

Perceptions of Acute Malnutrition and Its Management in Infants Under 6 Months of Age: A Qualitative Study in Rural Bangladesh

Yasir Arafat¹, M Munirul Islam², Nicki Connell³, Golam Mothabbir¹, Marie McGrath⁴, James A Berkley^{5,6}, Tahmeed Ahmed² and Marko Kerac^{7,8}

¹Department of Health and Nutrition, Save the Children (Bangladesh), Dhaka, Bangladesh.

²Nutrition and Clinical Services Division, International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), Dhaka, Bangladesh. ³Department of Global Health, Save the Children USA, Washington, DC, USA. ⁴Technical Department, Emergency Nutrition Network, Oxford, UK.

⁵Clinical Research Department, KEMRI-Wellcome Trust Research Programme, Kilifi, Kenya.

⁶Technical Department, The Childhood Acute Illness & Nutrition Network (CHAIN), Nairobi, Kenya.

⁷Department of Population Health, London School of Hygiene & Tropical Medicine, London, UK. ⁸Leonard Cheshire Disability and Inclusive Development Centre and Department of Epidemiology & Public Health, University College London, London, UK.

Clinical Medicine Insights: Pediatrics
Volume 12: 1–10
© The Author(s) 2018
Reprints and permissions:
sagepub.co.uk/journalsPermissions.nav
DOI: 10.1177/1179556518771698



ABSTRACT

BACKGROUND: World Health Organization guidelines advise community-based care (CBC) for “uncomplicated” severe acute malnutrition (SAM) infants <6 months old (u6m), whereas current national protocols refer to inpatient care. Our aim was to inform and shape future management strategies by understanding caregivers’ and different stakeholders’ perceptions on malnutrition among infants u6m on barriers/facilitators to future CBC.

METHODS: The methods used in this study are as follows: in-depth interviews and focus group discussions (FGDs) in southern Bangladesh, thematic analysis of transcripts, and sample size by data saturation.

RESULTS: We conducted 5 FGDs with 29 caregivers, 4 with 29 health care workers, 4 key informant interviews each with community leaders and health supervisors. Five themes emerged. 1) *Identification of SAM infants and care-seeking behavior:* malnutrition was not noticed until severe, caregivers focused on clinical symptoms. Both allopathic and traditional healers were consulted. (2) *Perceived causes of infant malnutrition:* underlying illness, poor feeding practices, poverty, and local superstitions. (3) *Views and preferences on treatment:* hospitals and doctors were perceived as offering the best treatment, health care workers were also important, and respondents highlighted the need care of the caregiver/mother along with the infant. (4) *Perceived benefits and risks of CBC:* lower cost and greater accessibility were appreciated but worried about quality. (5) *Community networks:* wider family and social support networks were considered important aspects of care.

CONCLUSIONS: There is considerable potential for CBC but needs to be better and earlier identification of at-risk infants, strengthening of health systems to avoid community options being perceived as “second best,” engagement with families and communities to tackle “upstream” determinants of SAM, and care for mother-infant pairs.

KEYWORDS: Malnutrition, severe acute malnutrition, infants under 6 months

RECEIVED: December 19, 2017. **ACCEPTED:** February 19, 2018.

TYPE: Original Research

FUNDING: The author(s) received no financial support for the research, authorship, and/or publication of this article.

DECLARATION OF CONFLICTING INTERESTS: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

CORRESPONDING AUTHOR: M Munirul Islam, Nutrition and Clinical Services Division, International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), Dhaka 1212, Bangladesh.
Email: mislam@icddr.org

Introduction

Acute malnutrition threatens the lives of 7.7% (52 million) children under 5 years old worldwide, more than two-thirds of whom (36 million) live in Asia.¹ Malnutrition not only increases their risk of death or disability from common pediatric illnesses, such as respiratory tract infections and diarrhea, but also causes deficits in intellectual development and long-term health.^{2–4} Severe acute malnutrition (SAM) affects some 19 million under fives, causing 500 000 deaths per year.³ Nutrition thus features strongly in the sustainable development

goals, with SDG Target 2.2 aiming to “End all forms of malnutrition” by 2030.⁵

Treatment programs for acute malnutrition have traditionally focused on children aged 6 to 59 months of age. Recently, there has been increasing awareness that infants aged under 6 months (u6m) are also affected.^{6,7} Globally, 4.7 million wasted, u6m are moderately wasted and 3.8 million are severely weak, with prevalence varying by country.⁸ Bangladesh is among the countries with the highest burden; in the latest



Demographic and Health Survey, 20% of infants u6m were acutely wasted and 5% severely wasted.⁹

Current treatment protocols for severe acute malnourished infants u6m recommend inpatient admission for all affected individuals.^{7,10} This contrasts with the public health-oriented *Community-based Management of Acute Malnutrition* (CMAM) guidelines for 6- to 59-month children which have revolutionized care by managing clinically stable (“uncomplicated”) SAM cases as outpatients.¹¹ Programs can thus achieve high population coverage, treat large numbers of patients early, and consequently have high public health impact. Inpatient-only care has none of these advantages, however, may be necessary for a minority requiring medical interventions or unable to feed.¹²

There have been several recent encouraging policy developments. Most importantly, 2013 World Health Organization (WHO) guidelines on SAM not only include a chapter on infants u6m for the first time but also outline outpatient management options for this age group.¹³ However, these global recommendations have largely not yet been taken up at country level, including in Bangladesh where infant guidelines remain solely inpatient based.¹⁴

A major barrier to national policy change is the lack of direct evidence on the content, uptake, delivery, and efficacy of outpatient management guidelines.¹³ A key step toward better future programs and policies is understanding community and health care workers’ views, attitudes, experiences, and preferences. Such contextual knowledge is essential to developing international recommendations that can be successfully adapted and rolled out at local levels. Toward the ultimate goal of outpatient-based care for acutely malnourished infants u6m in Bangladesh, we aimed to investigate perceptions and understandings of the following:

Acute malnutrition, especially as it applies to infants u6m;

Benefits and risks of community versus inpatient care.

Methods

Study design

This was a qualitative study using semi-structured key informant interviews (KIIs) and focus group discussions (FGDs) to capture the views and understandings of community members and health workers regarding acute malnutrition in infants u6m. We used the “Consolidated Criteria for Reporting Qualitative Research” (COREQ) checklist to report findings.¹⁵

Study settings and participant selection

We conducted the study in villages and health facilities in the rural Barisal and Hizla subdistricts of southern Bangladesh between October and December 2015. The study population comprised caregivers of infants u6m, community leaders, health

care workers (HCWs) (both hospital and community based), and their supervisors. All were identified through purposive sampling and comprised the following:

We defined caregivers as mothers, fathers, grandmothers, and grandfathers of infants u6m. These were identified by clinic staff who know the local population and could identify households with a young infant. We also recruited a group of parents whose infants u6m had previously received, or were currently receiving, inpatient treatment for SAM in the pediatric unit of Sher-e-Bangla Medical College Hospital (this is the only tertiary health facility in Barisal District and is therefore the main referral point for SAM). These caregivers were identified using hospital records and were invited by malnutrition ward nurses to join discussions.

Community leaders (eg, teachers, local government members) were those who had influence over caregivers regarding infants u6m nutrition and care. They were purposively identified by health workers known to the study team and respondents in the FGDs.

We recruited HCWs from both community clinics and the malnutrition ward at the pediatric unit of the Medical College Hospital. The same HCWs referred us to their supervisors. To select both workers and supervisors, we took into account their availability and relevant experience (ie, they worked in a role identifying and/or managing malnourished infants).

Sample size (number of KIIs and FGDs) was determined by data saturation, ie, no important new themes arising. Participants per group were based on previous experience of what works well in Bangladesh (we aimed for about 6 individuals per group).

Data collection and analysis

Lead researcher (Y.A.) conducted interviews and FGDs in Bengali in a quiet, private area, mainly in the community clinic building. Some were conducted in the community near the patient’s homes and some in the Barisal Medical College next to the malnutrition ward. Caregivers’ infants and 2 research assistants were also present during interviews; 1 assistant took contemporaneous notes.

The FGDs and KIIs followed an interview guide that had been used in a similar study in northern Bangladesh.¹⁶ This comprised open-ended questions to help capture both common issues and bring out new ones not previously considered. Y.A. facilitated discussions, exploring group agreements and disagreements, as well as written notes; we recorded all interviews on a digital recording device (Sony UTX-533). The FGDs lasted between 40 and 60 minutes and KIIs between 30 and 40 minutes.

As soon as possible after the interviews, recordings were transcribed (in Bangla) by experienced Save the Children staff and then translated into English by different individuals. Notes taken during the interviews were also attached and the final files were stored securely on password-protected servers. To verify the transcription/translation process, all the final English transcripts were checked and back-translated into Bangla by Y.A. who had conducted the original interviews.

We kept interviewee identifier information (name, address) separate from the main transcripts, also in a password-protected file (lead researcher access only). Participant identifier numbers enabled linkage.

Y.A. coded and analyzed data using thematic analysis: picking out and coding key themes arising from the transcripts.¹⁷ Excel software (Microsoft) was used for the coding.¹⁸

Interview team and reflexivity

Y.A. is a male medical doctor who also has an MPH and 7 years' experience in nutrition programming. He was working for Save the Children in Bangladesh (SCiB) as a senior nutrition advisor during the study. He was aided by a female research officer, a nutritionist working also working in the nutrition department of SCiB: she co-facilitated the interviews and FGDs according to the interview guide. Finally, a SCiB senior research officer was the study notetaker; he has a social science degree and 15 years' experience in community health and nutrition programs.

Prior to data collection, each member of the team introduced themselves to interviewees and explained the aim of the study. Because this study was closely related to another quantitative project on infant nutrition the same team were doing in Barisal, they were known to some of the health workers. They did not, however, personally know any of the caregivers at community level.

Ethical considerations

Our study protocol was reviewed and approved by icddr's institutional review board (protocol number: PR14112). We obtained informed written consent from each individual prior to starting the interviews. The study is registered with the ISRCTN registry and the registration number is ISRCTN12494235, which can be accessed at <http://www.isrctn.com/ISRCTN12494235>. To ensure anonymity, we analyzed without personal identifiers.

Results

Of the 74 participants we invited for interview, 8 could not attend due to time commitments after having initially consented to take part. Thus, 66 individuals were interviewed. These included 29 caregivers in 5 FGDs, 29 HCWs in 4 FGDs, 4 health care supervisor KIIs, and 4 community leaders KIIs. The FGDs had a median and interquartile range of 6 (6, 7.5) people per group, ranging from 4 in the smallest group to 9 in the largest (this was determined by participants' availability

and convenience). Age, sex, and educational profiles of the different groups are summarized in Table 1.

Identifying an acutely malnourished/SAM infants and care-seeking behavior

Most respondents, including caregivers, were aware of "Apusti," the local term for acute "malnutrition." However, determining whether an infant is malnourished or not differed among caregivers and HCWs. Caregivers focused only on physical symptoms and observable signs; HCWs also mentioned diagnostic tools.

Signs and symptoms mentioned by both groups included visible wasting, inability to feed or breastfeed, and associated illness. The baby's appearance was also mentioned; most respondents, particularly caregivers, described a malnourished child as one who is "skinny or bony with a big head, swollen belly and sunken eyes." A few respondents, particularly the HCWs, mentioned swollen hands and legs or loose skin as additional signs of malnutrition. Associated illnesses commonly reported included diarrhea, vomiting, fever, common cold, and cough. Inability to feed or breastfeed, becoming inactive, and crying excessively were additional concerns raised by many caregivers and HCWs:

The bones of the chest will be visible. His/her eyes will be prominent, the eyes will be pale, there will be less blood in the eye and it will get skinny. (A father, 55 years old, FGD)

When the baby is not getting nutritious diet properly and after feeding s/he gets diarrhea, vomiting, nothing can stay in the stomach for long, gets skinnier slowly, catches cold and has fever easily, then the baby is suffering from SAM. (A mother, 30 years old, FGD)

Almost all the HCWs mentioned that they could distinguish different severities of acute malnutrition in children under 5 years using Mid Upper-Arm Circumference (MUAC) tapes. However, in the case of infants $\leq 6m$, they were not sure that MUAC applied and thus they focused on visible wasting of arms, legs, and chest.

Most of the HCWs also reported that community members, especially parents, were unable to recognize a child or infant with SAM. They said that most cases were identified by HCWs themselves as a secondary finding when caregivers presented with a sick infant to higher level health facilities:

In most cases, they do not come with SAM as a problem. Those who have had prior experience of receiving treatment for this illness, only can quickly recognize. Otherwise in most of the cases, they come with illness and then SAM is identified. (A health care provider, 57 years old, KII)

Almost all respondents mentioned the need to consult doctors or other health care providers when the above-mentioned signs are apparent. However, the choice of service provider

Table 1. Participant characteristics.

	CAREGIVERS OF INFANTS <6 MONTHS OLD	HEALTH CARE WORKERS	HEALTH CARE SUPERVISORS	COMMUNITY LEADERS
Type	5 focus group discussions	4 focus group discussions	4 key informant interviews	4 key informant Interviews
Details	29 individuals: 22 mothers, 2 grandmothers, 2 fathers, 3 grandfathers	29 individuals: all community health care workers	Assistant Health Inspector; Family Planning Officer; Professor, SBMCH; Sub-Asst Community Medical Officers	Teachers, local leaders, Union <i>Parishad</i> (Committee) Chairman, Union <i>Parishad</i> (Committee) member
Infants' sex				
Male	10 (34%)	16 (55%)	3 (75%)	2 (50%)
Female	19 (66%)	13 (45%)	1 (25%)	2 (50%)
Age, y				
Mean	23.5	36.0	50.5	49.3
17-24	10 (35%)	—	—	—
25-34	9 (31%)	15 (52%)	1 (25%)	1 (25%)
35-44	4 (14%)	7 (24%)	1 (25%)	—
44-54	3 (10%)	6 (21%)	—	1 (25%)
≥55	3 (10%)	1 (3%)	2 (50%)	2 (50%)
Education				
None	2 (7%)	—	—	—
Primary	5 (17%)	—	—	—
Secondary	20 (69%)	6 (21%)	—	—
Degree	2 (7%)	23 (79%)	4 (100%)	4 (100%)

Five “major themes” around infant severe acute malnutrition emerged from discussions.

varied. Most caregivers stated that they had first taken their babies to nearby village doctors or health care providers and received advice on frequent breastfeeding, use of infant formula, and additional nutritious foods, such as milk, eggs, khichuri, vegetables, and banana, for the breastfeeding mother:

We took medicine from doctors outside the hospital for fever and treated with 2/3 phial of medicines to see if the fever reduces or not. We also gave medicines advised by the local village doctors or pharmacist which did not have any effect unfortunately. (A 50-year-old grandparent, FGD)

Respondents also shared that they visited local traditional healers (“kabiraj” or “fakir”) for care—prompted to do so by neighbors. A few also mentioned visiting both allopathic and traditional/local medicine practitioners:

I take the baby to the hospitals when it is sick. I take it to different places and do not sit here just waiting to get the baby recovered because it can cause death to the baby. I tried fakirs along with the doctors. They baby is fine now. (A 30-year-old father, FGD)

Caregivers with a severely malnourished infant said that they mainly used nutritious foods, juices and kept the infant warm to help recovery at home. Some said that treatment facilities were not available in their localities; they were not aware of home-based treatment options. All were aware that treatment could be obtained in hospitals or inpatient facilities.

Perceived causes of infant SAM

Perceived causes of infants u6m SAM were similar among caregivers and HCWs. These included underlying illnesses, maternal malnutrition, early marriage, and local superstitions or taboos. Poor awareness of appropriate feeding, illiteracy, and poverty was almost unanimously mentioned as major causes of SAM; a few respondents also mentioned violence and poor personal hygiene:

If the pregnant mother does not get a nutritious diet, then the baby will be malnourished too. If the baby is not getting breastfed properly and cleanliness of the baby is not maintained properly, then

the baby will suffer malnutrition which may become severe later. The mother needs to get more nutritious food to keep the baby healthy. (A 24-year-old mother, FGD)

Regarding inappropriate feeding, respondents mentioned that due to lack of awareness, some mothers do not breastfeed their baby regularly enough to ensure adequate intake. Instead, they give rice or semolina, infant formula, or cow's milk when the infant is hungry. As a result, infants would often become ill and hence end up with SAM:

Breastmilk should be given within 1 hour of the birth. But there are superstitions in many places about not giving it. (A 33-year-old health worker, FGD)

Lack of awareness . . . lack of knowledge on nutrition, especially not having knowledge about breastfeeding . . . could be the main reasons. (A 35-year-old health worker, FGD)

Most respondents indicated that a malnourished mother will give birth to a malnourished infant. They related several reasons for maternal malnutrition, including lack of awareness of nutritious food and inadequate care seeking during pregnancy. Some mentioned superstitious practices, such as eating less to avoid a large baby that will result in a painful birth, are particularly advised by in-laws and family elders. Early marriage due to poverty and lack of awareness in the families was also linked to maternal undernutrition:

If the mother of the baby is malnourished then the baby can be malnourished too. The village girls are married early at their age. Their body is not fit enough to have baby and they do not get nutrition properly which leads to malnourished baby. They can't buy meat for their nutrition as they have financial problems. They take less care of the baby and thus make the baby severely malnourished. (A 35-year-old father, FGD)

Financial crisis, superstitions . . . Because of the illiteracy of the mother-in-law, the mother is not fed properly. (A health worker, 45 years old, FGD)

Views and preferences on treating infants with SAM

In cases of SAM, caregivers were keen to have their infants treated. Some had experienced community HCWs screening for malnourished children in their locality—they check weight, assess whether the baby is malnourished or not, and, if needed, refer to higher level health facilities. However, infants u6m were not included in these screening programs. Caregivers expressed a wish for their needs to be also considered, some suggesting that HCWs should regularly visit infants at home to check nutritional status. This would enable referral to doctors or community HCWs in cases of slow or no growth. At present, many respondents felt helpless when they suspected that their infant was not growing adequately, as they did not have a place to go to in the village to have their babies assessed:

My baby was weighed by NGO [non-governmental organisation] field workers a couple of time;, they observed that the weight is fluctuating. There is nowhere I can go to weigh the baby in the village after they left. (A mother of 1 child, 22 years old, FGD)

Almost all the respondents, including caregivers and HCWs, mentioned caring for mothers as well as their malnourished infants. Maternal nutrition and well-being were viewed as essential for the infants' well-being:

At first, the mother should be kept well, she needs better nutrition. If the mother is ill, then it will not be helpful to feed the baby with a nutritious diet. The other must be treated as well. (A father of 1 child, 35 years old, FGD)

Perceived risks and benefits of community-based treatment versus inpatient treatment

Almost all caregivers and key informants considered community-based treatment for SAM to be a positive option which would be cheaper and more convenient than inpatient care. However, they also raised some concerns and made associated suggestions. For example, many said that HCWs in the community clinics are not adequately trained to diagnose or provide quality treatment for critical conditions such as SAM. They proposed that doctors should be made available in the community clinics at least once a week. The same suggestion was also made by several HCWs and key informants. Respondents also said that community clinics sometimes lack necessary equipment, such as weighing scales and MUAC tapes, but that these could easily be made available:

Community clinics are good for the children . . . The only bad side is the critical situations cannot be treated. The community clinic is near to the houses of people and the women can talk freely to them. This is an advantage. If a good doctor is provided in the community then it will be good. (A 43-year-old father, FGD)

Inpatient care in hospitals was perceived as higher quality treatment as it is provided by qualified doctors. The service is also available 24/7, allowing constant monitoring and management if an infant's condition worsens. However, such services were said to be very expensive both to access (eg, transport costs to get to hospital) and to stay (eg, cost of diagnostics, cost of medicines). This is especially so for poor people who are most at risk of malnutrition. Hence, most parents with experience of inpatient care were in favor of home-based management after an infant has stabilized and recovered from the highest risk initial phase of illness.

Other factors against long periods of inpatient care were inability of the mother to continue with household chores, the need to care for other members of the family, and poor hospital conditions:

When my baby was sick, I took him to the hospital in Barisal. It costs 2000-3000 taka (USD \$25-40) per day which was too much

to bear. So after 1 week when the baby gets little better, his father brought back him home for the rest of treatment. We believed that he should be taken care at home now. Because the cost is getting bigger and people like us are not solvent enough to spend such a big amount of money. However, we would say it is better to treat such babies in the hospital. (A mother of 3 children, 34 years old, FGD)

We all are suffering from financial crisis. So we try at home first. Then if the condition is not good we take them to the hospital for better treatment. (A father of 2 children, 40 years old, FGD)

Doctors and nurses in the malnutrition ward at Barisal Medical College Hospital discussed some practical issues. They mentioned that the increased workload due to increasing admissions to the malnutrition ward affects the quality of care; staffing levels are not always adequate to provide the care they want to provide. Moreover, because parents often present their infants at a very late stage of illness, SAM can be complicated to manage. A strong community-based model of care would identify cases earlier and thus help reduce mortality, as well as public and out-of-pocket expenditure.

Although respondents believed that inpatient treatment is the best option for managing critical cases, all were also in favor of having community-based care options. Few were confident that mothers alone could take care of their babies even if they were educated to provide home-based care. They did, however, suggest training community HCWs to support mothers, making doctors/nurses more available and providing equipment and medicine at the community clinics so that people need not go far for quality care of their sick babies:

We won't have to come to the hospital then and it will save our money. There will be less tension and won't have to ask for money to anyone. If the baby can be treated in the locality, then the family persons can also do their household chores properly. (A 50-year-old woman, FGD)

The benefit of being in the locality is that the cost is less. If the condition is critical then it is needed to take them to the hospital as there are better facilities with test instruments and doctor. But the village clinics have no doctor. (A 35-year-old father of 1 child, FGD)

Respondents also mentioned the need to train and raise awareness of community leaders such as imams and teachers to identify and support mothers with a malnourished infant:

Imams, Members, Chairmen (of community groups) and other concerned people need it (training). If he (a local leader) suggests something good for the local people, they will trust him and listen to him . . . There are some other concerned people in society like school teachers who can also help the infants under 6 months of age if they are trained. (A health care provider, 52 years old, KII)

Community networks for supporting infants with SAM

Most respondents identified parents as having primary caring responsibility for a sick infant. Mothers were said to be best

placed to determine the reason why their infants were ill and to care for them at home. Fathers and in-laws were also said to be crucial in cases of severe illness when an infant needs to be taken to hospital. Some also mentioned that fathers and other family members could help the mother while she is taking care of the sick baby at home:

The mother has main responsibility; she needs to inform the father about the problem of the baby and also should inform her in-laws about it. But the mother will observe it first. (A grandmother, 60 years old, FGD)

Most respondents in the family felt that the community HCWs, including nongovernmental organization (NGO) workers who visit households door to door, can help malnourished infants and their parents. This is not only a matter of direct support but they also have substantial experience of and links with the government health systems. They can provide advice on what to do at home, follow-up on improvement or deterioration, and refer to higher level health centers if needed:

The health workers can help mainly as they have the connection more than any one; they also know how many babies are there in a family. (A mother of 2 children, 26 years old, FGD)

Respondents also felt that influential and well-off members of the community could help caregivers, especially by providing financial or in-kind support to the family. Some mentioned imams and teachers, who could help by preaching or teaching about feeding and hygiene:

Those who have money like the leaders, members can help them with money. (A 27-year-old female health worker, FGD)

The Imam can tell them during Friday prayers, the teachers can tell them in schools and the local leaders can tell them when they speak to the crowd. (A 33-year-old female health care provider, KII)

Expected attributes of HCWs supporting infants with SAM mostly focused on "experience" of the condition and being "helpful" with good intentions. People preferred and sought out this kind of HCWs when their baby was sick. Respondents also emphasized the need to educate the community and raise awareness among neighbors and HCWs who can help mothers identify SAM and encourage fathers to seek early treatment before the illness gets serious.

Participants proposed several ideas to strengthen community-based management of infant SAM: improving community clinic facilities and making doctors and qualified HCWs more available so that care can be cheaper and more accessible. They also wanted the government to work on reducing child marriage and poverty so that no babies are born with malnutrition:

Government should take strong rules and implement laws to end child marriage and poverty. Save the Children can also work with

them together to take care of these things and to stop the birth of malnourished babies and the babies will not suffer malnutrition ever in their life. (An elected member of local union parishad, 48 years old, KII)

Discussion

Our study fills an important gap by focusing on SAM in infants u6m. This has been repeatedly and recently flagged as an area urgently needing new evidence to advance practice.^{6,13} Our findings will help inform and guide those planning future programs and research in this area through improving understanding of how malnutrition is identified in this age group, how underlying causes are understood which treatments are preferred, perceived benefits and risks of community-based treatments, and relevant community networks.

Our local population identified infants as malnourished (or suffering from “Apusti” in Bangla) using physical symptoms and observable signs such as skinny appearance, excessive crying, inability to breastfeed, and associated illnesses. Although not biomedically incorrect, this is problematic from a public health viewpoint in that many of these signs and symptoms are nonspecific and poorly sensitive. If relied on alone, they will result in many cases, especially less severe and borderline cases, being missed unless simplified anthropometric screening is readily available and acted upon. There is good evidence that health care professionals also miss cases by relying on clinical assessment alone.^{19,20} For this reason, latest versions of child health guidelines and tools notably (Integrated Management of Childhood Illness)²¹ have largely dropped the clinical assessment of malnutrition, instead requiring proactive screening using anthropometric measures such as MUAC. In our study, it was thus encouraging that

1. Caregivers were keen for such community-based screening/assessment of their infants;
2. HCWs were already familiar with MUAC-based screening for malnutrition. They correctly noted that MUAC-based cut-offs for defining SAM in today’s guidelines focus on infants aged >6 months. There is not yet an accepted MUAC-based case definition for infants u6m. However, familiarity with the measure is important because it makes acceptance and future use of MUAC more likely; there is increasing evidence that currently dominant weight-for-length assessment is problematic, whereas MUAC and weight-for-age are both technically and practically superior.^{22–24}

Regarding the causes of malnutrition, our respondents, including caregivers, seemed generally well informed. They relayed many common causes, including poor infant feeding practices, acute illnesses, and poverty. This provides evidence of the success of past educational initiatives; it is noteworthy that nearly 70% of our caregivers had been educated to secondary school standard and only 2/29 had not been to school at all.

Such baseline knowledge represents a solid foundation for future awareness/education campaigns to build on.

Although not expressed as much in our setting as in north Bangladesh,¹⁶ we also note coexisting traditional and superstitious understandings of causality; these also need to be considered and addressed by any future programs.

Treatment preferences and views of community-based treatment options are key to determining program coverage and hence impact.¹² The factors our respondents identified as affecting care seeking for infants u6m are not unexpected and are similar to those for older children.^{25,26} They include accessibility of treatment (both geographical and in terms of ease of access), severity of disease, cost of treatment, and social/community factors. There was, however, an interesting contradiction: many people valued proximity to care (and hence a practical preference for community-based options) yet also liked the perceived superior effectiveness of hospital-based care. Which of these dominates in a “real life” versus a “hypothetical” situation is key; in a related study in Barisal, we found that despite referral to inpatient care for SAM among infants u6m, most caregivers did not go as instructed—even when supported with transport costs.²⁷ Other barriers to inpatient care include treatment costs (ie, not all investigations and medicines are free) and time costs (eg, if a mother is admitted, household chores and duties may be left undone; other children may suffer because they also need attention).

It likely that caregivers would engage more with community than hospital-based services, and this needs to be established as services develop. To maximize chances of success, the barriers our study highlighted must be addressed. Of note is the expressed preference for doctor-fronted care, which is perceived as higher status, more effective, and thus greater treatment success. The barriers identified need to be tackled in developing well-trained, well-motivated, well-equipped, and well-supervised staff. There is strong evidence that “task-shifting” effective programs to nonphysician cadres of staff is not only well received and cost-effective but also is very effective for many health interventions in older children.^{28,29} There is no reason why infants u6m SAM treatment should not be similarly successful in the community. Indeed, there are many parallels with the evolution of treatment of older SAM children back in the early 2000s. Before this, many programs were inpatient based and clinically focused.³⁰ When public health-oriented models of care were first proposed,³¹ they were often controversial as some doubted that they could deliver adequate quality of care to very vulnerable children.³² It took time, planning, long engagement efforts with many different stakeholders, and, above all, evidence, to move into the mainstream as they are today.^{11,33}

Facilitators and foundations which future community-based infant SAM treatment programs can build on include a long tradition of community-based breastfeeding support in Bangladesh.^{34,35} Even though practicing recommended breastfeeding is not easy, what should be done (ie, exclusive

breastfeeding for the first 6 months of life) is at least widely known.^{36,37} Trained and experienced staff are available in country and could help either deliver or train others to treat infants u6m with SAM (breastfeeding support will likely to be core to any future intervention.) Toward this, a new support tool that incorporates feeding support, as well as anthropometric, clinical, and maternal factors, has recently been developed as an important step toward helping HCWs better identify and treat nutritionally vulnerable infants u6m at community level.³⁸

Finally, a key message arising from our results is that programs treating SAM among infants u6m need to include but not solely focus on breastfeeding support. Respondents identified a range of contributing factors that need to be addressed for intervention success. Although the well-being and caregiving role of the mother is central, programs must also engage with fathers, mother-in-laws, and other family members. At worst, they can block mothers' access to health care services and advise her on inappropriate care; at best, they can provide invaluable support and empower her to best respond to her infants' situation. Other stakeholders who need to be involved in infants u6m SAM programs are community leaders such as teachers and religious leaders. These can use their influence and authority to effect many positive changes, for example,

Correcting common misunderstandings about health/feeding³⁷;

Reinforcing key health/nutrition messages such as the need for 6 months exclusive breastfeeding, avoidance (and risks) of food supplements, and breastmilk substitutes³⁹;

Urging people to abandon harmful superstitions (eg, food taboos during pregnancy and breastfeeding which affect mothers' health and well-being; taboos which contribute to perceptions of breastmilk insufficiency, a common problem⁴⁰;

Speaking out on social barriers to optimal infant and young child feeding (eg, calling on local employers to provide maternity leave as per Bangladesh laws which are strong on paper but not always enforced and improve at-work breastfeeding support);

Facilities.⁴¹

The importance of tackling contextual factors has highlighted in a recent paper on SAM for older children.⁴² The authors emphasized the need for community-centered approaches to improve the coverage of treatment services and reduce the burden of acute malnutrition. They found an "appetite from implementers in multiple contexts for these practical and simple tools for re-engaging the community."⁴² With the right approach, sensitive to community perceptions, beliefs, and needs, we are confident that the same will be true for services aimed at nutritionally vulnerable infants u6m.

Limitations

We acknowledge the limitations of our study. Generalizability is often an issue in projects such as ours. Although our participants were selected from a range of different villages of Barisal Sadar and Hizla subdistricts, these are all areas where Save the Children, a large international NGO, has been working for several years, establishing CMAM services embedded in local health systems. Both caregivers and HCWs will have been exposed to messaging and awareness campaigns on SAM and their responses may not thus be representative of other communities, either in Bangladesh or beyond. Our project should thus be repeated in other communities and other countries where new services for nutritionally vulnerable infants u6m are being considered; we hope that our paper will offer a helpful framework regarding themes to explore.

Second, although we involved those with direct experience of acute malnutrition in infants u6m, we acknowledge that reported behaviors/actions and opinions are not always the same as actual behaviors/actions and opinions. Although people were overall positive about community-based treatment, there were conditions (such as doctor-led care); there is a need for community engagement in service planning and careful evaluation of early programs as they are rolled out, with strong accountability mechanisms. Our data very usefully identify some possible problems to address and solutions to explore but others will likely emerge over time. Managers and researchers should continue listening to and engaging with local views over the long term, not just in early planning and service development. Among the factors to establish is whether HCWs can successfully differentiate uncomplicated infants u6m SAM (who can be safely treated in the community as per WHO 2013 guidelines) from complicated infants u6m SAM (clinically unstable very high-risk cases who still need inpatient admission as before), and whether delivery of front-line service by trained community health worker is acceptable to the population.

Third, we acknowledge that some participants may have modified some of their answers knowing that the interview team had clinical/nutritional backgrounds. This may have led to underreporting of cultural/superstitious views of malnutrition. Again, this supports the need for ongoing engagement/communication initiatives.

Finally, we did not interview senior program managers and local/national policymakers. Their perceptions are also vital to the success of community-based programs for infants u6m and are critical to include in next steps to explore community-based options. However, it is likely that before offering their own opinions, these groups would also want information on what communities think and believe. We hope therefore that our results will be of interest and relevance and will help both high-level and local-level discussions.

Conclusions

Our interviews with caregivers and HCWs suggest a great need and potential for Bangladesh to adopt the latest WHO recommendations for community-based treatment of uncomplicated cases of infants u6m SAM. In our population, there was good background awareness of both the underlying causes and features of acute malnutrition in infants u6m. However, several issues need to be addressed if new programs are to be succeeded:

There needs to be greater focus on measurement and proactive screening for infants u6m SAM because the currently dominant clinical assessment will miss many cases. Also, acute malnutrition in infants u6m is not a common reason for seeking medical attention by caregivers. Infants often present “late,” when sick; early intervention is a key advantage to the community-based model.

Community health systems and community-level staff need to be well-supported, well-resourced, and well-trained to avoid any perceptions of being “second best” to hospitals and doctors (even though the latter’s SAM services are poorly used even when available). Community engagement in service development and feedback mechanisms to ensure accountability of services developed will be important from the outset and to sustain.

There needs to be close and ongoing engagement with families and communities to tackle the more “upstream” determinants of SAM. Supporting breastfeeding is a vital part of any future intervention package, but wider support for the mother and family is also critical.

The community insights identified in this study should provide a good basis to explore modification of the existing CMAM approach in Bangladesh as a starting point to strengthen the community-based management of uncomplicated SAM in infants u6m.

Author Contributions

Conceived and designed the study methods: MMI, YA, MK, MM, NC. Performed the study methods: YA, MMI, GM, TA. Contributed to specific areas of methods, data analysis, statistics and write-up: all authors. Analyzed the data and wrote the first draft of the manuscript: YA and MMI. Contributed to the writing of the manuscript and agree with the manuscript’s results and conclusions: MK, NC, MM, GM, JB, TA. All authors have read, and confirm that they meet ICMJE criteria for authorship.

REFERENCES

1. UNICEF-WHO-The World Bank Group. Joint child malnutrition estimates 2016. http://www.who.int/nutgrowthdb/jme_brochure2017.pdf?ua=1. Accessed December 5, 2017.
2. Black RE, Allen LH, Bhutta ZA, et al; Maternal and Child Undernutrition Study Group. Maternal and child undernutrition: global and regional exposures and health consequences. *Lancet*. 2008;371:243–260. doi:10.1016/S0140-6736(07)61690-0.
3. Black RE, Victora CG, Walker SP, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. *Lancet*. 2013;382:427–451. doi:10.1016/S0140-6736(13)60937-X.
4. Victora CG, Adair L, Fall C, et al; Maternal and Child Undernutrition Study Group. Maternal and child undernutrition: consequences for adult health and human capital. *Lancet*. 2008;371:340–357. doi:10.1016/S0140-6736(07)61692-4.
5. Sustainable Development Goals. <https://sustainabledevelopment.un.org/>. Accessed November 15, 2017.
6. Angood C, McGrath M, Mehta S, et al; MAMI Working Group Collaborators. Research priorities to improve the management of acute malnutrition in infants aged less than six months (MAMI). *PLoS Med*. 2015;12:e1001812. doi:10.1371/journal.pmed.1001812.
7. Kerac M, Mwangome M, McGrath M, et al. Management of acute malnutrition in infants aged under 6 months (MAMI): current issues and future directions in policy and research. *Food Nutr Bull*. 2015;36:S30–S34.
8. Kerac M, Blencowe H, Grijalva-Eternod C, et al. Prevalence of wasting among under 6-month-old infants in developing countries and implications of new case definitions using WHO growth standards: a secondary data analysis. *Arch Dis Childh*. 2011;96:1008–1013. doi:10.1136/adc.2010.191882.
9. National Institute of Population Research and Training (NIPORT), Mitra and Associates, and ICF International. *Bangladesh Demographic and Health Survey (BDHS), 2014: Key Indicators*. Dhaka, Bangladesh and Rockville, MD: NIPORT, Mitra and Associates, and ICF International; 2015. <https://dhsprogram.com/pubs/pdf/FR311/FR311.pdf>. Accessed October 12, 2017.
10. ENN/UCL/ACF. Management of Acute Malnutrition in Infants (MAMI) project. Emergency Nutrition Network, UCL Centre for International Health & Development, Action Contre la Faim; 2010. <http://www.ennonline.net/mami-technicalreview>. Accessed July 20, 2017.
11. Trehan I, Manary MJ. Management of severe acute malnutrition in low-income and middle-income countries. *Arch Dis Childh*. 2015;100:283–287.
12. Collins S, Sadler K, Dent N, et al. Key issues in the success of community-based management of severe malnutrition. *Food Nutr Bull*. 2006;27:S49–S82.
13. World Health Organization (WHO). Updates on the management of severe acute malnutrition in infants and children (guideline); 2013. http://www.who.int/nutrition/publications/guidelines/updates_management_SAM_infantandchildren/en/index.html. Accessed November 10, 2017.
14. Kerac M, Angood C, McGrath M, et al. Towards rollout of new who guidelines for improved management of severe acute malnutrition in infants aged <6 months: an agree appraisal of national guidelines. Paper presented at 2017 Nutrition & Growth Conference; March 3, 2017; Amsterdam, The Netherlands.
15. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care*. 2007;19:349–357.
16. Lyons C. *Perceptions of Caregivers and Health Workers on a Community Based Approach to the Management of Infant Acute Malnutrition in Bangladesh* [Msc Thesis]. London, England: Nutrition for Global Health, The London School of Hygiene & Tropical Medicine; 2015.
17. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol*. 2006;3:77–101.
18. Meyer DZ, Avery LM. Excel as a qualitative data analysis tool. *Field Methods*. 2009;21:91–112.
19. Hamer C, Kvatum K, Jeffries D, et al. Detection of severe protein-energy malnutrition by nurses in The Gambia. *Arch Dis Childh*. 2004;89:181–184.
20. Myatt M, Khara T, Collins S. A review of methods to detect cases of severely malnourished children in the community for their admission into community-based therapeutic care programs. *Food Nutr Bull*. 2006;27:S7–S23.
21. World Health Organization (WHO). Integrated management of childhood illness: distance learning course; 2014. http://apps.who.int/iris/bitstream/10665/104772/16/9789241506823_Chartbook_eng.pdf?ua=1. Accessed December 10, 2017.
22. Mwangome M, Berkley J. Measuring infants aged below 6 months: experience from the field. *Field Exchange*. 2014;47:34. www.ennonline.net/fex/47/measuring. Accessed September 20, 2017.
23. Mwangome MK, Fegan G, Mbunya R, et al. Reliability and accuracy of anthropometry performed by community health workers among infants under 6 months in rural Kenya. *Trop Med Int Health*. 2012;17:622–629.
24. Lelijveld N, Kerac M, McGrath M, et al. A review of methods to detect cases of severely malnourished infants less than 6 months for their admission into therapeutic care; 2017. <http://s3.ennonline.net/attachments/2615/MAMI-June-2017-Final-SHARE.pdf>. Accessed July 20, 2017.
25. Guerrero S, Myatt M, Collins S. Determinants of coverage in community-based therapeutic care programmes: towards a joint quantitative and qualitative analysis. *Disasters*. 2010;34:571–585. doi:10.1111/j.1467-7717.2009.01144.x.

26. Rogers E, Myatt M, Woodhead S, et al. Coverage of community-based management of severe acute malnutrition programmes in twenty-one countries, 2012–2013. *PLoS ONE*. 2015;10:e0128666. doi:10.1371/journal.pone.0128666.
27. Islam M, Arafat Y, Mothabbir G, et al. Presented by Connell N, Risk factors for severe acute malnutrition in infants <6 months old in semi-urban Bangladesh: a prospective cohort study to inform future assessment/treatment tools. Paper presented at: IBFAN 2nd World Breastfeeding Conference; December 11–14, 2016; Johannesburg, South Africa.
28. Seidman G, Atun R. Does task shifting yield cost savings and improve efficiency for health systems? a systematic review of evidence from low-income and middle-income countries. *Hum Resour Health*. 2017;15:29. doi:10.1186/s12960-017-0200-9.
29. Fulton BD, Scheffler RM, Sparkes SP, et al. Health workforce skill mix and task shifting in low income countries: a review of recent evidence. *Hum Resour Health*. 2011;9:1. doi:10.1186/1478-4491-9-1.
30. World Health Organization (WHO) *Management of Severe Malnutrition: A Manual for Physicians and Other Senior Health Workers*. Geneva, Switzerland: World Health Organization; 1999. http://www.who.int/nutrition/publications/en/manage_severe_malnutrition_eng.pdf. Accessed November 20 2017.
31. Collins S. Community-based therapeutic care: a new paradigm for selective feeding in nutritional crises. Humanitarian Practice Network, Report No. 48; 2004. <https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/508.pdf>. Accessed October 12, 2017.
32. Grobler-Tanner C, Collins S. Community Therapeutic Care (CTC): a new approach to managing acute malnutrition in emergencies and beyond. FANTA (Food and Nutrition Technical Assistance), Technical Report 8; 2004. www.eldis.org/vfile/upload/1/document/0708/DOC17926.pdf. Accessed May 12, 2014.
33. Collins S. Treating severe acute malnutrition seriously. *Arch Dis Childhood*. 2007;92:453–461.
34. Haider R, Ashworth A, Kabir I, et al. Effect of community-based peer counselors on exclusive breastfeeding practices in Dhaka, Bangladesh: a randomised controlled trial. *Lancet*. 2000;356:1643–1647.
35. Haider R, Kabir I, Huttly SR, et al. Training peer counselors to promote and support exclusive breastfeeding in Bangladesh. *J Human Lactat*. 2002;18:7–12.
36. Akhtaruzzaman M, Hossain MA, Karim MR, et al. Attitude and practices of mothers on breastfeeding attended at a tertiary hospital in Bangladesh. *Mymensingh Med J*. 2015;24:480–485.
37. Hackett KM, Mukta US, Jalal CS, et al. Knowledge, attitudes and perceptions on infant and young child nutrition and feeding among adolescent girls and young mothers in rural Bangladesh. *Mater Child Nutr*. 2015;11:173–189.
38. C-MAMI Tool. Community management of uncomplicated acute malnutrition in infants <6 months of age (C-MAMI); 2015. <http://s3.ennonline.net/attachments/2435/C-MAMI-Tool-Web-FINAL-Nov-2015.pdf>. Accessed November 15, 2017.
39. Sundaram ME, Labrique AB, Mehra S, et al. Early neonatal feeding is common and associated with subsequent breastfeeding behavior in rural Bangladesh. *J Nutr*. 2013;143:1161–1167. doi:10.3945/jn.112.170803.
40. Roy SK, de Groot S, Shafique S, et al. Perceptions of mothers and use of breast-milk substitutes in Dhaka, Bangladesh. *J Health Populat Nutr*. 2002;20:264–270.
41. Rollins NC, Bhandari N, Hajeebhoy N, et al. Why invest, and what it will take to improve breastfeeding practices? *Lancet*. 2016;387:491–504. doi:10.1016/S0140-6736(15)01044-2.
42. Blanárová L, Rogers E, Magen C, et al. Taking severe acute malnutrition treatment back to the community: practical experiences from nutrition coverage surveys. *Front Pub Health*. 2016;4:198. doi:10.3389/fpubh.2016.00198.