29580238

Álvarez Morán *et al*. (2018b). *Quality of care for treatment of uncomplicated severe acute malnutrition delivered by community health workers in a rural area of Mali*. Maternal and Child Nutrition, 18, e12449. www.ncbi.nlm.nih.gov/pubmed/28378463

Bailey *et al*. (2018). *Combined protocol for acute malnutrition study (ComPAS) in rural South Soudan and urban Kenya: study protocol for a randomized controlled trial*. BMC Trials, 19: 251. www.ncbi.nlm.nih.gov/pubmed/29690916

Blackwell N, Myatt M, Allafort-Duverger T, Balogoun A, Ibrahim A and Briend A. *Mothers Understand And Can do it (MUAC): A comparison of mothers and community health workers determining mid-upper arm circumference in 103 children aged from 6 months to 5 years. Arch. Public Heal.,* vol. 73, no. 1, pp. 1–7, 2015.

Friedman L and Wolfheim C. (2014). *Linking nutrition & (integrated) Community Case Management. A review of operational experiences*. Available at: www.ennonline.net/linkingnutritionintegratedcommunity casemanagementareviewofoperationalexperiences