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Contextual challenges experienced by CHVs in the informal use of mobile phones within integrated community case management (ICCM) in Nyaguda sub-location, Western Kenya

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Since the 1990s, Kenya has made substantial progress towards reducing child mortality. However, Kenya still lags behind regional and global averages in child mortality rates. Developing countries like Kenya face constraints in health system performance and access to services, especially in hard-to-reach areas such as Nyaguda sub-location calling for integrated care. Yet, it faces challenges that the everyday use of mobile phones could potentially address. In Nyaguda sub-location, mobile phones were used informally since they were not part of the integrated Community Case Management feasibility study. Several contextual challenges existed despite the benefits of using mobile phones within iCCM. This paper explores the contextual challenges to the informal use of mobile phones within iCCM in Nyaguda sub-location. The study employed an ethnographic research design. The data collection methods included informal conversations, Focus group discussions (FGDs)and in-depth interviews. This paper found several challenges to the informal use of mobile phones within iCCM, including physical challenges, high expectations on the Community Health Volunteers, cultural obligations, trust issues, and work/family conflict. The article concludes that physical follow-ups providing deeper connections among the various health stakeholders are still vital despite using mobile phones to avert child morbidity and mortality in hard-to-reach areas.

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Background

The integration of mobile phones within the healthcare system is an emerging way that holds promise for improving the quality of healthcare and reducing challenges associated with accessing quality healthcare (Noordam et al. 2011; Smillie et al. 2014; Zurovac et al. 2012). Through technology, human beings create social relations (Malvey and Slovensky 2017), which can be used to navigate communication challenges and access to quality health care. Despite the potential benefits, some challenges were experienced while navigating healthcare access issues within the integrated Community Case Management (iCCM) strategy in Nyaguda sub-location. Firstly, the socio-ecological challenges in Nyaguda sub-location necessitated the implementation of iCCM to bring healthcare closer to the community. The iCCM strategy in Nyaguda sub-location encompassed conducting Rapid Diagnostic Tests (RDTs) in case of fever and treat for malaria with Artemisinin-based Combination Therapy (ACT) if malaria is positive; diarrhoea was assessed and treated with ORS and zinc; suspected pneumonia and cough/short rapid breaths was assessed with respiratory timer and referral of suspected pneumonia cases; for malnutrition, measurement was done of Mid-Upper Arm Circumference (MUAC) and referral as indicated; for newborns specific assessment was conducted with a checklist and referral was done as needed (Kabue et al. 2016). The iCCM strategy was carried out by Community Health Volunteers (CHVs) chosen by community members trained and supervised by healthcare mentors who were sub-county health management team members. Each CHV was in charge of a hundred households.

Nevertheless, even with this community strategy, the challenging geographical and socio-economic context of Nyaguda sub-location, including the rugged terrain, poverty and a significant distance to the main referral sub-county hospital, posed difficulties in CHV supervision and motivation, commodity stock-outs, and referral of severe cases of illnesses among children under five years old (Kabue et al. 2016). Other studies have also indicated that the positive impacts of iCCM notwithstanding, the strategy faced several challenges, such as lack of sufficient supportive supervision, the tendency for health workers to follow protocols less rigorously overtime, and insufficient resource and policy support, among other challenges (Shrivastava et al. 2013). The challenges experienced within iCCM prompted the health workers and the community at large to employ their agency and make use of the ubiquitous nature of mobile phones to reconfigure and negotiate healthcare practices in Nyaguda sub-location. Since mobile phones were not part of the iCCM strategy, they were used informally by various health stakeholders, including the Community Health Volunteers (CHVs), the parents and guardians of the children (caregivers), the local health facility in charge, the CHV supervisors-Community Health Extension Workers (CHEWs), the child health care workers at the sub-County hospital in Bondo and the community leaders. The informal use of mobile phones mainly included the use of personal mobile phones to make voice calls, while the CHEWs and the child health care workers at the sub-county hospital would occasionally use short message service (SMS) in addition to voice calls.

Several systematic reviews (Aranda-Jan et al. 2014; Feroz et al. 2017; Mekonnen et al. 2019; Marcolino et al. 2018; Anstey Watkins et al. 2018) have assessed the impact of official incorporation of mobile technologies in healthcare programmes (mhealth) in Low and Middle Income Countries (LMICs) concluding that: some initiatives show positive results in the area of health behaviour change such as clinic attendance; adherence to long-term medication and outcomes such as decreased viral load, especially in low-income, rural and otherwise "hard-to-reach" communities. In their review, Odendaal et al. (2020) concluded that mhealth helped improve communication practices between health workers and patients. Integrating mobile technology in CHV work helped manage the CHV burden of work in terms of the number of duties and households to cover (Feroz et al. 2020). In their review, Feroz et al. (2020) further noted that the use of mobile technology among the CHVs in their work provided an organised workflow for carrying out specific tasks for each day within a reasonable geographical distance and provided support supervision for their work. A pilot study conducted in Gulmi District, Nepal, revealed that the mhealth intervention whereby all health workers in the peripheral health facilities were provided with a free phone number to call General Practitioner in the District Hospital offered support to the health workers who were able to consult and make decisions in emergency cases (Morrison et al. 2013). In the rural area of Mpumalanga, South Africa, patients with chronic diseases and pregnant women used their own mobile phones to remind themselves to take medication and attend clinics (Watkins et al. 2018). Mobile devices enabled real-time communication between health workers. In a study conducted in Makueni and Kibera (low resource settings), a content analysis of the messages that CHVs and their supervisors posted demonstrated how communication was efficient between them through mobile instant messaging technology (Henry et al. 2016).

Despite the positive benefits of mHealth projects in the African context, these projects are still at the small-scale levels, and the success of similar large-scale projects may not be guaranteed due to limited information on how the health workers, including CHVs, perceive the use of mobile phones and the challenges they experience (Aranda-Jan et al. 2014). However, the ubiquity of mobile phones in Africa has enabled the continued use of mobile phones "informally." Research unequivocally shows that 'informal mHealth' is happening at scale across Ghana, Malawi and Ethiopia, far out-doing the reach of its 'formal' equivalent, despite planning and investment in the 'formal' mHealth for more than a decade (Hampshire et al. 2021). Hampshire et al. (2021) further mention that despite having enjoyed notable success stories in formal mHealth Malawi, formal mHealth technologies in Malawi had reached a minority of their study population, with the projects often being patchy and unsustained. On the contrary, Hampshire et al. (2021) note that in all three countries (Malawi, Ghana and Ethiopia), almost every CHV surveyed owned a personal mobile phone that they were regularly using and proactively in their work informally. In Nyaguda sub-location, stakeholders in child health, including caregivers (parents or guardians), CHVs, CHV supervisors (CHEWs), and the health facility workers in Bondo sub-County hospital used their personal mobile phones and at their costs to improve accessibility to health care, especially in the rural and hard-to-reach areas such as Nyaguda sub-location.

While the potential of what we might call 'formal mhealth' (top-down programmes initiated by governments or donors) is yet to be fully realised, relatively little is known about what health workers are doing with their phones and with what consequences (Hampshire et al. 2021). Mechael (2009) called for the exploration of the benefits of the informal use of mobile phones in healthcare to ascertain their benefits. There is also a further need to contextually explore the challenges to the informal use of mobile phones since they are social productions determined by other social phenomena (Lemonnier 1992). This paper provides a contextual examination of CHVs' challenges as they use their personal phones to address gaps in the hard-to-reach context of Nyaguda sub-location. Understanding the context of these challenges is important because technologies modify space, time, relationships and types of communication that still continue to

co-exist with the other fields of knowledge inherent in a culture; hence, challenges may vary within specific contexts.

In looking at the spatiality of networks and, more specifically, the processes through which connected spaces of care are engendered (Duclos 2015), this paper employs the concept of 'networked thinking' or the everywhere-ness of healthcare by Vincent Duclos (2015). Duclos (2015) argues that the conception of networks and information entails examining the entangled projects, services, locations, things and figures (Moser and Law 2006). The relationship between the emergent networked spaces and the dominant narratives must be understood within their operation or use contexts. Duclos (2015) notes that there are variations in how networks are envisioned and the processes through which networked spaces are rendered operational. As with teleconsultations, mobile phones engender new clinical spaces with new epistemological and therapeutic qualities that need to be understood within specific contexts. Duclos (2015) calls for the need to consider how cultural practices and historical events shape global eHealth networks in all their turbulence, splendour, and inadequacy. In the context of Nyaguda sub-location, mobile phones were used to provide advice and to ensure prompt care through communication. However, its use needs to be understood within the cultural practice of the locality, given that it had engendered new spaces of care but also disrupted certain social and cultural processes. The concept of 'networked thinking' of healthcare helps us understand how individuals envision the use of mobile phones in Nyaguda sub-location and the challenges they encounter that are specific to that cultural, economic and ecological context.

Methods

Study design. This ethnographic research was conducted as part of the first authors' PhD work, which was conducted from July 2018 to March 2019 and supervised by the second and third authors. The ethnographic design aids in looking at the interactive strategies in human life. It is both a process and product of describing and interpreting cultural behaviours, such as integrating mobile phones within the health system. It also uses rigorous research methods and data collection techniques to avoid bias and ensure the accuracy and triangulation of data (LeCompte and Schensul 2010). LeCompte and Schensul (2010) further mention that ethnographic research reveals a greater and deeper insight into the matter being studied.

Study setting. This study was conducted in Nyaguda Sub-location, Siaya County in Western Kenya. Nyaguda sub-location is located near Lake Victoria and in a malaria-endemic area. It is situated in a rural area 112.4 kilometres from Kisumu Town. It is located in Siaya County and Bondo sub-County, which has one of the highest infant mortality rates in Kenya, at 110 infants per 1000 live births and an under-five mortality rate of 208 per 1000 live births (KNBS and ICF Macro 2015). KNBS & ICF Macro further note that this is thrice the national under-five mortality rate of 74/1000. The high burden of disease, high levels of poverty, and underdevelopment have led to the declining health status of the population in Bondo (KNBS and ICF Macro 2015). Nyaguda sub-location comprises seven villages, namely Minya, Nyaguda, Orengo, Otuoma, Uhendo, Wichlum and Wichlum Uhendo.

Nyaguda sub-location has approximately 1552 households. The main healthcare facility in Nyaguda sub-location is Nyaguda Health Center. According to the health facility's records, approximately 10–12 sick children visit the local health facility (Nyaguda dispensary) per day. The sub-location has 25 community health workers trained and supervised in iCCM (Kabue et al. 2016). The economic activities in the area are mainly fishing and subsistence farming. The location of the area on the shores of Lake Victoria, coupled with high levels of poverty and underdevelopment, makes the place more susceptible to common childhood illnesses. Despite several strategies and policy initiatives—such as the MOH's Reproductive Health Policy (2014), "National Implementation of Integrated Management of Childhood Illness (IMCI): Policy Constraints and Strategies"; and the MOH's Kenya Health Policy 2014–2030 (2014)—all of which are aimed at improving health indicators, especially for children under-five, there was still limited access to and use of health services in this study area.

The United States Agency for International Development USAID/Maternal Child Survival Program (MCSP) implemented a feasibility study on integrated Community Case Management (iCCM) in Bondo sub-county, Siaya County, Western Kenya, in 2013. The common childhood illnesses in the area included malaria, diarrhoea, pneumonia, and malnutrition. The use of mobile phones was not part of the implemented feasibility study on iCCM. However, most of the community members had personal phones that they were using informally to navigate and negotiate health care for the sick children. The various healthcare stakeholders were also using their personal mobile phones to communicate with their peers and with the community members, given the hard-to-reach nature of the area. This prompted the current study to explore and document not only the benefits of the informal use of mobile phones (Nyabundi et al. (2018) but also to examine the contextual challenges of using personal mobile phones within the context of Nyaguda sub-location.

Participant recruitment and data collection. Nyaguda sub-location had 25 trained CHVs in the seven villages, each CHV covering approximately 100 households. The entire CHV population was included in the study, given the small size of the population. Twenty caregivers (parents and guardians of children under five years old) were also purposively selected based on their recent (past six months) interactions with the CHVs to seek care for their children.

In-depth interviews were conducted with the twenty-five CHVs, after which five of the CHVs who had participated in the in-depth interviews were purposively selected and followed up for informal conversations to get a much deeper understanding of the challenges they had mentioned during the in-depth interviews. Further in-depth interviews were conducted with the 20 caregivers who helped corroborate the information on CHV challenges within the context of Nyaguda sub-location. On average, these conversations lasted between thirty to forty (30–40) minutes. Three Focus Group Discussions (FGDs) were conducted with Community Health Volunteers (CHVs), Community Health and Extension Workers (CHEWs) within Bondo sub-county where integrated community case management has been implemented, members of Bondo Sub-county Health Management Team (SHMT) who are often involved in iCCM supervision process. The FGDs, which lasted approximately ninety (90) minutes each, were carried out by the first author, assisted by a field assistant who helped with the recordings. The FGDs provided a group feel while eliciting further information on the challenges faced by CHVs as they used their personal mobile phones informally in Nyaguda sub-location, Western Kenya. Participant observation where AAN engaged in community activities such as threshing and airing maize, beans and small fish for drying purposes with the community members, helping mothers compose their sick children as they called the CHV and observing the actions taken by caregivers in incidences when the child was sick such as how they made calls, their communication

with the CHV and the actions that were taken. During the conversations with the CHVs, phone calls would come through from the caregivers, and I would observe how the CHVs would react and eventually address the problems presented to them.

Data analysis. Data was analysed using latent content analysis by interpreting the implied meaning of participant experiences. Data was first prepared and organised for analysis, with audio-recorded data transcribed verbatim by the first author (A.N) for further familiarisation. Since the A.N. was fluent in both Kiswahili and Dholuo, the language of the study area, this made it easy to work with the original Kiswahili and Dholuo text. A.N assigned codes to the data set, which E.N. reviewed with the key focus on the experiences, statements and reflections aligning with the study's objectives and conceptual idea. The codes were initially predetermined and descriptive even as the researcher (A.N and E.N) frequently returned to the data previously coded and assigned additional codes in line with the concepts and ideas directly related to the study's objective. The researchers developed a flexible codebook to include new codes as they emerged and delete or merge other codes as the analysis continued. Categories, which are the aggregate individual codes that are related conceptually or analytically, were then developed, and ultimately, the researchers produced themes from the data achieved by the researchers. The authors developed themes by bringing together related categories and recognising the set categories' similarities, differences and relationships. All authors reviewed themes and resolved discrepancies through further discussions to obtain a consensus. A.N finally disseminated the study findings to the community members and all the health stakeholders in Nyaguda sub-location and Bondo sub-county.

Results

The study participants were primarily female and had a primary level of education. This prompted the need to explore how they navigated the challenges of using mobile phones in the patriarchal society of Nyaguda sub-location with few men working as CHVs. The CHVs were also more advanced in age compared to the caregivers, who trusted their experience in addition to their training (Table 1a, b).

Theme 1: Technical challenges to the informal integration of mobile phones. Technical challenges, that is, related to the device and its use among the various stakeholders in child health, were evident. These challenges included the breakdown or loss of a mobile phone and power outages that interfere with phone charging. The technical challenges culminated in a communication breakdown, which could be salvaged by physically locating each other in the vast sub-location of Nyaguda sub-location. Atieno, for instance, narrated how when her phone fell into the water and stopped working, it left her without a device for communication save for the physical contact with CHV, which was not easy.

> The mobile phone is a good communication tool, especially within iCCM. However, when the phone breaks down like mine, which recently fell into the water, communication becomes a problem for me. For example, after my phone fell in the water while I was washing clothes before I got another one, my child fell ill, and I had no way to call the CHV and ask her for help. I, therefore, had to walk to her home with the sick child at night. If I had the phone working, I would have called her for advice and brought the child to her in the morning, depending on her advice (Atieno, 25-year-old Caregiver).

Table 1 a Socio-demographic characteristics of CHVs. b Socio-demographic characteristics of Caregivers.

Variable	Number
a	
Sex	
Male	3
Female	22
Age	
≥50 years	3
40–50 years	15
35–39 years	5
25–30 years	2
Education	
Secondary level	10
Primary level	15
b	
Sex	
Male	2
Female	18
Age	
≥50 years	2
40–50 years	3
35–39 years	3
25–30 years	12
Education	
Secondary	4
Level	
Primary Level	16

From Atieno's narration, mobile phones were used to provide real-time communication on the first aid the child can be given as the caregiver takes the next action of taking the sick child to the CHV. Mobile phones helped provide prompt care through advice to the caregiver by the CHV, especially at night in this area with a rugged terrain.

Stakeholders in child health at the community level, especially the caregivers and the CHVs, reported mobile phone charging as a challenge. They stated that most of their homes did not have the power to charge their mobile phones, and sometimes the queues at the marketplaces where they would take their phones to charge were too long. The lack of charge on the CHVs' phones made it difficult to communicate as soon as possible, given that they had to locate their clients physically. Given the vastness of the area and the poor and rugged terrain, they had to invest a lot of their personal resources, such as time and money, to get motorbike transport to visit clients whenever their mobile phones had no charge to communicate with the caregivers and follow-up on the health of the sick child they had treated especially given that at times they had many children to conduct follow-up on. The CHVs would get overly tired even though they had decided to work as volunteers.

> Communication becomes challenging when the power goes off and it is not sunny. In this community, members use electric or solar power to charge their mobile phones. The few charging places unaffected by lack of power experience long, unbearable queues. However, when both electric and solar charging cannot work, communication gets affected, and we, the CHVs, are forced to go around physically checking on the members of our various households, which can be tedious (Akomu, 35-year-old female CHV).

Atieno a caregiver in Nyaguda sub-location narrated how the lack of power for phone charging impacted communication in child healthcare. She mentioned that I had implications for her resources, yet advice could be offered via mobile phone.

> After my child has received treatment from the CHV, it is always important to communicate with the CHV and update her on the progress of my child. This is, however, not possible when my phone goes off due to no power to charge it. There was a time when I could not communicate with the CHV who had treated my child, yet my child was vomiting the medication, and I needed just to ask her if I could give another dose immediately or what I needed to do. This necessitated me to go to her home, which has an implication on my resources like time and money to take a boda boda (motorbike transport) to her house (Atieno 25-year old Female Caregiver).

The child health stakeholders used their mobile phones to communicate and had to buy the minutes in terms of airtime. They would, at times, lack airtime to communicate. The CHVs mainly worked on a voluntary basis with a small stipend, which would even delay times. The community's expectations of the CHVs made the community members feel like the CHVs were the ones to incur the communication costs. The caregivers would, therefore, call and commence the conversations with the alert that the child is sick, and then the phone conversation would be disconnected. The CHV would then be mandated to call back and attend to the sick child's needs. Okoko, a CHV in Nyaguda sub-location, narrated that;

> Most caregivers would call in case of an illness. However, since they do not have enough airtime, the phone conversation would immediately go off at the commencement of the call. The CHV is mostly the one expected by the caregivers to call back because they view it as our job to serve them and address the health issues of their children. Most caregivers do not understand that we can lack airtime, and some caregivers will even take offence when we do not call back. Therefore, I must physically visit the caregiver if I do not have airtime. (Okoko, 39-year-old male CHV).

The lack of airtime forced the CHV to physically locate the caregiver to determine the problem with the child and promptly attend to the health situation.

The iCCM strategy within the health care system mandates CHVs with the task of following up the sick child, especially after having referred a child for treatment and even after CHV care at the community level. Due to their diverse roles and needs in different parts of the vast community, CHVs use mobile phones to check on the child's welfare as they plan to see the child physically. Most caregivers will not take it upon themselves to call the CHV and give an update on the child's health. However, when the CHV makes a call to the caregiver to find out about the sick child's health, the CHV, according to the community's culture, would have to first find out about the welfare of the other family members. In the event that any other family member has a health-related problem, they would expect the CHV to further advise them on this call on what to do, making the phone calls long and expensive. During the Focused Group Discussion, a CHV narrated that:

> Even though airtime is a challenge, it is proper within the African context and especially for us here in Nyaguda, that when you call someone to find out about the health of their child, you first and foremost find out about the health of the caregiver and all the other members of the family before delving into the real reason for calling. This is usually an excellent opportunity to find out the health issues affecting the community members at the family and even at the community level (Group Discussion CHV 2).

The above narration reveals how the mobile phone has helped to bring about bonding among the community members, including the CHVs and the caregivers. The narrative also shows the challenge of not having enough airtime. However, despite the scarcity of airtime, it is still important to remember the values of the community, which are entrenched in the culture of the members of Nyaguda sub-location. Some of the values within the context of Nyaguda sub-location include greetings, which are key before any conversation commences, and it involves more than just finding out how you as an individual is faring and entails finding out even how the members of one's family are faring on. The greetings and finding out how the various family members are faring consume much of the CHVs' airtime. Therefore, the lack of airtime is a challenge when using mobile phones in iCCM. Apart from the technical challenges within this context, family conflict was also a challenge, as presented in the next section.

Theme 2: Family conflict as a result of CHV work. Achieng is a 39-year-old married CHV within the integrated Community Case Management (iCCM) strategy in Nyaguda sub-location, Western Kenya. She experienced challenges with the informal use of mobile phones, which were not officially integrated within iCCM. During an informal discussion with Achieng, she narrated the trust challenge in her marriage as a result of the informal mobile phone use within iCCM.

> When I used to receive frequent calls at night from caregivers, my husband kept wondering what kind of job this was where there was no rest. He kept questioning who was calling and, to some extent, would not even allow me to leave the house at night to go and attend to a client. He thought that I was having an affair yet pretended that it was a call for duty. I had to try get ways to manage this by putting my phone off at certain times of the night, yet the community members looked at me as a source of help for them at all times, given that I even had the commodities and medications to provide the much-needed help to their sick children at the community level (Achieng, 39-year-old female CHV).

Achieng's position as a CHV entails attending to the everyday health needs of children less than five years old. This position has given the community members confidence in her and the other CHVs, especially given that she can even test for malaria using a rapid diagnostic kit (RDT) and prescribe malaria medications in case the child tests positive for malaria. This privilege accorded to her allows community members to call her anytime they face child health challenges. The nature of Nyaguda sub-location in terms of the rugged terrain makes caregivers call the CHVs, who have become one of the first care options within their community units. The caregivers believe that if they explain their problem to the CHV, she may advise them on what to do or, even better, immediately take the mandate of her job and visit the caregiver to test and treat the child, especially given the severity of the case presented on the phone. However, these calls have posed a challenge to the families and even marriages of the CHVs, who have to attend to the calls at night and, to some extent, even go out to help the sick child. The roles undertaken by the CHVs are primarily voluntary. Hence, their spouses may not understand why they need to attend to calls at night and even go out to meet the needs of the community members. The frequent calls have made some of the CHV spouses uncomfortable and insecure. Some of their spouses, like Achieng's, sometimes think the calls could be from their friends. Some CHV partners went as far as to conclude that their CHV spouses are having affairs outside the marriage.

Hellen, a 42-year-old married CHV, also attested to the problem of how the informal use of mobile phones, though helpful, was affecting their relationships. For Hellen, it brought in the aspect of competition between the spouse and the work that she was doing in the community. The spouse showed jealousy and envy by questioning who was valued in communication. The spouse also brought up the issue of how the CHV allocated resources in the house, such as airtime, for CHV community work since the CHVs who valued their clients would go to great lengths to ensure that sick children less than five years old were well attended to. In addition to checking on the health of the children, the CHVs would also establish if the welfare and health of the rest of the family members were in good shape. The use of mobile phones in this hard-to-reach area has added value to the work of CHVs despite the challenge of using their phones.

> My spouse questioned that I had enough airtime to call patients and find out their welfare, yet whenever he was away, I would not call him, and when he called, and his airtime got finished, I would not call back, claiming that I had no airtime. He, therefore, did not understand what was of priority in my life, whether it was the voluntary work of a CHV or him who even provided for me and the family (Hellen, 42-year-old female CHV).

The mobile phone, therefore, posed the challenge of breaking trust in some CHV marriages, exposing one of the contextual effects of volunteering. The unpredicted interruptions to family life were a source of work-family conflicts, with volunteers attracting less partner support. The CHV partners would question their value to the CHV compared to the value that the CHV gave their work. The CHV partners felt less valued by the CHV compared to how the CHV valued the community they served because of their mobile phone engagements. Another challenge presented below is high expectations of the CHVs having been trained and supplied with commodities.

Theme 3: The challenge of high expectations. The CHVs are being faced with the challenge of high expectations from the community members, given that they have been trained. They are now able to test for malaria and other common childhood illnesses and treat and refer clients.

> There was a day when I had two children brought to me at once, and as I attended to the first child, a call came in from one of the caregivers within my community unit that her child was sick, and she wanted me to go to her home and attend to her. I explained the scenario at my home and asked her to bring the child so that by the time she arrived, I would have already finished with the second child and attended to her child. However, she refused and said she would rather wait for me to go and attend to her at her home. I tried to reason with her, putting the child's health to mind, but that did not work, and I eventually had to go myself to attend to the child (Akoth, 49-year-old Female CHV).

The CHV noted that despite the benefits of integrating mobile phones informally within iCCM, they suffered the need to attend to all client's needs at the community members' convenience. The mobile phones were to be used by caregivers to locate the CHVs in the vast sub-location and then take their sick children for care. However, it was the other way round for some caregivers who, after making calls, would expect the CHVs to visit them and provide healthcare for their children in their homes. Some caregivers did not consider how much work the CHVs had to do. In the case of Akoth, despite mentioning to the caregiver the amount of work she was attending to and requesting that the caregiver bring the child to her, the caregiver was still adamant about being attended to in her home. This prompts an understanding of the extent and amount of work CHVs should carry out. The expectations mandated upon the CHVs are overburdening, yet they do not obtain the required support to perform their duties, affecting their well-being. Consideration for CHVs' well-being will ensure the sustainability of their work and contribution towards health care.

> A caregiver called me very distressed at night that her child was unwell. I went and attended to the child, but later on, when I tried to call her and find out how the child was faring, the person who received the call kept on telling me that that was the wrong number and that she did not know the person who called using her number and told me not to disturb her again with my persistent calls (Onyango, 42-year-old male CHV).

The above narrative by Onyango, a 42-year-old male CHV, showed his frustration in trying to reach a caregiver whom he had attended to and needed to conduct a follow-up on the child. The disappointment was that the caregiver knew the CHV was to follow up on the child. Yet, the phone number previously used for communication could not locate the same caregiver again. The caregiver could not be located since she had borrowed a phone to call the CHV and did not have the same phone during the follow-up. The iCCM strategy insists on the CHVs the role of following up on the sick child whom they have had contact with, whether through treatment or referral. Using mobile phones could, therefore, assist the CHVs in the follow-up process. For example, during the follow-up process, CHVs could use mobile phones to establish if the caregiver is available at certain times for a visit, enabling the CHV to organise their work schedule. In Nyaguda sub-location, some community members share mobile phones to communicate health problems experienced among children less than five years old to have them receive the needed care. However, it seems sharing phones is a persistent phenomenon sometimes due to a lack of mobile phones when the client's phone has no charge or in the case of no airtime. The person who shares may not even remember all the people they have helped with the mobile phone for communication purposes.

> It is not like the members of this community do not have mobile phones but they still share phones because of the cost of calling or when their phones do not have charge and they need to communicate that their child is unwell. Generally, most people have a basic mobile phone for communication but sometimes lack airtime to communicate (Okoth, 36-year-old Male CHV).

The CHVs acknowledged that mobile phones were ubiquitous in this area, but phone sharing was still prevalent due to particular technical challenges impacting their workflow. Okoth mentioned how the community members had mobile phones and that sharing was mostly occasioned by lack of charge or airtime. Another challenge that also affected the use of mobile phones within the context of Nyaguda sub-location was the aspect of truth and trust while using the phones.

Theme 4: Truthfulness as a challenge in the use of mobile phones within iCCM. This study also found that lying during follow-ups was a challenge for the CHVs. The caregiver would tell the CHV on the phone that they were home with the child to be reviewed, only to be found absent when the CHV physically visited—during an informal discussion with Caroline, a 45-year-old female CHV, she narrated her experience and disappointment

concerning the caregivers who do not tell the truth about their whereabouts during the follow-up process.

> Once I interact with and treat the child, I must ensure that the child I attended to is improving in terms of their health. Therefore, I will call to find out about their family's well-being and schedule a follow-up visit with the child's caregiver to check their health progress further. At one time, I called a caregiver and notified her that I would like to visit them and see how the child was doing, and she told me to just go ahead and visit. I started my journey to the home only to reach there and find the child alone at the door with no caregiver (Caroline, 45-year-old female, CHV).

The location of Nyaguda sub-location near Lake Victoria's shores makes most caregivers too busy, sometimes even to focus on their children's health. The caregivers are trying to make ends meet by engaging in various activities along the shores of Lake Victoria. Therefore, after the sick child has received treatment, some caregivers immediately go back to their chores and get so engrossed in their work that they forget to be close to the child who is still recovering. Therefore, when a CHV calls and schedules a follow-up visit, some caregivers will lie that they are at home. However, when the CHV goes there physically, she finds that only the child has been left alone or with other siblings. iCCM brought healthcare for children closer to the caregivers, and using mobile phones to find out the recovery progress of the child before physically visiting the child has also made life easy for caregivers. They, therefore, take basic requirements within iCCM, such as follow-ups for the child, for granted, yet it is a vital process to ensure good health for the child.

Other than giving false information during follow-up through the mobile phone, misinformation has been experienced during the referral of sick children to the local health facility or even to the sub-county hospital for severe cases of illness. Several caregivers, when referred, do not go to the facility, yet when called by the CHV, they report that they took the sick child to the facility. Anyango, a 39-year-old female CHV, narrated her experience with a caregiver during an informal discussion, who, instead of going to the local health facility where the CHV had referred her for treatment, went to the sub-county hospital.

> Our caregivers can sometimes be hard to understand, just like all human beings are sometimes. This is because I referred a particular caregiver to the local health facility, and I had even talked to the doctor on my mobile phone about her taking the child there, only for her not to come back with the referral form to me to show that she had gone to the facility. When I followed her up at her home, she mentioned that she did not think it was wise to take her child to the local facility and instead went to the sub-county hospital where she thought the child would receive proper care (Anyango, 39-year-old female CHV).

The sub-county hospital is further from the residents of Nyaguda sub-location. However, when referred to the local health facility, the community members prefer going directly to the higher level of health care provision; this is despite the several cadres that the Government of Kenya has put in place for health care-seeking, whereby for children less than five years, the caregivers start by seeing the CHV, who can then refer them to the local Government health facility, which then refers to the sub-county hospital. To gain further clarity on why the community members preferred to go to the sub-county hospital instead of the local health facility, during an FGD with the sub-County Management Team, it narrated that;

> Most caregivers just believe in getting treatment from the sub-county hospital when referred from the community by the CHVs. Most of them do not think they can get the best care from the local facility, a myth that we are trying to get out of them and making them aware that the local health facility can handle most of the cases and those they cannot handle they refer to us. (FGD with the Sub-County Health Management Team members).

To further try and demystify this myth that the sub-county hospital provides better care that cannot be provided by the local health facility, the study, through an in-depth interview, received information from Akinyi, a 30-year-old caregiver with a child less than five years old.

> When the CHV refers us and makes phone calls to the in-charge to await our arrival to the local health facility, we prefer to go to the sub-county hospital even though it is far because there, we are sure of having tests done and proper treatment provided. The sub-county hospital has more advanced equipment than the local health facility. When we go to the sub-county hospital, we are also able to get a few or all drugs that the doctor prescribes. There are many pharmacies in the town where we can buy the medications that we cannot get from the hospital. This is unlike here in the village, where even the missing prescribed drugs from the health facility cannot be found, forcing us to go to the main town near the sub-county hospital. Therefore, it is better to make that one journey with the child to get both good treatment and drugs (Akinyi, 30-year-old caregiver)

Most community members perceive that the best care could only be received from the sub-county hospital, not the local health facility, despite the calls made by the CHV to the local health facility in charge that a client is coming and needs to be attended to urgently. This behaviour by the caregivers was attributed to the lack of equipment and drugs at the local health facility and their belief that the child's illness would not be well handled at the local health facility.

The mobile nature of the phone comes with the challenge of ensuring or ascertaining that the information given is truthful. During supervision, incorrect information may be offered, for example, when a CHV informs a CHEW that all is well in the community when that is not so. Aluoch accepts that giving false information to the CHEW is not right. However, the many roles expected of her within the context of Nyaguda sub-location can sometimes be overwhelming, leading to the lies as she narrates.

> Sometimes, I may be cooking or taking care of my visitors when the phone rings from the CHEW. It is during that time that the CHEW may be inquiring about the welfare of the members of my community unit. Because I have not visited the members due to my prior preparations and the hosting of the guests on a particular day, I quickly just tell her that all is well in my community unit, even without consulting the community members to know whether what I am reporting is accurate. This is how we sometimes give incorrect information, which is not the right thing to do (Aluoch, 35-year-old female CHV).

The above narrative shows some roles that Aluoch, a 35-year-old female CHV, has to play in her community. One of the roles she played during the interview, besides that of a CHV, was that of a host. Aluoch is expected to take care of guests in terms of not just entertaining them by talking to them but also cooking and giving them food. When taking care of guests interferes with her role as the CHV, she offers an immediate answer for her supervisor, the CHEW, when asked about the welfare of the

community. Her duties entail making rounds within her community unit and ensuring that all is well regarding their health. If there are any health issues, she is to help address them or report to the CHEW, who would engage the public health officials to attend to them. Therefore, when asked concerning the welfare of the community unit while attending to her other duties, she would lie to manage the expectations of the CHEW.

Discussion

Integrated Community Case Management is a strategy that trains CHVs and provides them with commodities to test and treat common childhood illnesses and refer severe cases promptly. The CHVs were the best bet for the Government, Non-Governmental institutions, and other collaborators in child health to bring health care to children less than five years old closer to the community. Bringing health care for children under five closer to the community was such that one CHV was responsible for a hundred households. This strategy was convenient for the community members and provided a level of trust given that the CHVs who were responsible as the first resort for care were their village mates. Despite all these benefits that were brought in by integrated Community Case Management, the vast, rugged terrain and economically challenged context of Nyaguda sub-location, including its location far away from the main sub-county referral hospital, made it necessary for the community to come up with ways to navigate even better and prompt care. Through their agency, the community members and all child healthcare stakeholders integrated their personal phones informally into the iCCM strategy. Locality reflects the creative solutions that the inhabitants of a particular space have adopted to deal with problems of survival (Combi 2016). Though the use of mobile phones improved communication and efficiency in caring for sick children under five, it suffered several challenges. This paper explored the contextual challenges to the informal use of mobile phones in the context of Nyaguda sub-location.

Despite their similarities worldwide, digital technologies encounter a diversified cognitive world in different localities (Combi 2016). Locating the challenges contextually helps to understand how the local culture acquires the new technologies, re-works them and eventually makes them acceptable to the existing culture (Combi 2016). Nyaguda sub-location experienced technical challenges to the informal use of mobile phones, including loss of or faulty mobile phones, lack of charge and insufficient airtime. Mechael et al. (2010) noted that battery life and memory storage affected the use of mobile phones in health care. The informal use of mobile phones within the context of Nyaguda sub-location called for the CHVs' use of their airtime. Even as they provide healthcare services voluntarily, using their airtime poses a challenge to integrating mobile phones and ease of work for them. The challenge of airtime in Nyaguda sub-location is exacerbated by the cultural obligations that come with the context, which include caring for the entire community and not just the sick child. Waruingi (2009) pointed out that health workers' use of chargeable minutes within the healthcare system might be unaffordable for many in developing countries. The problem of insufficient airtime was also a concern brought forth by (Istepanian and Lacal 2003) at the macro systems level, the individual citizen level and the level of health care providers. Rivett (2007) suggested implementing a billing structure within the health care system, allowing for a "reverse cost" approach, paid for by the MOH or other responsible party. However, this is only possible when the use of mobile phones is integrated formally within the health care system, which was not the case for Nyaguda sub-location. Rivett (2007) called for the implementation of reverse cost to ensure the feasibility and sustainability of using mobile phones in health care. To provide an amicable solution for mHealth, Mechael et al. (2010) call for the need to bring together health ministers and officials to deliberate with mobile service providers, doctors, technologists, and financiers, yet this still remains a challenge. Coordination among these stakeholders and agreement on incentive structures and responsibilities for meaningful collaboration is needed to inform better public and private investments and deploy commercially viable solutions (Mechael et al. 2010).

Using mobile phones in the context of Nyaguda sub-location revealed one of the contextual effects of volunteering: work /life balance. For instance, some CHV marriages were affected by a lack of trust among the CHV's and their couples. According to a study conducted by Cowlishaw et al. (2010), volunteer work impacts resources such as time and energy put into the various roles and responsibilities. The interference of family life and activities is one of the ways volunteer work affects volunteers' lives. CHVs in Nyaguda sub-location are charged with multiple responsibilities as community and family members other than implementing iCCM, hence the need for balance within their daily activities. The balance of life and work for the CHVs calls for an understanding community. Jaskiewicz and Tulenko (2012) noted that CHVs need support in supervision, training, remuneration, transportation, supplies, equipment, and respect from the community and health system. There is a need for an approved scope and schedule of work CHVs. It is also essential to answer the ongoing question of how many duties an individual worker should effectively perform. Performance and results are compromised when a worker's workload exceeds a certain threshold (Jaskiewicz and Tulenko 2012). Despite communities' appreciation of the CHVs and their work in the communities, the CHV's well-being (physical, psychological and economic) must also be considered (Lee 2020).

In Nyaguda sub-location, mobile phones are shared among household members, neighbours and other kin members, primarily due to low or no charge other than the ability not to own one. Mobile phones in low- middle-income countries are often shared among household members (Mechael 2009). DeRenzi et al. (2011) state that the ownership of mobile phones is usually for business. However, people borrow phones for a short time for other purposes, including notifying the CHV of a childhood illness. Despite their ubiquity, mobile phones in the developing world are still expensive and unaffordable for many people, especially in rural areas (Mechael et al. 2010).

Mobile phones are needed in hard-to-reach areas like Nyaguda to ensure proper communication. The lack of real-time communication channels would force the CHV to go around the community physically without establishing the availability of the caregiver. Nevertheless, the same mobile phones have also contributed to frustration in the lives of the CHVs, who rely on them to improve communication. Mobile phones become a source of frustration when the CHVs are not able to reach the caregivers for follow-up after having communicated with them initially. A WHO (2019) review indicates that patients bypass primary health care (PHC) facilities to seek care directly from facilities that provide secondary or higher levels of care in many LMICs. This is the case in Nyaguda sub-location, where caregivers referred to the local health facility would swiftly seek care at the sub-county hospital, which should be the next level after the health facility. Despite the benefits of the PHC approach, which include understanding the family and community context and managing patient pathways, patients bypass primary care facilities and seek care directly from secondary-level facilities. Some reasons for bypassing primary health care (PHC) include lack of access to good-quality, affordable primary care due to human resources and supply issues for rural populations and low-income people

(Islam et al. 2015). In cases where the CHV refers a client to the local health facility and cannot reach the client, the CHV would have to establish from the local health facility in charge if that caregiver went to the facility. This study established the need to continue with physical follow-ups, even while using mobile phones, to ensure the sick child receives proper health care.

The challenge of lying on the phone is also common among some CHVs in their relationship with the CHEW (Valaitis & O'mara, 2005) stated that mobile health-facilitated supervision made some supervised workers have the sense of "big brother (is) watching" (Henry et al. 2016) also note that mobile health made work more visible to supervisors. The current study establishes the cost of this kind of visibility of work where CHVs are willing to lie to show their supervisors that they are working while, in reality, there could be a problem in society. This makes the analogy of "Big Brother (is) watching" true. Roberts and David (2016) noted the irony that while mobile phones are supposed to provide better interpersonal relationships, they have also enhanced interruptions and distractions, as experienced with marital partners of CHVs in Nyaguda sub-location, increasing spousal conflict.

Conclusion

The ubiquitous nature of mobile phones offers potential for the health care system since it makes space to lose its physical nature to a conceptual space due to the instant linkages which cancel the perception of spatial space. The results of this paper are based on the everyday informal use of mobile phones within the context of iCCM in Nyaguda sub-location. This study found that the everyday use of mobile phones within Nyaguda sub-location suffered the technical challenges of mobile phone loss or breakdown, power outages affecting phone charging, and lack of adequate airtime for the kind of obligations the CHVs have to attend to. The cultural obligations of greetings and finding out how each family member, other than the sick child, made inadequate airtime even more challenging. This paper also reveals how the work/life balance can be a challenge with the lack of trust among CHV partners. The community believes that since CHVs have been trained and supplied with commodities, they should always be at the community's service. Lastly, the trust challenge while using mobile phones within iCCM was experienced in this context. The various stakeholders wanted to please each other instead of offering accurate information. However, given that iCCM emphasises the need to physically visit the sick children, any harm that could have emanated from the use of mobile phones was averted to a large extent.

Strengths and limitations. This work adds to the knowledge of mHealth, which is still nascent in Africa. It further contributes to the practice of care for children less than five years old with common childhood illnesses in hard-to-reach areas. The qualitative method used in this paper provides an in-depth analysis of the fundamental challenges affecting all health stakeholders, especially the CHVs, as they integrate mobile phones informally within their work context. The findings of this study can, however, not be generalised to whole communities but to specific communities with the context, such as the Nyaguda sub-location. Further studies could also be done with a mixed methodology to include quantitative techniques.

Data availability

The data can be accessed by contacting the first author Dr. Agnetta Nyabundi (agnetta.adiedo14@gmail.com), who can share anonymized transcripts. However, due to its qualitative and personal nature, the data is not publicly available.

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Author contributions

This is part of the research work conducted by the corresponding author, AAN, for her PhD research work; hence, she contributed significantly to the manuscript. The second and third authors, EON and SM, supervised the corresponding author during conceptualising the study, fieldwork, and thesis writing and provided further guidance in writing this manuscript. The fourth author, SOO, assisted in reviewing and writing the manuscript.

Competing interests

The authors declare no competing interests.

Ethics approval

Ethical clearance was sought from the Maseno University Ethics Review Committee (MUERC) reference number (MSU/DRPI/MUERC/00116/014). Permission was also sought from the gatekeepers at the community level and the Bondo sub-county hospital.

Informed consent

The first author informed participants about the study, and oral and written informed consent was obtained from them. The first author assured the participants of their confidentiality during the research process by not using names in any instance while collecting data. For privacy, the authors presented results without referencing the participants' names. The researchers further assured participants of anonymity and confidentiality for the recorded interviews. During the recorded interviews, the first author anonymised the names of the participants (names used for this paper are pseudonyms) and the data was kept safe only to be accessed by the researchers, ensuring the utmost security of the participants' data.

Additional information

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