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Qualitative Study of Healthcare Seeking Behavior and Development of Behavioural Nudges for a Nutrition Program in Gombe State, Nigeria

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ABSTRACT

Objective: This qualitative study aimed to identify and explain healthcare seeking behaviours among caregivers of young children and apply these findings to develop a mobile phone-based messaging intervention to encourage sustained attendance at a community-based management of acute malnutrition (CMAM) program in Gombe state, Nigeria.

Design: Researchers conducted focus group discussions (n=6) and key informant interviews (n=3) with 33 subjects. Transcripts were independently coded and thematic analysis was conducted to gain an understanding of the facilitators, barriers, and motivators shaping caregivers' decisions to attend health services for malnourished children, as well as access to and use of mobile phones.

Participants: Focus groups and interviews were conducted with caregivers of children aged 6-59 months living within travelling distance of three CMAM sites in Gombe state, Nigeria.

Results: Barriers to seeking health services included high costs; perceptions of poor quality of care, including poor treatment by health workers; and female caregivers' limited autonomy. Despite barriers, participants recommended seeking hospital care for a malnourished child. Participants described widespread mobile phone use and recommended messages emphasising that CMAM services are free, conveying respect for caregivers, and reminding caregivers to continue making an effort to attend the CMAM program even as their child began to appear healthier.

Conclusions: This study provides a framework for developing contextually salient behavioural nudges for child health and nutrition programs which, in combination with other community outreach strategies, could help motivate and sustain care seeking behaviour.

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Introduction

Reducing default from community-based management of acute malnutrition (CMAM) programs is a pathway for improving effectiveness of treatment for acute malnutrition. Evidence from public health and behavioural economics suggests that messaging interventions, such as automated texts and reminder calls, can increase participation in similar health interventions [1-3]. The aim of this qualitative study is to better understand why default occurs and patterns of caregiver mobile phone use and apply these findings to develop a messaging intervention for caregivers of children attending a CMAM program in Gombe state, Nigeria.

Acute malnutrition remains a significant contributor to child mortality, with its effects increasingly concentrated in sub-Saharan Africa and South Asia [4]. In 2019, an estimated 5.2 million children around the world died before their fifth birthday, with 993,000 deaths and 16.6% of disability-adjusted life years attributable to child wasting [5]. Over the next decade, acute malnutrition, including wasting, is projected to account for a growing share of the burden of undernutrition, with cases heavily concentrated in societies affected by poor governance and conflict [6].

In Nigeria, the prevalence of child wasting among children under five was seven percent in 2018 [7]. However, cases were concentrated in northern states, where rates of wasting were approximately two times higher than in southern states [7]. States

in the northeast region have been affected by years of armed conflict, contributing to widespread displacement, interrupted livelihoods and agriculture, increased food insecurity, and weakened health systems [8].

Throughout Nigeria's northern states, government agencies, UN agencies, and non-governmental organisations implement CMAM programs, including outpatient therapeutic programs (OTPs) to treat severe acute malnutrition (SAM) without medical complications [9]. The duration of outpatient treatment typically ranges from five to nine weeks among programs in northern Nigeria [10,11].

The default rate is a core performance indicator for CMAM programs. It represents the proportion of children who stop attending before reaching nutritional recovery [12]. The Sphere standards for humanitarian response state that default rates should not exceed 15 percent [13]. However, previous CMAM programs in Gombe state have reported default rates as high as 50 percent [14].

The field of behavioural economics offers a theoretical framework for designing interventions to increase participation in health services. Behavioural economics postulates that the provision of new information or cognitive frameworks through "nudges", such as messages, can influence behaviour [15,16]. Research in health services delivery demonstrates that messaging interventions can increase attendance and medication compliance in outpatient clinical programs [17,18].

Implementation of messaging interventions in low and middle income countries (LMICs) poses particular challenges, including reliability of mobile phones, disparities in access to mobile phones, and weak information systems [19]. In Nigeria, a 2017 Pew Research Study found that 80 percent of adults own some type of mobile phone [20]. However, phone ownership and network coverage tend to be lowest in rural areas, which have higher burdens of acute malnutrition and lower access to health services. Low literacy rates may pose a challenge for text-based interventions. Among women aged 15-49 years in Gombe state, literacy rates were 32.1 percent in 2018, likely with lower rates in rural areas [7].

Nevertheless, a growing body of evidence suggests that messaging interventions can increase participation in community health programs in LMICs. In a randomised trial of adherence to antimalarial treatment in northern Ghana, receiving text messages reminders increased adherence to the full course of antimalarials [2]. Also in Ghana, a cluster randomised controlled trial found that new parents who received voice call reminders were 10.5 percent more likely to have their infant vaccinated on-time compared to new parents who received no reminder [1]. Due to the low costs of automated mobile messages, these interventions can be cost-effective when implemented as part of scaled programs, even when effect sizes are modest [21]. However, a recent systematic review of mobile health (mHealth) interventions in sub-Saharan Africa found that existing mHealth systems did not address major causes of child mortality in the region [22].

Related to nutrition specifically, interactive voice recorded phone calls to caregivers of young children in Senegal were associated with an increase in the consumption of nutritious foods [3]. During COVID-19 lockdowns, health workers in India used mobile phone calls to evaluate the status of children after discharge

from inpatient treatment for acute malnutrition [23]. In Kenya, a two-way text message intervention with caregivers to monitor children's nutritional status at home using a MUAC tape was associated with a 37 percent reduction in wasting incidence [24]. However, this is among the first studies to examine the utility of mobile messaging interventions to reduce default in CMAM programs.

Methods

Study Design

The research team conducted a qualitative descriptive study in which caregivers of children aged 6-59 months in Gombe state, Nigeria discussed their perceptions of childhood malnutrition, facilitators and barriers to seeking health services for children, and mobile phone use. Semi-structured focus group discussions were conducted with 30 caregivers. Focus groups were segregated by gender and facilitated in Hausa by university lecturers with post-graduate training in the social sciences and humanities and fluency in Hausa and English. To contextualise the focus groups, in-depth interviews were conducted with three caregivers of children receiving treatment for acute malnutrition. Interviews were facilitated by a university lecturer, fluent in Hausa and English, with previous experience collecting qualitative health data in Gombe state. COREQ guidelines were followed in the description of the study design, analysis and presentation of findings (see Supplementary material: Table 1) [25].

Table 1: Participant Characteristics

Female participants Focus groups: 15 Interviews: 3
Male participants Focus groups: 15 Interviews: 0
Total participants: 33

Thematic analysis of focus group and interview content was used to gain an understanding of factors shaping caregivers' decisions to seek health services for children, access to and use of mobile phones, and resulting preferences for messaging. Qualitative findings were applied to develop a framework for sending automated voice reminder calls via mobile phone to caregivers to encourage weekly CMAM attendance.

Ethical Considerations

Focus groups were completed in a private space arranged by a community leader, such as classrooms after school hours. Interviews took place in private spaces in the health facilities where the children were receiving care. Facilitators used a standard script to obtain verbal consent from each participant before commencing the discussion (see Supplementary material: Consent scripts). Participants received 500 Nigerian Naira in cash as compensation for their time.

To ensure confidentiality, an identification number was assigned to each recording, transcript, and field notes. Names of participants were not recorded. Researchers recorded the phone numbers of a subset of participants who were willing to receive calls to provide feedback on findings and draft messages.

Characteristics of the Research Team

All authors have post-graduate training in qualitative research

methods and prior experience working on or researching child health programs. The principal investigator (J.O.) is a public health program manager with the Taimaka Project, an NGO providing CMAM services in Gombe state. The co-investigators include a practising paediatrician with training in public health (S.K.) and a university lecturer and doctoral candidate in medical sociology (H.U.). A co-investigator (H.U.) with prior experience conducting qualitative research in health facilities in Gombe state led field data collection with trained external facilitators. The corresponding author (O.S.) served as the study manager and has post-graduate training in gender studies. Prior to this research, no relationship was established between the researchers and the participants.

Participant Selection and Sample Size

This study was conducted in three purposively sampled communities with new CMAM program sites in Gombe state, Nigeria. To recruit focus group participants, researchers visited community leaders and obtained recommendations about individuals or venues for recruitment. To recruit interview participants, researchers liaised with health care workers at facilities providing treatment for acute malnutrition.

Individuals were eligible to participate in focus groups if they: (i) were the primary caregiver of at least one child aged 6-59 months; (ii) lived within walking or travelling distance of a CMAM OTP site; (iii) spoke Hausa; and (iv) consented to participate in the study. Interview participants were further required to be seeking or have recently sought care for a malnourished child.

Facilitators approached individuals or groups recommended by traditional leaders and health workers and invited them to participate by presenting a verbal overview of the study and its purpose. Some individuals approached for recruitment declined to participate, primarily due to lack of time. Precise numbers of refusals were not recorded.

Face-to-face focus groups and interviews were conducted the same day. In some cases, traditional leaders were present to introduce the discussions. Only the researchers - including facilitators and designated notetakers - were present for the full duration of the discussion. Thirty caregivers of children aged 6-59 months took part in six focus groups (n = 5 participants per group) and three caregivers of acutely malnourished children took part in interviews.

Data Collection

Data were elicited through focus groups and interviews using a semi-structured discussion guide (see Supplementary material: Semi-structured guides). The focus group guide was developed from a literature review of default in CMAM programs, health applications of behavioural economics, and mHealth interventions. The interview guide was adapted from the focus group guide to be shorter and ask about caregivers' direct experiences seeking services for an acutely malnourished child.

Guides were developed in English, translated into Hausa, and back translated into English. Prior to data collection, the focus group and interview guides were piloted in Hausa with four nutrition program staff and four researchers.

Focus groups and interviews were conducted in August and September 2022. Focus groups lasted 60-80 minutes; interviews lasted 30-40 minutes. Both focus groups and interviews were audio-recorded in Hausa using a mobile phone application. Recordings were uploaded to a secure folder, transcribed verbatim in Hausa, and translated to English for coding. Translations were checked for accuracy by a bilingual member of the research team. Full transcripts were not returned to participants due to time and resource constraints and low levels of literacy in the target population. However, a member of the research team called a subset of participants to obtain feedback on messages developed from qualitative findings.

During focus groups, a designated notetaker recorded notes in English on a standard template. Notetakers were not present during interviews. The interview facilitator recorded notes on the standard template after completion of the interview.

Data collection concluded after the sixth focus group, when participants repeated similar ideas and no new themes emerged, achieving data saturation [26]. Interviews were limited to one per location (three in total) to triangulate focus group findings while minimising the burden on caregivers of ill children.

Data Analysis

Two authors (S.K. and J.O.) independently coded all English transcripts (n=9). A third author (H.U.), fluent in Hausa and English, coded a subset of English transcripts (n=3) to ensure the quality of the Hausa-English translation. Coding was conducted in Microsoft Word using the comment and highlight features.

This study followed thematic analysis according to the steps outlined by Braun and Clark [27]. Two authors (S.K. and J.O) read all transcripts and separately generated an initial list of descriptive codes and illustrative quotes pertaining to each code. The authors then met to develop a common codebook, which was applied to all transcripts. New codes that emerged during coding and recoding were integrated into the final list of codes.

The final codebook included inductive (n=10) and theoretical (n=11) codes. Theoretical codes reflect topics from the semi-structured guide and the literature on CMAM, child health, and behavioural economics. Final codes are presented in the coding tree in Supplementary material: Table 2. To ensure integrity and consistency of code applications, researchers (J.O. and S.K.) independently coded a common transcript and then met to compare code applications and reach a common agreement on code applications.

Table 2: Messages for Caregivers Developed from Qualitative Findings

Message sent before second visit:	<p>Hello, this is [name of health worker] from the Taimaka nutrition clinic in [site of OTP], calling you with a free, recorded message about the health of your child.</p> <p>Thank you for coming into the Taimaka nutrition clinic this week. We hope that your child is feeling better today and look forward to working with you to improve their health and wellbeing over the next weeks. Please remember to come in for your visit tomorrow. Everything at the nutrition clinic is free and we open at 8am. See you soon!</p>
Message sent before third visit:	<p>Hello, this is [name of health worker] from the Taimaka nutrition clinic in [site of OTP], calling you with a free, recorded message about the health of your child.</p> <p>Thank you for coming into the Taimaka nutrition clinic for your second visit. We really admire your commitment to your child's health and wellbeing. Sometimes children look healthier already! It's important to keep coming to get medication and food so that your child can make progress. Please speak to anyone in the nutrition clinic if you have any problems or concerns. Everything at the clinic is free.</p>
Message sent before fourth visit:	<p>Hello, this is [name of health worker] from the Taimaka nutrition clinic in [site of OTP], calling you with a free, recorded message about the health of your child.</p> <p>It was great to see you and your child this week! Your child may look better - they may feel happier and healthier. This has been a result of your dedication, consistency in your weekly visits, and care in feeding your child. Even if your child is improving, it's important to keep bringing them in each week to see how they are doing and help them become fully healthy. Please speak to anyone in the nutrition clinic if you have any problems or concerns. Everything at the clinic is free.</p>
Message sent before fifth and subsequent visits:	<p>Hello, this is [name of health worker] from the Taimaka nutrition clinic in [site of OTP], calling you with a free, recorded message about the health of your child.</p> <p>We really appreciate your patience and time coming to the Taimaka nutrition clinic. As you visit the clinic, your child may look healthier and healthier. Our goal is for your child to achieve their full potential to be happy and healthy, which means that you must keep coming in weekly until you are discharged from the program! You have done so much for your child - we want to do our best for you, please let one of our staff know if you have any feedback. All of our care is free.</p>

Message sent to absentees:	<p>Hello, this is [name of health worker] from the Taimaka nutrition clinic in [site of OTP], calling you with a free, recorded message about the health of your child.</p> <p>We hope that you and your child are doing well. We noticed that you didn't come to the Taimaka nutrition clinic for your weekly visit this week. We would love to see you, and you must come weekly in order for your child to be fully happy and healthy again. Please speak to anyone in the nutrition clinic if you have any problems or concerns, everything at the clinic is free. We look forward to seeing you soon!</p>
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Using tables, final code applications were grouped into categories and then into themes. Each theme was reviewed with consideration to the research aims and the degree of overlap with other themes. Significant verbatim quotes from participants were selected to include in the results section to elucidate themes.

Results

A summary of participants by gender is presented in table 1. All participants reported having at least one child aged 6-59 months. Interview participants reported having at least one child receiving treatment for acute malnutrition. No other demographic information was collected.

Six main themes were identified: costs associated with seeking health services, quality of care as a driver of health seeking behaviour, stigma and gender roles, treatment for acute malnutrition at the hospital and at home, patterns of mobile phone use among caregivers, and recommendations for message content.

Theme 1: Costs Associated with Seeking Health Services

Participants described poverty as both a cause of malnutrition and the primary reason families do not seek health services for children. Even when health services were free, participants noted the transportation costs as a barrier to access, including access to follow-up care. As a caregiver of a malnourished child explained "Since our first visit, we have never come for follow up. [...] I don't have the transportation fee to take him to the hospital" (I-1.1). Participants also described struggling to pay or choosing not to seek health care because of anticipated costs of clinical consultations, hospital bed fees, medications, and other consumables.

The unpredictability of costs, in part due to stockouts and shifting prices, further deterred caregivers from seeking health services for children. Participants explained that they did not know which labs or medications would be requested during their child's treatment, making budgeting difficult and creating a sense of futility around seeking care only to run out of money before effective treatment could be rendered. In the words of a focus group participant, "One may want to go to the hospital but [...] when you go and pay for tests and the rest, the money to get drugs may become difficult" (FG-1.6). Participants worried that fees would increase without notice, and that the drugs and consumables ordered by the clinician would stock out at free or subsidised public pharmacies, forcing them to procure the products at higher prices from private pharmacies.

Theme 2: Quality of Care as A Driver of Health Seeking Behaviour

High costs overlapped with low quality of care to deter health seeking behaviour. Participants described deciding not to seek care because of the poor quality of affordable services or, in some cases, feeling compelled to seek care at private facilities at higher cost. Participants described staff shortages, unqualified staff, inadequate infrastructure and commodities, and rude or inattentive treatment by health staff. As a female focus group participant said, “Then, at the hospital, still on medicine, sometimes, one meets nobody at the pharmacy and you sometimes will wait for hours only to be informed that the doctor on call is not around” (FG-2.1). Participants generally felt that private facilities offered better services than public facilities, including shorter waiting times and more attentive staff.

A minority of participants commended the efforts of public facility staff to assist ill children, even with limited resources. As one male focus group participant explained, “There are those [health workers] that welcome you warmly and with dignity [...] this encourages us. We will keep going to the hospital” (FG-1.11). Consistent with the discussion on barriers, participants described good treatment by facility staff, free consultations and medications, short waiting times, and sufficient staffing as qualities that would encourage people to continue attending follow-up appointments.

Theme 3: Social Stigma and Gender Roles

While participants noted the structural barriers associated with poverty and low quality of care, they also described caregivers of malnourished children as lazy, ignorant, and careless. A male focus group participant described the perceived neglect of parents of malnourished children, saying “And some people are lazy. They find it difficult to look after their children, including seeking for medicine” (FG-3.8). This stigma applied to male and female caregivers according to their gender roles.

Male caregivers of malnourished children were criticised for failing to provide for their families. According to a female focus group participant, “many men abandon their responsibility” to support their children (FG-2.4). Similarly, a male focus group participant stated that malnutrition “signifies the father’s lacking, his lack of ability to feed the mother with good food” (FG-1.9).

Criticisms of male caregivers generally reflected perceptions that they had the agency to improve the health of their children, but failed to do so. In contrast, female caregivers described having limited autonomy in decision making and control over financial resources. In an interview, a female caregiver of a malnourished child described dependence on her husband to grant permission to visit the hospital and provide financial support, saying “[My husband] allows me to visit hospital, but I don’t get a penny from him” (I-1.1).

Nevertheless, female caregivers were also perceived as facing stigma for not providing adequate care for their children, despite gendered structural barriers to seeking care: “They blame the mother, ignoring the harsh economic condition. People suffer. Some can’t even afford one meal a day, talk less of three times a day” (FG-2.2).

Theme 4: Treatment at the Hospital and at Home

Despite the costs, nearly all participants recommended seeking care for a malnourished child at the hospital. A minority of participants also stated that there was a need to counter misconceptions that free services were intended to harm recipients and that malnutrition was a spiritual illness rather than a medical one.

Participants further noted that, while hospital care was preferred, many caregivers would attempt to treat their children at home due to high and unpredictable costs of seeking hospital care, poor quality of care at affordable facilities, and, among female caregivers, lack of permission or financial support from male household members. When asked how caregivers might address malnutrition at home, participants suggested feeding children “healthy” or “body building” foods such as groundnut, beans, egg, fish, liver, greens, and fruit. However, costs again emerged as a barrier to implementing such advice. In the words of one focus group participant, “One may want to [buy beans] but [this] may not be possible because he does not have the means for the money” (FG-1.4).

Theme 5: Mobile Phone Use among Caregivers

When asked about mobile phone use as a potential tool for communicating with caregivers, participants expressed a perception that “almost everyone” uses phones throughout the day, with the exception of children and some elderly people. Some participants also expressed a preference for in-person events to raise awareness about health services, in part to facilitate the inclusion of people who do not have access to phones.

All participants noted that mobile phone sharing sometimes occurs, though most participants did not share phones themselves and tended to view the practice as more prevalent in rural areas. The most common forms of phone sharing described by participants were sharing phones among members of the household - often wives borrowing phones from their husbands - and sharing phones with neighbours. A small number of participants also described paying a fee to a vendor to use a phone or inserting a SIM card into someone else’s phone to receive or make calls.

Despite descriptions of limited female autonomy and financial resources, participants did not express a clear consensus on whether men or women use phones more. Some participants insisted that men use phones more, while others maintained that women use phones more, and still others reported no difference.

Participants generally indicated that they would listen to automated messages from the CMAM program if messages were engaging and presented relevant information. However, some participants cautioned that people would not answer calls from unknown numbers and that automated calls were sometimes in a language that the recipient did not understand. A minority of participants felt text messages could be an effective means of reminding caregivers despite low literacy levels; caregivers who could not read would simply ask someone to read the message for them.

Theme 6: Recommendations for Message Content

When asked what they would say to caregivers to encourage them to attend weekly CMAM visits with their child, participants recommended emphasising that care would be free, including free medicines, and that there would be adequate, polite staff and equipment at health facilities. A male focus group participant said simply: “The polite expression will encourage people going back to the hospital” (FG-3.9).

Participants advised against sending messages that requested recipients to call back because this would incur a cost to the message recipient. Participants also emphasised the need to acknowledge the caregivers’ efforts to seek care and urge them continue attending despite the costs of transport. A small number of participants raised concerns that people would be suspicious of free services because of a possible ulterior motive to harm recipients.

Interview participants who were themselves caregivers of malnourished children emphasised the importance of including messages that acknowledge the improvement of the child and the need to continue attending the clinic until the child is fully recovered. In the words of one interviewee, “Once their child looks healthy, [caregivers] won’t return and need a reminder” (I-2.1).

When asked about an appropriate messenger, nearly all participants expressed that a reminder from a relative would be most effective. After relatives, religious leaders and health workers were described as the most trusted messengers. Among participants who raised concerns about ulterior motives for offering free services, having a trusted messenger was viewed as a means of mitigating these suspicions.

Discussion

The study identified facilitators and barriers of healthcare seeking behaviour for malnourished children, preferences around messaging, and patterns of mobile phone use in three communities in Gombe state, Nigeria. Reasons for not seeking health services - even when they are free - were consistent with explanations of default in other CMAM programs, including transportation costs, household distance from health facilities, unacceptability of treatment, low quality of care, lack of social support for caregivers, limited female autonomy, and loss of interest in the program, particularly after the child starts to appear healthier [28-35]. Opportunity costs of childcare or missed work have been identified as causes of default in other CMAM programs, but did not emerge in this study. Possible explanations include the dominance of seasonal agrarian employment and the multi-family structure of households in the communities included in the sample, reducing the costs associated with childcare or missed work during the study period, which took place after planting but before harvest.

Automated voice messages could build on existing community mobilisation strategies to encourage caregivers to seek services for malnourished children and prevent default once they are enrolled. Since its inception in the early 2000s, community mobilisation and outreach have played an important role in CMAM [36]. The daily work of community mobilizers varies by program, but may include house-to-house screening for acute malnutrition, meetings with local leaders, conducting home visits to check on children enrolled in the program, and verifying addresses and tracing absentees. A trial in Kenya suggested that a two-way text messaging intervention to encourage caregivers to monitor their child’s MUAC at home could support or replace door-to-door screening activities for case identification [24]. Messaging interventions to reduce default could build on existing community mobilisation strategies by engaging local leaders as trusted messengers - particularly religious leaders and well-known health workers, as recommended by participants - to record automated calls in local languages. Widespread phone sharing may also present an opportunity to raise awareness about the program among heads of household and neighbours who share phones with caregivers attending the clinic.

Consistent with Key Concepts From BE

The themes from the focus groups and interviews were consistent with key concepts from behavioural economics, including the ideas that people tend to make inconsistent choices over time, apply shortcuts to make decisions faster and easier, lack adequate knowledge to make informed decisions, defer to social preferences or the “status quo”, and are more sensitive to immediate losses than long-term gains [37]. Lack of information about the costs of

seeking care and scepticism about the quality of care - particularly from more affordable government facilities - led participants to explain that they and their peers sought care only occasionally, despite perceiving seeking treatment at the hospital as the best course of action to care for a malnourished child. Immediate costs, such as transportation to the health facility, were commonly described as a deterrent to seeking timely healthcare for an ill child. Despite some positive interactions with health workers, the general perception that health services were prone to staffing shortages, stockouts, lack of infrastructure, and rude or inconsiderate staff discouraged caregivers from seeking health services at all.

Various public health interventions draw on concepts from behavioural economics to encourage health seeking behaviour, including efforts to simplify health information, provide health education, and tailor the framing of messages to the particular health service offered [37]. Such interventions are consistent with the recommendations of participants to create reminder messages that reassure caregivers that all health services will be free to caregivers and emphasise that children should continue attending the CMAM program despite transport costs and after their child starts to appear healthier.

Development of Messages

In combination with the literature on CMAM default, health messaging interventions, and behavioural economics, the findings from this study were used to develop a set of automated voice messages to deliver by phone to encourage caregivers enrolled in a CMAM program to attend weekly visits until their child reached nutritional recovery. English translations of the messages are presented in Table 2.

Messages emphasise that care is free, including free medicines, and aim to communicate respect to the caregiver and commitment to quality of care. Messages acknowledge caregivers’ efforts to bring their children to the clinic each week and frame these investments as a worthwhile step in attaining good health and wellbeing for the child. After drafting the initial messages, a member of the data collection team contacted three participants - one from each site - to ask for feedback on the messages. Participants were generally satisfied with the messages, but recommended further emphasising that all services at the CMAM program were free.

Final messages were recorded by health workers in local languages, including Hausa, Fulfulde, and Tangale. Caregivers indicate their preferred language when reporting their phone number to health workers at the CMAM OTP site, who obtain consent to send calls to the number provided. Community mobilizers responsible for active case finding and referral help caregivers to identify shared phone numbers where they can receive messages, including assisting with writing phone numbers of husbands and neighbours on referral slips submitted to OTP staff.

Our team chose to use health workers to record the messages because they were described by participants as a well-respected source of information and were readily available to assist with recording messages. Future iterations of voice message interventions should consider engaging religious leaders as messengers, particularly in light of the influence of religious leaders and faith-based organisations on uptake of child health services in Nigeria and elsewhere [38-40].

Automated voice calls are sent one day before the child’s next follow-up visit using a commercially available communication

Application Programming Interface. To mitigate inconsistent phone access due to phone sharing, calls are attempted twice to each phone number - once in the morning and, if unanswered, again in the afternoon. The messaging intervention is currently being tested in a randomised controlled trial in a CMAM program in Gombe state. Data collection is expected to conclude in 2024. This project will generate high quality, trial-derived evidence on the use of messaging interventions and feasibility in a CMAM program.

Limitations

Caregivers from rural and remote areas were likely underrepresented in this study. This resulted from patient sampling and recruitment from semi-urban communities hosting CMAM sites, which tend to be larger and less rural than surrounding villages. As a result, the unique barriers to seeking health services and mobile phone use among caregivers from rural and remote areas may not have been fully captured.

Focus group participants were not recruited on the basis of seeking treatment for a malnourished child. This was because the study aimed to seek perspectives from the community members at large, not only those who seek treatment at a health facility, as well as logistical and ethical concerns about recruiting participants on the basis of having a malnourished child. However, this could have resulted in an underrepresentation of perspectives of caregivers of malnourished children.

Conclusion & Recommendations

Findings from the study were instrumental to understanding drivers of healthcare seeking behaviour and developing messages to caregivers in a CMAM program. This framework could be applied by implementers of other child health and nutrition programs to develop contextually salient behavioural nudges to encourage caregivers to seek health services. In the context of Gombe state, messages focused on welcoming, respectful content that aim to clarify expectations around cost, appreciate the efforts of caregivers and their families to attend appointments regularly, and increase caregiver knowledge of the need to sustain program attendance until the child reaches nutritional recovery. Similar messages may be appropriate for other nutrition interventions, particularly in light of the consistency between our qualitative findings and drivers of CMAM default. Messages should be checked for appropriateness and local relevance through consultation with community outreach workers, program participants, families, and other partners. These consultations can be used to inform which languages are needed and identify trusted messengers to feature in voice recordings.

We emphasise that in many contexts automated voice calls should be viewed as a supplement - not a replacement - for existing community outreach activities to reduce default. While the messages developed address some of the themes that emerged in the qualitative findings, such as information gaps about cost and recovery, other important findings are not addressed, including caregiver stigma, limited autonomy among female caregivers, poverty and other structural barriers to accessing health services. Meaningful reductions in barriers and support for uptake of child health and nutrition services must address this array of barriers through a range of outreach activities, leveraging mobile and digital technologies in combination with more traditional strategies, such as household visits, community meetings, and mobile clinics.

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Conflict of Interest

Jennifer Ostrowski and Olivia Shoemakers are employees of the Taimaka Project, the organisation that implements the CMAM program described in this study. Sanjana Kattera is a research fellow with the Taimaka Project.

Authorship

The study was designed by O.S., J.O., and S.K. Study implementation was overseen by O.S., H.U., and J.O.. O.S. and H.U. compiled, translated, and verified the underlying data. Data were analysed by S.K. and J.O. S.K. and J.O. wrote the first draft of the manuscript. All authors edited and approved the content of the final manuscript.

Ethical Standards Disclosure

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the Gombe State Ministry of Health Ethical Committee (reference number MOH/ADM/621/V.1/420). Verbal informed consent was obtained from all subjects. Verbal consent was witnessed and formally recorded.

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Supplemental Table S1: COREQ Checklist

No. Item	Guide questions/description	Location in manuscript
Domain 1: Research team and reflexivity		
Personal Characteristics		
1. Interviewer/ facilitator	H.U. led the data collection team, including training and coordinating facilitation of focus groups by two external facilitators. H.U. conducted the interviews.	Methods, lines 103-105
2. Credentials	H.U. is pursuing a PhD in medical sociology. External focus group facilitators held PhDs in social sciences and humanities.	Methods, lines 71-76 and 103
3. Occupation	H.U. and external focus group facilitators were lecturers in the social sciences and humanities at a state university in Nigeria.	Methods, lines 71-76
4. Gender	H.U. was female. External focus group facilitators included one male and one female, who facilitated the male and female focus groups, respectively.	-
5. Experience and training	H.U. had undertaken training in qualitative research methodologies and had previous experience conducting qualitative research related to women's health in Gombe state. External focus group facilitators had post-graduate training in the social sciences and humanities. H.U., S.K., J.O. and O.S. delivered a half-day qualitative data collection training to external facilitators and notetakers prior to data collection.	Methods, lines 75-76 and 103-105
Relationship with participants		
6. Relationship established	No prior relationship was established between the researchers and the participants.	Methods, lines 106-107
7. Participant knowledge of the interviewer	Participants knew where the researchers worked and the purpose of the research. Participants were introduced to the interviewers by local leaders and health workers who assisted with recruitment. Interviewers explained the purpose of the study and obtained verbal consent prior to commencing the focus groups and interviews. Participants were aware that the facilitators worked at a state university and were conducting data collection to help inform nutrition programming carried out by the Taimaka Project, a local NGO.	Methods, lines 111-114 and 122-124
8. Interviewer characteristics	FGD and IDI facilitators were fluent in Hausa and English. All facilitators resided in Gombe state, Nigeria. The facilitators had an academic interest in research, but were not employed by health and nutrition service providers.	Methods, lines 71-76
Domain 2: study design		
Theoretical framework		
9. Methodological orientation and Theory	The study was underpinned by theory from behavioural economics that "nudges" influence behaviour. Thematic analysis followed the steps outlined by Braun and Clarke (2006)	Introduction, lines 33-36 Methods, line 169
Participant selection		

10. Sampling	A purposive sample of three communities with new nutrition treatment programs was recruited. The researchers contacted traditional leaders in each location and asked for assistance in recruiting parents of children ages 6-59 months to participate in focus groups. To recruit interview participants, researchers contacted health care workers at health facilities providing treatment for children with acute malnutrition.	Method, lines 110-114
11. Method of approach	Facilitators approached individuals or groups recommended by traditional leaders and health workers and invited them to participate by presenting a verbal overview of the study. Face-to-face focus groups and interviews were conducted the same day at a nearby location. Verbal consent was obtained from each participant during the introduction of each focus group or interview (Supplementary material: Verbal consent scripts). Participants were provided with a written information sheet, including contact information for the data collection team.	Method, lines 122-125
12. Sample size	30 caregivers of children aged 6-59 months took part in six focus groups (n = 5 participants per group), 3 caregivers of acutely malnourished children took part in interviews.	Methods, line 129-131
13. Non-participation	Some individuals approached for recruitment declined to participate due to lack of time. Precise numbers of refusals were not recorded. No participants withdrew consent.	Methods, lines 124-125
Setting		
14. Setting of data collection	Focus groups with caregivers of children aged 6-59 months took place in a quiet, private space designated by the traditional leader, such as a classroom after school hours. Interviews with caregivers of acutely malnourished children took place in health facilities where the children were receiving care.	Methods, lines 87-89
15. Presence of non-participants	In some cases, traditional leaders were present to introduce the focus group. Only the researchers were present for the full focus group or interview.	Methods, line 128-129
16. Description of sample	All participants reported having at least one child aged 6-59 months. Female FGD participants: 15 Male FGD participants: 15 Female IDI participants: 3 Male IDI participants: 0 No other demographic information was collected about participants.	Table 1
Data collection		
17. Interview guide	Semi-structured guides for focus groups and interviews with questions and probes were developed and used during the sessions. Guides were developed by S.K. and J.O. and revised by H.U. and O.S. (Supplementary material: Semi-structured guides).	Methods, lines 134-139
18. Repeat interviews	No repeat focus group sessions or interviews were required.	-

19. Audio/visual recording	Focus groups and interviews were audio-recorded in Hausa using a mobile app. Recordings were transcribed verbatim in Hausa and translated to English.	Methods, lines 275-277
20. Field notes	During focus groups, a designated notetaker recorded notes on a standard template. Notetakers were not present during interviews; researcher H.U. facilitated interviews and recorded notes on the standard template after completion of the interview.	Methods, lines 147-148 and 154-156
21. Duration	FGDs ranged from 60-80 minutes. IDIs ranged from 30-40 minutes.	Methods, line 146
22. Data saturation	Thematic saturation occurred by the sixth focus group, at which point no new emerging themes were presented and ideas became repetitive. Interviews were not conducted according to saturation, as they aimed to cross-check the findings from the focus groups while minimising the burden on caregivers of acutely malnourished children.	Methods, lines 158-161
23. Transcripts returned	Transcripts were not returned to participants.	Methods, lines 149-152
Domain 3: analysis and findings		
Data analysis		
24. Number of data coders	Two researchers (S.K. and J.O.) independently coded the English transcripts of all data. H.U. coded a subset of English transcripts to ensure integrity and consistency of themes and Hausa-English translation.	Method, lines 164-166
25. Description of the coding tree	The final codebook used a blended approach of inductive and theoretical codes. A coding frame is provided in Supplementary material: Table 2.	Methods, lines 175 Table 2
26. Derivation of themes	Themes were derived from the data, by reviewing a subset of transcripts (S.K. and J.O.), and recent literature on child health, nutrition, messaging, and behavioural economics (O.S. and J.O.).	Methods, lines 182-185
27. Software	Coding was conducted in Microsoft Word using the comment and highlight features.	Methods, lines 166-167
28. Participant checking	A small number (n = 3) of participants were contacted for feedback on the messages developed from the findings, but did not check the findings directly.	Methods, lines 384-387
Reporting		
29. Quotations presented	Quotations are presented in the results section, with participant codes assigned to all participants and used to attribute quotations.	Results, throughout
30. Data and findings consistent	Authors attempted to report the findings in a clear, consistent manner to accurately reflect the data collected.	-
31. Clarity of major themes	Major themes are stated at the beginning of the results section.	Results, lines 192-195
32. Clarity of minor themes	Diverse cases departing from major findings are highlighted in the results section, within the presentation of each major theme.	Results, throughout

Supplementary Material: Table 2
Coding tree for FGDs and KIIs

Parent codes	Child codes	Process of code development
Perception of acute malnutrition	Causes of malnutrition	A priori - topic in semi-structured guide
	Signs of malnutrition	A priori - topic in semi-structured guide
	Treatment - standard of care	Inductive - theme in coders' margin notes
	Treatment - alternatives to standard of care	Inductive - theme in coders' margin notes
	Treatment - health system limitations	Inductive - theme in coders' margin notes
Availability of resources in health facilities	Staffing shortages	Inductive - theme in coders' margin notes
	Equipment shortages	Inductive - theme in coders' margin notes
	Distance to health facilities	A priori - topic in CMAM default literature
	Availability of nutritional products	Inductive - theme in coders' margin notes
	Availability of other medical products	Inductive - theme in coders' margin notes
Health seeking behaviour	Gender and family roles	Inductive - theme in coders' margin notes
	Community support	Inductive - theme in coders' margin notes
	Health literacy	A priori - theme in child health and nutrition literature
	Household income	A priori - theme in child health and nutrition literature
	Unequal care by health professionals	Inductive - theme in coders' margin notes
	Facilitators to treatment	A priori - topic in semi-structured guide
Mobile phone use	Extent of information sharing	A priori - topic in behavioural economics literature
	Perceptions of automated calls	A priori - topic in semi-structured guide
	Descriptions of mobile phone use	A priori - topic in semi-structured guide
Messages	Recommendations for message content and structure	A priori - topic in semi-structured guide
	Trusted messengers	A priori - topic in semi-structured guide

Supplementary Material: Semi-Structured Guides

Part I: Focus Group Guide

Introduction

1. Use script to explain the purpose of the study and obtain consent.
2. Check for questions.
3. If any caregivers do not consent, they are free to leave the group.

Section 1: Knowledge and Perceptions of Malnutrition

The first few questions we would like to ask you are about perceptions of malnutrition in your community.

1. When we mention the idea of childhood malnutrition, what comes to mind for you?
2. In your opinion, compared to other problems facing children in your community, how concerned or unconcerned are you about malnutrition?
3. Based on what you have heard or experienced, how do you know when a malnourished child is very sick?
4. Based on what you have heard or experienced, how do you know when a malnourished child is better?
 - a. **Probe:** How long does it usually take for a malnourished child who is very sick to get better?
 - b. **Probe:** What is the role of the caregiver in helping the child recover?
5. Suppose there is a caregiver in your community whose child is malnourished. What advice would you give them to help their child get better?

- a. **Probe:** Where or from whom would you advise them to seek care?
6. If a caregiver suspected that their child was suffering from malnutrition, who would they speak to in your community about it?
 - a. **Probe:** Other family members? Other caregivers? Community leaders? Religious leader? Doctors?
 - b. **Probe:** How many people, in total, would they speak to about their child's health?

Section 2: Knowledge and Perceptions About Health and Nutrition Treatment Programs

The next few questions are about programs to treat health and nutrition problems among young children in your community.

1. What do people who have malnourished children do if they cannot afford to go to the hospital? Are there other resources available in the community?
 - a. **Probe:** What do you know about infant and young child feeding groups in your community? Have you participated in them?
2. What is your perception of malnutrition treatment programs in this community? (skip if no information is known)
 - a. **Probe:** Where or from whom do you receive information about these programs?
3. Please describe your experience with seeking health care for young children. What would you do if your child was sick? Where would you go?
 - a. **Probe:** Have you ever visited a primary health care centre before? Why or why not?
 - b. **Probe:** What is your perception of primary healthcare centres or other healthcare facilities in your community?
4. What are some barriers or challenges that you or people you know have encountered in trying to bring a child for treatment at a health facility?
 - a. **Probe:** What are some of the things that make it easier to bring a child for treatment at a health facility?
 - b. **Probe:** What are ways that you overcome these barriers if they exist?
5. When you visit a health care centre for your child (or plan to visit it), do you tell other people in your community?
 2. **a.Probe:** Who do you share this information with? What is your relationship to them?
 - b. **Probe:** When you take your child to a health facility, about how many people - such as your friends and family members - will you tell about your visit? How many of them have children with the same age and health problems?
6. When you bring your child to a healthcare facility, do you go with other people? If so, who?
 - a. **Probe:** Do you bring/accompany children from different households? Do you coordinate with other caregivers?

Section 3: Scenario to Identify Facilitators and Barriers

Suppose you are a caregiver seeking treatment for malnutrition at a health facility. You have already attended one visit, and now you and your child have to go back to the facility once a week for about eight or nine weeks to talk with a health worker, take some measurements, and pick up medicine for the week.

1. What are some of the things that might prevent a caregiver in your community from going to a health facility once a week?
 - a. **Probe:** What are some things that might cause someone to stop participating in a malnutrition treatment program, even after they have already visited one or more times?
2. What could make accessing health facilities easier for a caregiver in your community, especially people with young

children?

- a. **Probe:** What are some things that might help a caretaker attend the program week after week?
- b. **Probe:** What motivates you or people you know to use the services available at health facilities, such as a general hospital or PHC?

Section 4: Access to and Use of Mobile Phones

We are thinking of using mobile phones to communicate with caregivers about treatment for their children at health facilities. In these next few questions, we want to hear your thoughts about this, including what you know about how mobile phones are used in your community.

1. How do people in your community use mobile phones?
 - a. **Probe:** How often do you or people you know use mobile phones?
 - b. **Probe:** What types of mobile phones do people in your community use? How much are smartphones used, and who has access to them?
 - c. **Probe:** How do you or people you know share mobile phones within their household or neighbourhood? Who typically owns mobile phones that are shared?
 - d. **Probe:** How does mobile phone use in your community differ between men and women?
 - e. **Probe:** What groups in your community do not use or do not have access to mobile phones?
2. How often do you personally use a mobile phone? Whose phone is it? What do you use it for?
 - a. **Probe:** What time of day are you usually available to answer a phone call?
3. We would like to know a little more about your thoughts on automated voice calls. By this, I mean a recorded voice message that plays when you answer the phone. Have you ever answered an automated voice call before? If so, what are your thoughts about them?
 - a. **Probe:** If you haven't answered an automatic voice call, what would your reaction be? Would you hang up immediately? How could we prevent that from happening?
4. Other than automated phone calls, what are some good ways to remind/encourage caregivers to continue bringing their child for treatment at a health facility, week after week?
 - a. **Probe:** If a health facility wants to share information with you, would you prefer an SMS, automated voice call, a phone call, a radio message, or some other types of message?

Section 5: Message Content

Our next set of questions is about messages for parents or caregivers of young children to remind or encourage them to participate in treatment programs. Remember this scenario: "Suppose you are a caregiver seeking treatment for malnutrition at a health facility..." We want to identify some messages that would encourage people in your community to continue attending malnutrition treatment programs at health facilities, week after week.

1. What would you say to encourage a caregiver to come back to a weekly visit? What messages can you think of that would be persuasive to caregivers?
 - a. **Probe:** What kind of information would you want in a voice message? What kind of message would be persuasive or supportive to you in bringing your child to a health facility?
2. Now, I am going to share some messages with you. Please point out which messages are most effective and explain why. By effective, I mean likely to encourage a caregiver to return for a visit each week. Here are five messages:
 1. Thank you for visiting the nutrition clinic with your child last week. Please remember to come for your child's visit this

week on [Monday, for example]. Our clinic is open from 8 in the morning until 2 in the afternoon.

2. This is a reminder that your child has an upcoming visit at the nutrition clinic. Please state the time that you will be coming to the clinic into the phone. We look forward to seeing you!
3. Even though your child may look healthier, they still need to attend their weekly visits at the nutrition centre to fully recover. We look forward to seeing you and your child in the clinic this week!
4. We want to support you and your child. Our care is completely free. Please call Taimaka's care manager, [Name], if you have any concerns. [Name's] number is 123-456-7890.
5. Thank you for coming in for your week of treatment. As your child eats their weekly food ration, they will slowly gain weight. Observe changes in your child's weight, energy, and overall health and keep coming into the clinic to see full recovery!

Please give your feedback on each of these messages. What do you think of this message? How does it compare to the others? Would it be effective?

- a. **Probe:** What information is missing from the messages? What other messages might be more helpful?

Section 6: Effective Messengers

1. We want to identify people in your community who would be persuasive in encouraging caregivers to continue weekly visits. Who would be most persuasive in encouraging a caregiver to attend a weekly visit at a malnutrition clinic?
 - a. **Probe:** Family? Friends? Healthcare workers?
2. Now, I am going to share some types of people with you. Please point out which messages are most effective and explain why. By effective, I mean likely to motivate a caregiver to return to the PHC each week until the treatment is finished. Here are seven types of people who could deliver messages to caregivers:
 1. Traditional leader
 2. Community health worker
 3. Doctor
 4. Religious Leader
 5. Family member
 6. Nollywood actors/radio show hosts
 7. Politicians

If one of these people called through an automated system, which would be most likely to motivate you to return to the health facility/PHC? What makes that person more effective/motivating than the others?

- a. **Probe:** Who currently encourages people to go into health facilities?
- b. **Probe:** Who are some other people you would want to hear from?

Thanks and closing

Check for additions, questions, and feedback. Thank the participants.

1. Are there any final thoughts you would like to share about either treatment programs for children with malnutrition or messages to encourage their participation, or any of the other topics we have discussed?
2. Is there anything else that you'd like me to know?

Instructions to Facilitator

Distribute incentive and collect phone numbers from participants who would like to receive a call about the research results. Emphasise that providing a phone number is voluntary and be

sure to distribute the full incentive before asking about a phone number.

Part II: Interview Guide

Introduction

1. Use script to explain the purpose of the study and obtain consent.
2. Check for questions.
3. If the caregiver does not consent, they will not be interviewed
4. Ask questions about the child and caregiver to build trust [before the main interview]. E.g., How long has your child stayed in the hospital? How is your child doing at present?

Section 1: Knowledge and Perceptions of Malnutrition

The first few questions we would like to ask you are about your perceptions of malnutrition.

1. How did you know that your child was malnourished?
 - a. Probe: What were the signs that your child was sick?
 - b. Probe: Did you decide to go to the hospital because of your child's malnutrition or because of an additional sickness?
2. Who did you tell when you knew that your child was malnourished?
 - a. Probe: Friends? Family?

Section 2: Decision to Seek Healthcare

The next few questions are about your decision to come to the hospital.

1. Why did you decide to go to the hospital?
 - a. Probe: After you knew your child was sick, did you wait before deciding to go to the hospital?
2. What did your family think about your decision to go to the hospital?
 3. When you decided to go to the hospital, who did you tell?
 - a. Probe: How many people did you tell? Family? Friends?
 - b. Probe: Why did you tell these people?
 4. When you travelled to the hospital, did you go with anyone else?
 - a. Probe: If you've been to the hospital before, did anyone accompany you? Have you ever brought children other than your own to health facilities?
5. Some caregivers face many barriers or challenges when coming to the hospital, and others do not face any. What barriers did you face when coming to the hospital?
 - a. Cost of treatment in the hospital? Distance travelled to the hospital? Approval of a spouse? Lack of time? Previous hospital experiences?
 6. Qu 9. What could make accessing health facilities easier for a caretaker in your community, especially people with young children, if at all?
 - a. Probe: What are some things that might help a caretaker attend weekly appointments?

Section 3: Knowledge and Perceptions About Health and Nutrition Treatment Programs

The next few questions are about programs to treat health and nutrition problems among young children in your community.

1. How often do you go to the hospital?
 - a. Probe: How often do you go to a primary healthcare centre?
 - b. Do you prefer going to the primary healthcare centre or the hospital?
2. What resources for malnutrition treatment are available in your community? We would like to know about resources and treatments that you use at home and that you access outside your home, either now or in the past.
 - a. **Probe:** What do you know about infant and young child

feeding groups in your community? Have you participated in them?

- b. **Probe:** What alternatives did you have, other than coming to the hospital?

Section 4: Decision to end Engagement with Healthcare

The next few questions are about when you will decide to leave the hospital.

1. How will you know when your child is healthy?
 - a. **Probe:** About how long do you think it will be until your child is healthy?
 - b. **Probe:** How long do you expect to stay in the hospital? How long are you willing to stay in the hospital?
2. Caregivers decide to leave the hospital for a variety of reasons related to health, money, family matters, school, work, and other things. How will you decide when to leave the hospital?
 - a. **Probe:** What factors will motivate you to leave? Family? Costs? Health of the child? Opinion of the doctor?
 - b. **Probe:** Would you leave the hospital before the doctor said that you could? If so, why?

Section 5: Access to and Use of Mobile Phones

We are thinking of using mobile phones to communicate with caregivers about treatment for their children at health facilities. In these next few questions, we want to hear your thoughts about this, including what you know about how mobile phones are used in your community.

1. How do you and other people in your community use mobile phones?
 - a. **Probe:** How often do you or people you know use mobile phones?
 - b. **Probe:** What types of mobile phones do people in your community use? How much are smartphones used, and who has access to them?
 - c. **Probe:** How do you or people you know share mobile phones within their household or neighbourhood? Who typically owns mobile phones that are shared?
 - d. **Probe:** How does mobile phone use in your community differ between men and women?
 - e. **Probe:** What groups in your community do not use or do not have access to mobile phones?
2. We would like to know a little more about your thoughts on automated voice calls. By this, I mean a recorded voice message that plays when you answer the phone. Have you ever answered an automated voice call before? If so, what are your thoughts about them?
 - a. **Probe:** If you haven't answered an automatic voice call, what would your reaction be? Would you hang up immediately? How could we prevent that from happening?
3. Other than automated phone calls, what are some good ways to remind/encourage caregivers to continue bringing their child for treatment at a health facility, week after week?
 - a. **Probe:** If a health facility wants to share information with you, would you prefer an SMS, automated voice call, a phone call, a radio message, or some other types of message?

Section 6: Message Content

Our next set of questions are about messages for parents or caretakers of young children to remind or encourage them to participate in treatment programs.

Here is a scenario: Suppose you were enrolled in a program for malnutrition at a health facility. You have to attend around eight visits, one a week. You have attended one visit, and now you and

your child have to return to talk with a health worker, take some measurements, and pick up medicine for the week. We want to identify some messages that would encourage people in your community to continue attending malnutrition treatment programs at health facilities, week after week.

1. What would you say to encourage a caregiver to come back to a weekly visit? What messages can you think of that would be persuasive to caregivers?
 - a. **Probe:** What kind of information would you want in a voice message? What kind of message would be persuasive or supportive to you in bringing your child to a health facility?
2. Now, I am going to share some messages with you. Please point out which messages are most effective and explain why. By effective, I mean likely to encourage a caregiver to return for a visit each week. Here are five messages:
 1. Thank you for visiting the nutrition clinic with your child last week. Please remember to come for your child's visit this week on [Monday, for example]. Our clinic is open from 8 in the morning until 2 in the afternoon.
 2. This is a reminder that your child has an upcoming visit at the nutrition clinic. Please state the time that you will be coming to the clinic into the phone. We look forward to seeing you!
 3. Even though your child may look healthier, they still need to attend their weekly visits at the nutrition centre to fully recover. We look forward to seeing you and your child in the clinic this week!
 4. We want to support you and your child. Our care is completely free. Please call Taimaka's care manager, [Name], if you have any concerns. [Name's] number is 123-456-7890.
 5. Thank you for coming in for your week of treatment. As your child eats their weekly food ration, they will slowly gain weight. Observe changes in your child's weight, energy, and overall health and keep coming into the clinic to see full recovery!

Please give your feedback on each of these messages. What do you think of this message? How does it compare to the others? Would it be effective?

- a. **Probe:** What information is missing from the messages? What other messages might be more helpful?

Section 7: Effective Messengers

Our next set of questions are about messengers for caregivers of young children to remind or encourage them to participate in treatment programs. We want to identify the people in your community who would be most persuasive in encouraging caregivers to continue attending weekly visits.

1. Who would be most persuasive in encouraging a caregiver to attend a weekly visit at a malnutrition clinic?
 - a. **Probe:** Family? Friends? Healthcare workers?
2. Here are five types of people who could deliver messages to caregivers:
 1. Traditional leader
 2. Community health worker
 3. Doctor
 4. Religious leader
 5. Family member

If one of these people called through an automated system, which would be most likely to motivate you to return to the health facility/PHC? What makes that person more effective/motivating than the others?

- a. **Probe:** Who currently encourages people to go into health facilities?

Thanks and Closing

Check for additions, questions, and feedback. Thank the participants.

3. Are there any final thoughts you would like to share about either treatment programs for children with malnutrition or messages to encourage their participation, or any of the other topics we have discussed?
4. Is there anything else that you'd like me to know?

Instructions to Facilitator

Distribute incentive and collect phone numbers from participants who would like to receive a call about the research results. Emphasise that providing a phone number is voluntary and be sure to distribute the full incentive before asking about a phone number.

Supplementary Material: Consent Scripts

Part 1: KII Script for Informed Consent

Hello, my name is [name]. Thank you for joining me. We are looking forward to hearing your perspectives and learning from you.

Research Purpose

We are here to learn how people in your community think about participation in treatment programs for young children who are malnourished. You have been invited to participate because you have a child younger than five years old that is suffering from malnutrition. We are from the Taimaka Project, an NGO that works here in Gombe state, and we plan to use the findings from this discussion to help improve programs to treat childhood malnutrition.

Procedures

This interview will involve talking with us for approximately an hour. We will ask questions about your perspectives on treatment programs for childhood malnutrition, any barriers and challenges encountered in accessing these programs, and about how staff can improve full participation in these programs. Please note: there are no 'right' or 'wrong' answers to the questions.

We will record this discussion to help us with note taking and data analysis purposes for this research study. This recording will be stored securely to protect your identity.

Risks and Benefits

We will not write your name on any notes, so the answers cannot be linked to you. You will not benefit directly from taking part in this discussion, but we hope that the ideas you share will contribute to efforts to improve the programs to treat malnutrition in children in Gombe state.

Confidentiality

All answers will be kept private and you will be kept anonymous. The recordings will be destroyed after the study is completed. Only the study team members and ethical review boards may review the data collected.

Voluntary Participation

You are free to join the study or not. You do not have to answer any questions that you do not want to answer. You may stop participating in this study at any time; you will not lose any benefits or services if you stop.

Contact Information

If you have any questions about the interview at any time, whether now or later, you are welcome to speak with me at [phone number] or my colleague at [name and contact of another colleague]. Our contact information will be given to you.

After the discussion is complete, you will have the option to provide a phone number, which our research team will use to call you and share the results of the research in approximately 1-2 months. Your phone number will not be used for any purpose other than sharing our results. These calls will be at no cost to you. Providing a phone number is voluntary; that is, you can participate in this research whether or not you wish to provide a phone number.

Thank you for your time and we would be very grateful for your help. Do you have any questions for me before we begin?

Part 2: FGD Script for Informed Consent

Hello, my name is [name]. Thank you all for joining us here today. We are looking forward to hearing your perspectives and learning from you.

Research Purpose

We are here to learn how people in your community think about participation in treatment programs for young children who are malnourished. You have been invited to participate because you have a child younger than five years old. We are from the Taimaka Project, an NGO that works here in Gombe state, and we plan to use the findings from this discussion to help improve programs to treat childhood malnutrition.

Procedures

This group will involve talking with us for approximately an hour. We will ask questions about your perspectives on treatment programs for childhood malnutrition, any barriers and challenges

encountered in accessing these programs, and about how staff can improve full participation in these programs. Please note: there are no 'right' or 'wrong' answers to the questions.

We will record this discussion to help us with note taking and data analysis purposes for this research study. This recording will be stored securely to protect your identity.

Risks and Benefits

Everyone in the group will be asked to respect the privacy of the other group members. All participants will be asked not to repeat anything said within the context of the discussion, but it is important to understand that other people in the group with you may not keep all information private and confidential. We will not write your name on any notes, so the answers cannot be linked to you.

You will not benefit directly from taking part in this discussion, but we hope that the ideas you share will contribute to efforts to improve the programs to treat malnutrition in children in Gombe state. We are just here to ask questions. We unfortunately cannot provide any treatment for your child.

Confidentiality

All answers will be kept private and you will be kept anonymous. The recordings will be destroyed after the study is completed. Only the study team members and ethical review boards may review the data collected.

Voluntary Participation

You are free to join the study or not. You do not have to answer any questions that you do not want to answer. You may stop participating in this study at any time; you will not lose any benefits or services if you stop.

Contact Information

If you have any questions about the interview at any time, whether now or later, you are welcome to speak with me at [phone number] or my colleague at [name and contact of another colleague]. Our contact information will be given to you.

After the discussion is complete, you will have the option to provide a phone number, which our research team will use to call you and share the results of the research in approximately 1-2 months. Your phone number will not be used for any purpose other than sharing our results. These calls will be at no cost to you. Providing a phone number is voluntary; that is, you can participate in this research whether or not you wish to provide a phone number.

Thank you for your time and we would be very grateful for your help. Do you have any questions for me before we begin?

Supplementary Material: Study Information Leaflet

Thank you for participating in a focus group discussion or interview with the Taimaka Project. This information sheet contains details of the study as discussed at the beginning of your conversation with the Taimaka facilitator.

Research Purpose

Taimaka hopes to learn how people in your community think about participation in treatment programs for young children who are malnourished. You have been invited to participate because you have a child younger than five years old that is suffering from malnutrition. We are from the Taimaka Project, an NGO that works here in Gombe state, and we plan to use the findings from this discussion to help improve programs to treat childhood malnutrition.

Risks and Benefits

We will not write your name on any notes, so the answers cannot be linked to you. You will not benefit directly from taking part in this discussion, but we hope that the ideas you share will contribute to efforts to improve the programs to treat malnutrition in children in Gombe state.

We will record this discussion to help us with note taking and data analysis purposes for this research study. This recording will be stored securely to protect your identity.

Confidentiality

All answers will be kept private and you will be kept anonymous. The recordings will be destroyed after the study is completed. Only the study team members and ethical review boards may review the data collected.

Voluntary Participation

You are free to join the study or not. You do not have to answer any questions that you do not want to answer. You may stop participating in this study at any time; you will not lose any benefits or services if you stop.

Contact Information

If you have any questions about the interview at any time, whether now or later, you are welcome to speak with [Name] at Taimaka [insert phone number].

After the discussion is complete, you will have the option to provide a phone number, which our research team will use to call you and share the results of the research in approximately 1-2 months. Your phone number will not be used for any purpose other than sharing our results. These calls will be at no cost to you. Providing a phone number is voluntary; that is, you can participate in this research whether or not you wish to provide a phone number.

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