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A qualitative study to explore mother's experiences of a family MUAC project in two provinces in South Africa

C. Horwood[1*], S. Luthuli[1], L. Haskins[1], S. Mapumulo[1], Z. Kubeka[2] and G. Tshitaudzi[3]

Abstract

Background In South Africa, severe acute malnutrition remains a significant cause of child mortality. Measuring mid-upper arm circumference (MUAC) is a simple, cost-effective approach to identify malnutrition in communities. The Family MUAC intervention supported community health workers (CHWs) to mentor mothers and child caregivers to measure MUAC, record their findings and access nutrition information from the child's Road-to-Health-Book. Family MUAC was implemented in seven sites in two provinces in South Africa: Gauteng and KwaZulu-Natal. This study aimed to explore mother/caregiver's perceptions and experiences of participating in Family MUAC.

Methods Focus group discussions (FGDs) were conducted with mothers purposively selected by CHWs based on their active participation in Family MUAC. Trained qualitative researchers conducted one FGD at each participating site. Coding reliability thematic analysis with topic summaries was employed to analyse the data using Nvivo v12.

Results Seven FGDs were conducted with a total of 59 participants. Key themes identified were mother's perceptions of the CHW's role, experiences of implementing Family MUAC activities, and perceptions of the broader effect on maternal empowerment and child health. Mothers appreciated the support from CHWs who were perceived as patient and caring, taking time to develop mother's skills and answer questions. CHWs provided ongoing care, encouraged participation and understood the mother's home situation. Mothers experienced group learning positively, and helped each other learn about MUAC measurements. Most mothers experienced measuring MUAC as challenging initially, needing support from CHWs to gain confidence to measure and record findings. Participating in Family MUAC empowered mothers in caring for their child, and improved their relationships with CHWs. Mothers compared support from CHWs to care received at the clinic, saying clinic visits were costly and time-consuming and nurses frequently did not explain their findings. Mothers reported feeling more confident to ask questions during clinic visits after participating in family MUAC.

Conclusions Using CHWs to support mothers measuring MUAC in households was acceptable and feasible. CHWs provided ongoing good quality care, relevant advice and support, and empowered mothers. Family MUAC had wide ranging benefits for building relationships and peer support in communities and strengthened mothers perceived role in the care of her child.

Keywords Mid upper arm circumference, Malnutrition, Severe acute malnutrition, Children, Child health, Community-based intervention, Community health workers, Africa, South Africa

*Correspondence:
C. Horwood
horwoodc@ukzn.ac.za
Full list of author information is available at the end of the article

Background

Despite major improvements in child mortality globally, malnutrition remains an important public health concern and is associated with significant morbidity and mortality, particularly in low income countries [1]. In addition to the immediate and devastating consequences of malnutrition for affected children, childhood malnutrition has lifelong consequences for individual's physical and cognitive development, and their economic productivity [2]. Individuals with a history of childhood malnutrition are unlikely to fulfill their full potential as adults, limiting their ability to provide for themselves and their families. Further, women with a history of malnutrition are more likely to have low birthweight babies, leading to an intergenerational cycle of poverty, ill health, and malnutrition [3, 4]. Thus, affordable, accessible, effective and sustainable solutions to improve early detection and treatment of malnutrition are required to protect the well-being of current and future generations [1], as well as to achieve global targets to end hunger and malnutrition [5].

In South Africa, despite improvements to infant and child mortality over the past two decades [6], childhood malnutrition remains an important health challenge and child mortality audits suggest that severe acute malnutrition (SAM) is the underlying cause of one-third of under-five deaths in hospital [7, 8]. In addition, improvements to child mortality as shown by national and provincial data mask widespread inequalities between districts and sub-districts, where malnutrition remains common in some low-income communities with high levels of food insecurity. South Africa has one of the most unequal societies in the world, with huge socioeconomic and health inequalities, many of which have persisted in the decades since the advent of democracy [4, 9], and children in the lowest wealth quintiles are at a high risk of illness and death [10]. Thus, there is a need to develop and evaluate interventions to identify and manage malnutrition that are aimed at the most vulnerable communities.

Screening for malnutrition in South Africa is routinely conducted in primary healthcare (PHC) facilities using anthropometric measures to determine the weight-for-height Z-score (WFHZ). However, this approach requires well maintained equipment and trained professional staff, and mothers have to bring their children to the clinic, which may be prohibitively costly for very low-income families. In contrast, identification of children with wasting (SAM and MAM) can be done in communities and households using a simple color-coded tape to measure mid upper-arm circumference (MUAC) [11]. MUAC measurements are a good method to detect acute malnutrition, and MUAC has been shown to be more sensitive to identify undernourished children most at risk of mortality compared to WFHZ [12, 13]. MUAC measurement is cost-effective, brings the health of children closer to families and communities, and can be done accurately by community health workers (CHWs) [14, 15]. CHWs are community-based, non-professional health workers deployed in most communities in South Africa. Although using MUAC tapes to screen for malnutrition in children during routine household visits is part of CHW's scope of practice, CHWs are overworked with many competing responsibilities [16, 17].

Family MUAC was a community-based intervention implemented in two South African provinces: Gauteng and KwaZulu-Natal. The intervention was undertaken by CHWs who supported mothers and child caregivers to screen their children for malnutrition using a MUAC tape and checking for bilateral pedal oedema, with the aim of improving early detection of malnutrition in households. CHWs also supported mothers to access key child health information on the child's record (Road to Health Book; RTHB), including child feeding advice, danger signs of childhood illness and information about the child's growth.

Mothers and families are the primary caregivers of children and are best placed to identify signs of illness, including malnutrition, if they have the appropriate knowledge and skills and are empowered to do so. Studies in several settings, including Kenya [18], Niger [14] and Burkina Faso [19], among others [15], have demonstrated that child caregivers can measure MUAC correctly. However, if high levels of coverage of household MUAC measurements are to be achieved and maintained it is important to explore the experiences of measuring MUAC from the perspective of mothers and caregivers, and identify any barriers to measuring MUAC in the household. We present the findings of a study which aimed to use a qualitative methodology to develop an in-depth understanding of mother's and caregiver's experiences of implementing Family MUAC.

Methods

This qualitative study was conducted as part of a larger mixed methods study to evaluate Family MUAC implementation and to explore the acceptability and feasibility of implementing Family MUAC at household level, focusing on mother's and child caregiver's experiences and perceptions of using MUAC tapes to screen their children for malnutrition.

Study design

Focus group discussions (FGDs) were conducted with purposively selected mothers and child caregivers in each participating study site six months after completion of Family MUAC.

Study sites

Family MUAC was implemented in seven sites in two provinces in South Africa, Gauteng and KwaZulu-Natal (KZN), comprising four sites in two districts in KZN and three sites in three districts in Gauteng. Each site corresponded to the catchment area of a Primary Health Care (PHC) clinic. Sites were purposively selected in partnership with the Department of Health, based on high malnutrition case-loads at the clinic or high SAM deaths in local hospitals.

The three Gauteng sites were largely urban with a high population density and many informal houses and shacks. The median age of the population ranged between 28 and 30 years and annual average household income was R24 600.00 (US $ 1306). One third of households in Gauteng sites were female-headed (33–38%) and there were high rates of unemployment (49–53%). Key child health indicators for Gauteng included: immunization coverage for children under 1 year at 83%; exclusive breastfeeding rate at the 14week immunisation visit at 45%; and SAM in-patient case fatality rate at 8% [20, 21].

The KZN sites comprised deep rural areas with scattered households, low population density and traditional dwellings. KZN sites had a young population (median age 18–19 years), and very low annual average household income (R14 600.00; US $ 775). More than half of households in KZN sites were female-headed (54–59%), and unemployment was high (82%). Immunization coverage for children under 1 year of age was 92%; 56% of infants were exclusively breastfed at the 14week immunisation contact; the SAM in-patient case fatality rate was 10.5% [20, 21].

Description of the family MUAC intervention

Local Family MUAC community task teams were established in each site to promote community ownership and sustainability. A health day to raise awareness of nutrition and the importance of growth monitoring was held in each community to launch Family MUAC. A family MUAC facilitator was employed in each of the two provinces to support and oversee project activities and mentor participating CHWs. CHWs received a one-day update from the Family MUAC facilitator to ensure that they had the relevant skills and knowledge to undertake project activities, particularly measuring MUAC correctly.

CHWs were then required to visit all households in their designated area with children aged 6 months to five years to mentor mothers and caregivers to screen their children for malnutrition using a MUAC tape and to check for bilateral pedal oedema. Mothers/caregivers in each household were provided with a MUAC tape and a simple household recording form on which to record their findings. CHWs were encouraged to visit each household at least monthly to support ongoing project activities, particularly focusing on correct and ongoing MUAC measurements. At each visit, mothers or caregivers demonstrated MUAC measurements on their children, received feedback from the CHW and were encouraged to record the findings on the household recording form. They were also supported to access information from the RTHB and were provided with relevant age-appropriate nutrition counselling. The Family MUAC facilitator visited each CHW at least three times to support CHWs by accompanying them on household visits.

Sampling

All mothers and caregivers with children aged 6 months up to five years who participated in the Family MUAC intervention were eligible to participate in the FGDs. Child caregivers were eligible to participate if they were caring for the child regularly and had participated in Family MUAC. At each site CHWs participating in the Family MUAC intervention were asked to select mothers or child caregivers from the households they served to participate in the study. CHWs purposively selected mothers or child caregivers based on their positive engagement with Family MUAC and their willingness and availability to participate in a discussion about their experiences of Family MUAC. The number of FGDs were determined at the start of the study based on the literature and the experience of researchers of how many groups would be adequate to reach saturation [22], as well as logistical and funding considerations, including participation from all seven sites.

Data collection

Seven FGDs were conducted with 59 participants between July and September 2022. Participants were all mothers with the exception of one grandmother and one grandfather. A FGD guide was used to guide the discussion (Appendix 1). The FGD guide was designed to elicit a discussion about the experiences and challenges of measuring MUAC at home from the perspective of mothers and caregivers who had participated in Family MUAC, using open-ended questions and follow up prompts. The questions were reviewed by members of the implementation team and the research team based on their experience and knowledge of the project. The guide was translated into the local languages. Discussions were led by participants.

FGDs were undertaken in local venues including clinics and libraries. All FGDs were conducted in the local language (IsiZulu, IsiXhosa, Setswana or Sepedi) by experienced female qualitative researchers trained to masters

level who had no previous relationship with the mothers. Refreshments were provided after each FGD. Participants were given a sum of R40.00 (approx. USD2) in compensation for their time and expenses.

Data analysis

All FGDs were audio-recorded, transcribed verbatim, and translated to English. Transcripts were quality checked for accuracy against the audio recordings prior to analysis. Transcripts were transferred into Nvivo 12 software and coding reliability thematic analysis with topic summaries to present the findings were employed to analyse the data [23]. This involved multiple iterative readings of the data to generate initial codes, followed by the grouping of codes into broader themes to develop summaries of the narratives evolving from the data. Four researchers (CH, LH, SM, SL) read all the transcripts to familiarize themselves with the content and to identify recurring themes, commonalities and variations. The researchers met regularly to discuss coding and themes, and a consensus was reached among the researchers on themes for the manuscript. Using coding reliability thematic analysis was appropriate for our study because we were interested in how mothers experienced the intervention and acceptability of Family MUAC in the household.

Ethical considerations

Ethical approval was obtained from the Biomedical Research Ethics Committee (BREC/00003893/2022) at the University of KwaZulu-Natal, and permission was obtained from the KwaZulu-Natal Department of Health (KZ_202203_30) and Gauteng Department of Health (GP_202203_057). Individual approval was obtained from ethics committees in the three districts in Gauteng and letters of support were obtained from the two districts in KZN. All participating mothers and child carers provided written informed consent. Consent forms were prepared in isiZulu, Setswana and English. To ensure participants' anonymity participants were allocated a study number and no names or identifying information were recorded.

Results

The number of participants in each of the seven FGDs ranged between 4 and 12 and the duration of the FGDs was between 60 and 97 min. As all participants were mothers with the exception of only two grandparents, we will therefore refer to all participants as mothers throughout the results section.

The results are presented according to the following broad themes: mother's perceptions of the role played by CHWs in delivering the Family MUAC intervention; mothers' experiences with Family MUAC activities and MUAC measurement; and the broader impact of Family MUAC on maternal empowerment and child health.

Most participants were first time mothers (33/59; 55.9%), see Table 1 for demographic data.

Overall, FGD participants were overwhelmingly positive about their experiences of Family MUAC activities in their households and communities. Mothers reported that the intervention provided them with knowledge and skills about how to access information from the RTHB, how to feed their children and how to identify and manage malnutrition in the household.

> *We will overcome this malnutrition disease affecting children because before the arrival of MUAC we knew nothing. Now we know what makes a child grow. What will stop us from doing it? The rate of this disease will decrease so that no children under the age of 5 die. (Mother #5, site 7, KZN)*

Mothers perceptions of the role played by CHWs in delivering the family MUAC intervention

Mothers particularly praised the various ways in which CHWs supported delivery of the Family MUAC intervention. Benefits of utilising CHWs to perform this role were that CHWs were able to spend the time needed for mothers to gain sufficient knowledge and skills to measure MUAC, including doing repeat visits where necessary. CHWs consulted mothers in their own home which was convenient and accessible, and CHWs were able to relate to mother's personal circumstances and involve other family members in the care of the children. Ongoing visits by CHWs were described as essential to support sustainability.

Table 1 Demographic data of participants

	N **= 59* (including missing data)**
Age of participants	Median 30 years SD 9.349 IQR 26–36 years
Number of children	
1 child	33 (56%)
2 children	15 (25%)
3 children	3 (5%)
Missing	8 (14%)
Education	
Completed grade 12	24 (41%)
Grade 10–11	18 (31%)
Grade 8–9	7 (12%)
Grade 7	2 (3%)

**Data missing for 8 participants in one Gauteng site*

CHWs were responsible for ongoing household visits to provide support and encouragement and continuity of care to mothers over the intervention period. Mothers highlighted that because CHWs were members of the local community, they were comfortable to talk to them and ask questions. As a result, relationships with the CHWs improved over time.

> *I also say that our relationship with CHWs has improved since we had MUAC because you could not tell the nurse at the clinic about the problem, but I can talk to CHW about everything when she is at [my] home… When this program came, they started from the ground up and joined us in our homes, which means that CHWs are the people we live with in society and they are the people you can talk to and they will show you. (Mother #5, Site 6, KZN)*

Mothers praised the CHWs for being patient and understanding when helping them to use the RTHB to obtain information about their child's health, and learning about infant and young child nutrition. The mothers appreciated being treated with respect and kindness and ongoing support from CHWs helped them to better understand good child feeding practices.

> *The other thing that we like about these people (CHWs) coming to our homes is that they are patient and speak to you in a proper manner unlike the clinic, you can't even explain at the clinic that the child was vomiting or what was happening because you are already scared. When they [CHWs] come to your house you can explain everything that you see with the child that you are not happy about, you understand? (Mother #5, Site 1, Gauteng)*

Mothers reported that ongoing support by CHWs encouraged sustainability by helping them continue with MUAC measurements after the training, stating that they wouldn't have continued with the program if it were not for continuous support visits and encouragement from CHWs.

> *We wouldn't continue [if CHWs did not visit] to tell you the truth. Yes, she would explain that this is about your child's health. But if there is no one to push you or to encourage you and say: 'Hey have you measured the kids?' or 'on this date you should take the child to the clinic', or 'the child needs this and that'. We would not be motivated or push ourselves the way we are pushing ourselves. (Mother #4, Site 7, KZN)*

CHWs visits were perceived by mothers as more helpful than clinic visits, and several participants contrasted the patience and support from CHWs with their experiences of clinic visits. Mothers reported that taking their child to the clinic for growth monitoring was expensive and time consuming, and at times they left the clinic without receiving assistance. As a result, several mothers expressed relief that they were able to measure their children's MUAC at home, perceiving this as an alternative to going to the clinic.

> *We don't have a clinic around where we can take the children to, which could be a reason why our children might not be growing well. That is why we are scared to go to the clinics because even if you were to spend your last cent, when you get to the clinic you find one very long queue when you get there at 5am, you will only leave 5pm when they have already closed or at other times you wouldn't have received assistance. (Mother #5, Site 1, Gauteng)*

Mothers experiences with family MUAC activities

Mothers reported that CHWs used different approaches to teaching mothers about measuring MUAC including teaching in groups with other mothers or individually in their own homes with members of their family present. A small number of mothers were trained by CHWs at the clinic during their routine health visits. All training undertaken by the CHWs, regardless of where it was done, was appreciated by participants.

Most mothers reported they had been trained in a group with other mothers and expressed that they enjoyed group training, saying that this approach generated opportunities to engage with other group members, both during and after the training. Participants reminded each other about the training content, supported each other to understand, and reminded each other to measure and record the MUAC regularly every two weeks. Mothers recognized that this was a more efficient approach that allowed CHWs to work with more mothers compared to visiting individual households.

> *It is better to be called together and trained so that we can remind each other, and that we can hear more ideas together. Because if she [CHW] visits each house, she is not able to visit every household (Mother #9, Site 5, KZN).*
> *Now we sometimes meet and remind each other so that if the other person has forgotten [to do the measurements], we remind each other [about] what was said. (Mother #5, Site 6, KZN)*

A number of mothers were trained alone in their households and these mothers appreciated the individual attention and the time taken by the CHW. The CHW was able to get support from other family members, and was able to take the time to answer individual questions and

continue training until the mother gained the required skills.

> *I prefer to study alone because the time will be between me and the CHW. I will ask questions and she will answer me. If I don't hear well, I ask and say 'I didn't hear well there, explain it to me.' And if there is many of us, she should pay attention to all of us (Mother #4, Site 4, KZN).*

Involving family members was an important benefit of delivering the intervention in the household and played a role in mothers successfully undertaking Family MUAC activities. Family members reminded mothers to conduct MUAC measurements, at times taking responsibility for measuring MUAC when the mother was unavailable. Men in the family were described as supportive, helping mothers to conduct MUAC measurements by holding the children while the MUAC was being measured.

> *They enjoyed it at home, CHW came and explained it to us. Since I sometimes leave a child with my sister, I asked her to measure the child (Mother #5, Site 4, KZN).*
> *They are very happy because sometimes I will measure the child and even call his uncle to hold the baby. The uncle asks: what is this, then I explain to him. They are very happy because the uncle reminds me to measure his nephew. Then I [ask] him to assist me. When he sees that I don't call him, he asks me who will help you with the baby? Then I say come let's measure him (Mother #1, Site 5, KZN).*

Most mothers highlighted that measuring MUAC on their children was challenging initially, and they often failed to gain the required skills after the first training, frequently requiring several CHW visits before they felt confident to measure MUAC and record the findings without assistance. The patience of the CHWs during this mentoring period was appreciated by mothers.

> *My CHW was patient because he said that even though he had already explained it to me, if I had a problem, I would contact him and ask him how it was going and he would explain it to me. I've got used to it. (Mother #5, Site 7, KZN)*

Mothers reported that measuring the child's MUAC gave them a more proactive role in the care of their children and helped them to know when they needed to go to the health facility. In particular, mothers understood how to interpret the colors of the MUAC tape and knew what to do when there is a red or yellow reading.

> *I was familiar with the tape. If I measure him and get a red colour, I have to take him to the clinic within 24 h. If I get a yellow [colour], I have to take it to the clinic within a week. If I get a green colour, it means that everything is fine with the baby. (Mother #7, Site 7, KZN)*

Several mothers mentioned that they really enjoyed doing the MUAC on their child and that this became a time for bonding with the child.

> *Mine [my child] gets excited because she can talk now so she would ask what [is] that thing for? When I tell her that I was going to use it for her, then the response would be that she is growing and becoming a big girl. It's become easier for me because I can see we are both enjoying what we are doing, especially when I am affectionate and holding her, when I hold her by the feet she would tell me that it's nice. (Mother #3, Site 1, Gauteng)*

Mothers also demonstrated awareness of the importance of checking for pedal oedema even when the child had a green MUAC measurement and they understood that a child can look healthy but be malnourished.

> *I understand that it does not mean that the child is well-nourished. Because I used to think that since the baby is big, the baby might be full of water. I saw that because I have been taught about MUAC (Mother #4, Site 7, KZN).*

The Family MUAC facilitator accompanied each CHW on several support visits to the households and the presence of the facilitator in the community strengthened buy-in from mothers, families and communities.

> *CHW was with sis [Family MUAC facilitator] from Durban. She found us with the children's grandmother. We were both at home and at that time the children's grandmother was ill. Many questions were directed to me. I think they came back twice. (Mother #2, Site 4, KZN)*

The wider effects of family MUAC on maternal empowerment and child health

Mothers spoke about how participating in the family MUAC project built their knowledge, skills and confidence in caring for their children, leading to changes in how they cared for their child and strengthened their child caring role. Overall, mothers felt empowered in their role in a number of ways.

> *Whereas previously a child could be ill and you would just treat them without checking up on them or being able to identify the danger [signs] or if the child is okay or not. MUAC has helped a lot because when a child starts falling ill you check if you can*

continue treating them at home or if you need to take them to the clinic. It really does help. (Mother #1, Site 1, Gauteng)

Using the RTHB to access information was an empowering experience, and challenged mothers' perceived role as passive recipients of care by giving them tools to make their own decisions about child care. Mothers explained that in the past they did not understand that the RTHB was a resource for them, they would take the RTHB to the health workers at the clinic and would otherwise just keep it safe at home. Many participants were unaware the RTHB contained valuable information about breastfeeding, infant feeding and danger signs of severe illness in children. Mothers reported they spent time reading the child's book to gain an understanding of how to care for their child at home and manage expectations when visiting the clinic.

I also say that this program of MUAC helped me a lot because I was not used to opening a child's card [RTHB] and when you open the child's card on page seven, it shows about the child's food, so that if you give food to a child you must give it according to the child's age. Right now, I'm running to the card to see what kind of food I should buy for him, not to buy food that doesn't last long. (Mother #1, Site 6, KZN)

As a result of the knowledge gained from the RTHB some mothers reported they had changed their feeding practices to include a variety of homemade or family foods for young children.

[It] also showed me the importance of making purity [pureed baby food] for a child in the house and not necessarily [buying] in the shop. You buy fruits; wash them and make fresh purity. You feed a child porridge with peanut butter or add egg on a different day. Also, that children [can] eat meat because we used to only give them gravy, so you can grate the meat and give the child to eat. The child grows up well eating vegetables that have vitamins (Mother #2, Site 1, Gauteng).

Empowerment of mothers was further highlighted in some rural communities, where MUAC trained mothers took the initiative to spread the Family MUAC intervention by showing untrained mothers or grandmothers how to measure MUAC. The need to see improvements in child health at the community level was what motivated these mothers.

We help children who live with their grandmothers, we show them how to do it and they are teachable to the extent that others have understood better than us. MUAC has helped us…We teach mothers that this is a new program for children that requires the child to be measured and to eat well. It is easy to train grandmothers but training peers is difficult. They complain about not having time to do it. But for grandmothers it's going well. (Mother #1, Site 7, KZN)

Overall, mothers reported that participation in Family MUAC project activities strengthened their understanding of the importance of their role in the provision of care for their own children. The project helped mothers to quickly notice danger signs in children who were unwell.

One thing that occurred to me is that the child's first doctor is the mother, before the mother starts taking the child to another place. (Mother #3, Site 7, KZN)

Several mothers reported that when they took their child to the clinic the nurses did not communicate, explain their findings, give feedback about the child's progress or give advice about how to feed the child. In addition, mothers were often anxious about clinic visits, saying that they were fearful of talking to the nurses and asking them questions. The knowledge gained from Family MUAC improved mother's confidence in communicating with health workers during clinic visits, reporting that they were more able to engage with health workers about the services provided, to ask questions and they felt empowered to ask for services they required.

You know, when a nurse says something, it's hard not to know what it means. Because it's hard to say how you will answer. Right now, when the nurse says something, I say that I have been taught about this too. Even though I don't have a certificate like you, but I have been taught. (Mother #6, Site 6, KZN)

Discussion

Our findings demonstrate that measuring MUAC at home with the support of CHWs was well received by mothers and feasible to implement in low income communities, supporting other studies where MUAC measurements by mothers and CHWs has been successfully implemented [11, 14, 15]. In particular, using CHWs to support Family MUAC was a strength of this intervention and had a range of benefits. Mothers perceived CHWs as caring, patient, and willing to spend time to support them in caring for their children. CHWs were accessible with a good understanding of the mother's home and family situation. Mothers appreciated the good communication, continuity of care and how their relationship with the CHW strengthened over time, all of which motivated them to continue with MUAC measurements. Mothers contrasted this with their experiences in

busy clinics, where long waiting times and lack of feedback were disempowering and demotivating.

Mothers and family members are best placed to identify malnutrition in their own children, and MUAC measurements can be done effectively by mothers and child carers [15, 18]. Using mothers to measure the MUAC can lead to more frequent screening, earlier detection of malnutrition, and support prompt entry into treatment programmes [14], and reduce length of hospitalisation and mortality among children [15]. Ale et al. suggest that involving mothers in screening their own children using MUAC tapes was the key to improving access to care among children with malnutrition [11]. Our findings show that measuring MUAC engaged the mothers more strongly in their children's care and mothers responded well to participating in the decisions about their child's health. Blackwell and colleagues noted in their study of community MUAC that mothers and family members had previously seen MUAC measured but it had never been explained to them, and they appreciated the opportunity to understand and participate in their children's care and helped each other learn [14].

Our findings highlight the important role that CHW can play to strengthen and support child health in households and communities, particularly in the context of the global shortage of health workers [24]. Positive relationships and continuity of care are important attributes of a CHW led service [25]. CHWs are ideally placed to provide ongoing support for mothers and other child carers, and were accessible to mothers for additional support if required. CHWs already provide household visits in their areas so can be sustainable without requiring additional resources. Further, our findings suggest that CHWs are a powerful resource for improving child care in the household. CHWs have been able to effectively support a wide variety of child health programmes and interventions in many settings including supporting breastfeeding [26], management of common childhood diseases [27], household hygiene and early child development [28]. During their routine ongoing household visits CHWs can add value by providing health education for mothers and children. Over time this will improve working relationships between CHWs and mothers, build community resilience and social capital, and improve adherence to nutritional therapy or other treatments when required [25].

In South Africa, the CHWs existing scope of practice includes regularly measuring MUAC in children in the households they visit, but CHWs are overworked with multiple responsibilities that severely limit their ability to check the MUAC frequently and regularly [16, 17, 29]. Thus, we suggest that shifting the CHW's role from direct responsibility for measuring MUAC to the supportive role of assisting mothers is a feasible way of improving coverage of MUAC measurements. In contrast with other studies that suggest that measuring MUAC is easy for mothers [14, 18], many mothers in our study reported that learning to use the MUAC tape was difficult, and required several visits from the CHW until they were confident to do the measurement.

Supporting mothers to access nutrition and growth information on the RTHB was empowering to mothers in our study, giving them an active role in their children's care. Women's empowerment has been positively associated with a variety of maternal and child health outcomes such as antenatal care, skilled birth attendance during delivery, contraceptive use, child mortality, nutritional status and immunization [30]. Studies have shown that empowered women are better able to make informed decisions about food in the household, recognize early signs of malnutrition, and seek appropriate healthcare for their children leading to improved health outcomes [31]. Over half of under-five deaths in South Africa occur at home, possible reasons are that mothers do not seek care timeously, are discouraged by perceived inadequate care at health facilities, or do not have the knowledge or resources to return to health facilities when the child's condition deteriorates [6, 8, 32]. Therefore, developing mother's skills and empowering them to take more responsibility for their children's health is important for improving health seeking. Further, our study suggested that mothers were empowered to ask questions and demand services during the clinic visit, and this could be further strengthened in a future Family MUAC project. Thus, screening children using MUAC is an entry point to involving, engaging and empowering mothers in the care of their children.

Mothers were supportive of learning together in groups, and often went to their peers for support if they required assistance with MUAC measures, demonstrating that group learning built social capital and resilience. Some mothers also reported assisting other mothers in the community who had not been trained in MUAC. There is evidence that women's peer support groups can improve coverage of community-based interventions, improve household child care practices, create secure spaces where women can share their opinions and experiences with their peers, thereby promoting women's empowerment, behavioral change, social capital, collective action, peer support and resilience [33]. With appropriate training and support, CHWs and their team leaders could establish women's support groups, which would improve the effectiveness and efficiency of CHW activities by bringing mothers together for peer support, information sharing, training and mentoring over a broad range of topics including Family MUAC but also antenatal care and education, breastfeeding support, early child

development and nurturing care and other key household child care practices.

Strengths and limitations of the study

This study was part of a mixed methods evaluation of Family MUAC and provides in-depth understanding of experiences of Family MUAC from the perspective of mothers in different sites. However, although we aimed to include other child carers, almost all participants were mothers so the voices of other child caregivers were not heard. Further, using qualitative methods we were unable to determine the effectiveness or sustainability of Family MUAC.

Conclusion

Our findings support the use of CHWs as a community resource to support mothers to screen for malnutrition using MUAC measurements on their children and suggest that CHWs are an important resource for empowering mothers to take a stronger role in caring for their children and could be used to support other child health interventions. Empowering mothers with knowledge and skills to care for their children will have ongoing benefits for the child, the family and the community.

Abbreviations

CHW	Community Health Worker
FGD	Focus Group Discussion
KZN	KwaZulu-Natal
MAM	Moderate Acute Malnutrition
MUAC	Mid Upper Arm Circumference
PHC	Primary Health Care
RTHB	Road to Health Book
SAM	Severe Acute Malnutrition
WFHZ	Weight For Height Z-score

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40795-025-01003-7.

Supplementary Material 1.

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Authors' contributions

CH, SM, SL, LH, GT and ZB participated in the design of the intervention. CH, SM, SL and LH conceptualized the evaluation. SM and SL undertook data collection. CH, SL, SM and LH read all the transcripts and analysed the data. SL wrote the first draft of the manuscript. CH, SM, SL, LH, GT and ZB commented on versions of the manuscript. All authors approved the final manuscript prior to submission.

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Data availability

Data used and analysed during this study are available from the corresponding author upon reasonable motivation and request.

Declarations

Ethics approval and consent to participate

The study was carried out according to the guidelines and regulations laid down in the declaration of Helsinki. Ethical approval was obtained from the Biomedical Research Ethics Committee (BREC/00003893/2022) at the University of KwaZulu-Natal, and permission was obtained from the KwaZulu-Natal Department of Health (KZ_202203_30) and Gauteng Department of Health (GP_202203_057). Individual approval was obtained from ethics committees in the three districts in Gauteng and letters of support were obtained from the two districts in KZN. All participating mothers and primary child carers provided written informed consent to participate. Consent forms were prepared in isiZulu, Setswana and English. To ensure participants' anonymity participants were allocated a study number and no names or identifying information were recorded on the database.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

[1]Centre for Rural Health, University of KwaZulu-Natal, Durban, South Africa. [2]Child Youth and School Health: National Department of Health, Pretoria, South Africa. [3]UNICEF South Africa, Pretoria, Gauteng, South Africa.

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