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Original Research

Experiences of using the toll-free telephone line to access maternal and newborn health services in central Uganda: a qualitative study

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ABSTRACT

Objectives: Save the Mothers (STM) operates the toll-free telephone line (TFL) service in nine health facilities in Uganda. The TFL is influential in addressing the first and second delays in seeking care as it connects vulnerable mothers to health facilities at no cost. This study aimed at exploring the experiences of health workers and community members in using the TFL to access maternal and newborn health services in four health facilities in central Uganda.

Study design: This phenomenological/qualitative study used focus group discussions (FGDs) to collect data in four health facilities.

Methods: A total of 10 FGDs were conducted; two with health workers, four with women, and another four with both men and women. Each session lasted 45–60 min and had a moderator, observer, and note taker. All discussions were audio-recorded after obtaining consent from the participants. Interviews were transcribed verbatim and translated to English from audio recordings. Data analysis was performed using the thematic analysis using QDA DATA Miner software.

Results: The TFL service was pivotal in improving health worker and community relations, relaying timely health advice, ensuring prompt response to obstetric emergencies and facilitated timely referrals. However, the service faced several obstacles: unanswered calls, language differences, poor connectivity/network, and misuse/abuse.

Conclusion: This study demonstrates the potential of the TFL service in addressing the first and second delay as it allows for timely linkage of vulnerable mothers to health facilities. The TFL enhanced health worker and community relations and facilitated timely referrals

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and relaying of health advice. Addressing maternal mortality in low-income settings necessitates increased investment and scale up of such high-impact mHealth interventions.

Introduction

Despite efforts to accelerate decline, maternal mortality remains a significant public health challenge.[1] About 830 women die daily from pregnancy and childbirth complications; with 99% of these deaths occurring in low-income countries.[2] In 2015, Sub-Saharan Africa registered the highest regional maternal mortality ratio at 546 deaths per 100,000 live births.[3] In Uganda, 336 maternal deaths per 100,000 live births occur annually contributing to an estimated 18% of all deaths among Ugandan women of reproductive age (15–49 years).[4] However, most of these deaths are preventable and can be addressed with low-cost, effective interventions.[5,6] This necessitates an in-depth, contextual understanding of the Three Delays associated with maternal morbidity and mortality—the delay in decision to seek care, the delay in reaching the health facility, and the delay in receiving adequate care at that facility.[7] These delays are due to a myriad of constraints such as weak health systems, societal norms, literacy, and poverty.[8,9]

A delayed decision in seeking care accounts for a large portion of women that reach health facilities in poor clinical condition.[10,11] This decision-making is a complex behaviour based on an individual's perception of need, personality traits, and cultural and socioeconomic status.[12,13] This delay in decision-making can be shortened if women receive timely information and support.[14]

In Africa, over 82% of the general population has access to a mobile phone.[15] In Uganda, mobile phone ownership has increased from 52.3% in 2014 to 70.9% in 2018.[16,17] This technology holds enormous potential in providing the much needed support to combat maternal and newborn deaths.[18] Mobile health interventions can be used to provide educational information, reminders, support, emergency response, and monitoring.[19] Studies on leveraging mobile phone technology to improve maternal outcomes have reported an increase in facility-based deliveries, antenatal care attendance and a reduction in delay during transit to the health centre.[20–22] Increased antenatal and postnatal care attendance was reported in a study utilising a toll-free hotline, unidirectional text and voice messaging to provide health advice on appropriate care seeking, health practices, and referrals.[23] In addition, in a study providing educational and emotional support via telephone, a significant reduction in depressive symptom among HIV-positive pregnant women was reported.[24] A systematic review of seven studies mHealth interventions in low-income countries reported a substantial improvement in acquiring expert advice.[25] Another review of 27 mHealth studies among pregnant women in low- and middle-income countries reported increased facility-service utilization, skilled attendance at birth, and vaccination rates.[26]

Save the Mothers (STM), an international non-profit organisation, works to ensure that women receive timely, high-quality and dignified healthcare during pregnancy and child birth.[27] In 2011, STM piloted the toll-free telephone line (TFL) service within four health facilities as a communication outreach program to connect vulnerable mothers to health facilities. Community members can call anytime, any day, and speak to a health worker at no cost to them. Community awareness of the TFL service and numbers is done through outreach campaigns in addition to passport stickers normally attached to every mother–child health card. An average of 101 calls are received at each health facility per month. The phone is strategically placed in the maternity or labour suite with three nurses per health facility taking turns to answer calls.

This study aimed at exploring the experiences of health workers and community members in using the TFL to improve access to and quality of maternal and newborn health services in four health facilities in central Uganda. Acquiring an understanding of these experiences is crucial to improving and scaling up this service, and, subsequently, maternal and newborn health.

Methods

Design

In this phenomenological study, we used focus group discussions (FGDs) to collect data from health workers and community members who utilised the TFL service in four purposively selected health facilities (St. Francis Naggalama Hospital, Mukono Health Centre IV, St Charles Lwanga Buikwe Hospital, and Kawolo Hospital) in central Uganda.

Setting

The study was carried out in two districts; Buikwe and Mukono located in central Uganda. Mukono is located 21 km from Kampala, the capital city of Uganda with 596,804 inhabitants.[28] Buikwe has a predominantly rural population of 422,771 inhabitants and is located 60 km away from Kampala.[29]

Study participants

A total of 10 FGDs were conducted between May and June 2017. The number of FGDs was determined by reaching saturation, where no new information or ideas emerged. At each of the four health centres, at least two FGDs were conducted: one with health workers and another with community members/callers. Participants were purposively sampled based on previous experience using the TFL to access

healthcare services. Only those participants who were available, willing, and gave consent to participate in the study were recruited. Overall, 77 participants participated in the FGDs (9 health workers and 68 callers) as outlined in Table 1.

Data collection

Health workers from the respective health facilities were approached and invited to participate in the study with study objectives explained. On giving verbal consent, those who had used the TFL service were recruited. Two volunteer health workers from each of the health centres identified, invited, and recruited community members for study participation.

FGDs were held in quiet, comfortable rooms and lasted between 45 and 60 min. Each discussion was facilitated by a moderator who led and steered the conversation aided by an observer and a note taker who recorded participants' non-verbal communications. All FGDs were audio recorded. FGDs with health workers were conducted in English. FGDs with community members were held in Luganda and moderated by a health worker who provided a safe, secure environment in which they could talk openly and share experiences. At the start of each FGD, the research team and participants introduced themselves by name, residence, and profession. The moderator then asked participants for consent to being voice recorded, assured them of confidentiality and offered any of those unwilling to participate a chance to withdraw. Moderators utilised a discussion guide with a set of predetermined open-ended questions to facilitate flow of discussion and probe where necessary (Table 2 and Table 3). Focus group guide questions were informed by responses from health workers and callers during monthly site visits and call quality checks. The authors also discussed and revised these questions until everyone was in agreement.

Data analysis

FGD audio files in English were transcribed verbatim by two researchers. Those in Luganda were transcribed and translated to English. Data analysis was performed using thematic analysis with major themes determined a priori and minor themes derived deductively from the data. This index was then used to code the remaining transcripts. Any emerging themes identified were also added to the matrix. Table 4 illustrates the data analysis process from codes, categories to themes. To support the coding process, manage the transcribed data, and expedite data analysis, QDA DATA Miner Lite (version 2.0.3) software was utilised. To ensure reliability in analysis, two researchers independently read and coded the transcripts. Discrepant or unclear data was examined and resolved with a third researcher. On calculating Cohen's Kappa, a measure of inter-rater reliability,[30] the level of agreement was shown to be good (k = 0.75). The unit of analysis considered was a focus group discussion.

Ethics

Ethical approval was obtained from the Institutional Review Board (IRB) of Uganda Christian University. Verbal consent was obtained from the participants who were assured that their names would not appear in any report. Participation was entirely voluntary. As an incentive, participants received a snack and a small transport refund at the end of the discussion.

Results

Overall, ten focus groups were conducted; two with health workers, four with women, and another four with both men and women. A total of 77 respondents participated in the focus group discussions. Of these, 9 were health workers and 68 were callers. Most (88%) of the respondents were females. Eight overarching themes were identified across the FGDs. Findings from these discussion sessions are detailed in the following.

Caller demographics

Based on caller data, more females than males reported using the TFL service. Most of the callers reported using the TFL in the evenings. With regard to call frequency, almost half of the callers had called the line at least twice. One caller, a motorcyclist, had called in over 15 times.

> *"I have called the TFL over 15 times. As a motorcyclist, I transport women to the health Centre for deliveries; I first call the health centre and elaborate on the current health condition of the mother. This is important because I get to know whether the services are available at that health facility." FGD 5*

Table 1 – Characteristics of focus group discussion (FGD) participants.

FGD	Location (Health facility)	Composition	Total number	Duration (min)
1	Buikwe	Health workers, female	4	45
2	Naggalama	Health workers, female	5	48
3	Buikwe	Callers: 3 males and 8 females	11	56
4	Kawolo	Callers: 3 males and 11 females	14	60
5	Mukono	Callers: 1 male and 7 females	08	54
6	Naggalama	Callers: 2 male and 10 females	12	57
7	Buikwe	Callers: only female	05	46
8	Kawolo	Callers: only female	07	47
9	Mukono	Callers: only female	06	47
10	Naggalama	Callers: only female	05	45

Table 2 – Focus group discussion (FGD) guide for community members or callers.

Introduction, briefing about the study and seeking consent for participation and audio recording. Probe to ensure clarity

1. How many times have you used the TFL? Where did you get the number from?
2. Share with us your experience using the TFL:
   a. The reason for calling.
   b. Time you called. Was the call answered or not?
   c. Your experience talking with the health worker.
   d. The immediate steps you took after using the TFL.
   e. What happened as a result of using TFL?
   f. How did you feel when you called the TFL?
3. What are the major challenges using the TFL that you would want the team to address?
4. What would your experience have been if you choose not to call the TFL?
5. What reasons would give to mothers or community members to use/not use the TFL?

TFL, toll-free telephone line.

Table 3 – Focus group discussion (FGD) guide for health workers.

Introduction, briefing about the study and seeking consent for participation and audio-recording. Probe to ensure clarity.

1. As a health worker, share with us your experience of receiving calls from the community members through the TFL service:
   a. The main reasons why community members call
   b. Is it mainly the men or women that call?
   c. Are there any specific hours when calls are so many?
   d. What is the main language that people use over the TFL?
   e. Is the location of the telephone convenient
2. What are the main challenges that come with receiving calls from the community members that are using the TFL?
3. Please suggest any solutions to the above challenges.
4. Has the availability of the TFL created any impact?

TFL, toll-free telephone line.

Table 4 – Illustration of the generation of codes, categories, and themes.

Text	Code	Category	Theme
They call in the morning mostly around ten	Morning	Call time	Caller demographics
I called in late at around 8 pm at night	Evening		
I called the number like one time	Once	Call frequency	
I called on this telephone so many times when I was pregnant	More than once		

Phone location

In all four of the health facilities, the TFL phone was stationed in the maternity or labour suite. Nearly all the health workers reported that the location of the telephone was convenient.

Language

Most call conversations were conducted in Luganda. However, in some cases, the language used varied depending on the caller.

> *"So I have never received anyone [calling in a language] apart from Luganda." FGD 1*

> *"Sometimes it depends on the language that the caller uses. If someone calls and they start with Luganda, I will also go with that, if they go to Kinyarwanda; I will find a way of dealing with that too …." FGD 2*

Service

Over half of the respondents stated that their calls were answered. However, some complained about delays in their calls being answered.

> *"It went through though they delayed picking [up the phone]" FGD 5*

Almost all of the callers who received a response felt that the health workers were helpful, polite, and that the information given was clear and understandable.

> *"…I called the hospital and I asked the health worker about how best I could come to Kawolo since my stomach was already hurting. The health worker was polite and I was able to understand everything they said. I came and I was worked on very well." FGD 8*

Reasons for calling

Most of the calls were related to enquiries on pregnancy and newborn complications, availability of certain services and drugs, and family planning.

> *".. mothers always prefer to call and inquire when they can come to the health facility especially when they are not sure about the availability of drugs. Also, some pregnant women call because they are having some pregnancy pains and they want the advice of the health worker." FGD 2*

> *"I had a sister of mine who was pregnant and she was having a painful pregnancy. Her stomach was hurting and that is when I decided to call this number..." FGD 8*

In addition, some callers used the TFL to alert the health facility of an emergency case before arrival. Alongside this, some enquiries were specifically related to the availability of blood at the health facility.

> *"The other is.., preparing for emergencies in advance so we are able to prepare for them." FGD 1*

> *"Sometimes we get so many referrals and most times people call to inquire if we have any blood before bringing the patient." FGD 2*

Impact

Overall, both health workers and callers reported that they greatly benefitted from the TFL service. The health workers cited improved communication and client relations as well as becoming more prepared for emergency cases.

> *"It has created a good relationship, good communication with the community [...] the mother had malaria. So I gave that gentleman the TFL [number]. When they arrived, I had already prepared the room. They were very grateful [and said] they will bring others...." FGD 1*

Callers mentioned that the TFL enabled them receive the much needed timely advice.

> *"Personally it made my access to health workers faster and I got the necessary advice I wanted." FGD 6*

> *"Okay, I had a girl whose mother had sent her to me when pregnant. She had back and abdominal pains so we called the line ... and explained to the health worker. She said we should bring her to the centre for a check-up. We brought her and she received medical attention." FGD 7*

Furthermore, callers stated that the TFL service addressed their health fears and worries, and helped them save on transportation fare to and from the health centre.

> *"I stopped worrying about the type of baby I was going to have since the health worker told me that my baby was going to be just fine." FGD 6*

> *"I have ever called over the weekend and I was told to come during the week day because the health worker who I wanted to see was not there on Sunday." FGD 9*

Challenges

Some callers misused the TFL and called in with issues completely unrelated to health while a few hurled insults at the health workers.

> *"...I was wondering if you could help me with my land issues. Is this the office of the chief justice? I think they just do not have what to do. Sometimes men call to insult us." FGD 2*

On the other hand, some callers complained about a few health workers being rude when responding to their calls.

> *"The biggest challenge with using the TFL is that the health workers are very rude." FGD 4*

Several callers reported not having their calls answered which the health workers attributed to understaffing and heavy workload on the wards.

> *"My problem would be health workers not really picking [up] the telephones" FGD 9*

> *"Sometimes the maternity ward is very busy in most cases so we find ourselves, we can't pick [up] these calls. When you're giving treatment, you can't be available to answer when someone is calling." FGD 1*

Discussion sessions also revealed that language barrier hindered the success of the service. At times, the caller and the health worker were speaking different languages making it difficult to communicate

> *"My only small problem is sometimes health workers use English; it becomes hard to understand what they are saying since I do not speak English." FGD 10*

In some cases, the service was hampered by poor network connectivity and low receiver volume.

> *"Another challenge with this telephone is the network. I remember when I used the telephone the line kept breaking. Also, sometimes it is hard to hear what the other person is saying over the telephone." FGD 6*

Some callers were not aware of the existence of the service or doubted that the service was entirely free of charge to the caller.

"People think it's a hoax that does not really work. So most of them think they will still use their airtime when they call." FGD 10

Participant recommendations

In spite of these challenges, both callers and health workers felt that the service was very beneficial, but could still be improved. They suggested further publicity of the service through strategically placed posters at health facilities, sticker distribution, community drives and interpersonal dialogues.

"We need to have community dialogue days where we can have the Community Health Workers talk more about these toll-free hotlines." FGD 4

".. Print out more stickers and give them out within the community. This number is known by mainly the people in town and out there in the villages people do not know this number…" FGD 8

To overcome language barrier, health workers also seemed to agree that they would need to seek the assistance of other colleagues who were conversant in the caller's language.

"The language barrier could be solved by us. If I cannot understand Kinyarwanda [language], she [another health worker] might be understanding it." FGD 1

Callers also recommended having a stand-by attendant dedicated to receiving the calls that would otherwise be missed. In the situation where he/she could not be hired due to financial limitations, they suggested at least adding a call back feature on the phone so that health workers could return any missed calls.

"What I would want them to improve is ensuring that there is always a person who can pick the phone so that the callers are not discouraged from using this telephone since it is free of charge." FGD 3

Discussion

The findings highlight participant experiences and recommendations for TFL service improvement. The TFL service is pivotal to improving health worker and community relations as well as access to quality healthcare information and services. Similar findings have been reported in several studies.[21–26,31,32]

The TFL service enabled vulnerable mothers make an informed decision on seeking care even before travelling to the health facility. This relieved some women of long distance travel and saved them transport costs that are a substantial portion to medical care expenditure.[33]

The service also allowed for callers to enquire about the availability of services, vital medications, and other resources, including blood, and facilitated timely referrals to better equipped facilities as reported in a similar study conducted in Indonesia.[31] In addition, local motorcyclists utilized the service to alert health centres to prepare for obstetric emergencies. Such crucial enquiries and timely referrals have been shown to significantly improve responsiveness to obstetric emergencies.[34]

However, the service faced several obstacles: unanswered calls, language differences, poor connectivity, and misuse. The success of the TFL therefore hinges on adequate health worker training in clinical skills and customer care in addition to continued community awareness of the service.

Unlike most mHealth studies that focus on text messaging,[35,36] this study was strengthened by timely and direct contact/interaction between health workers and community members. This allowed the health worker to tailor a more specific and appropriate message to each caller which is often a limitation in text messaging interventions.[37]

Study limitations included a reliance on health workers in the selection of participants who left room for selection error, and confounding resulting from multiple moderators utilized in the study, who differed in interviewing style across FGDs. In the future, these limitations could be mitigated by training the interviewers more consistently and ensuring that they fully utilise the FGD guides.

Conclusion

This study demonstrates the potential of the TFL service in addressing the first and second delay as it allows for timely linkage of vulnerable mothers to health facilities. The TFL enhanced health worker and community relations and facilitated timely referrals and relaying of health advice. Addressing maternal mortality in low-income settings necessitates increased investment and scale up of such high-impact mHealth interventions.

Author statements

Ethical approval

Verbal consent to participate in this study was obtained from each participant. Ethical approval was obtained from the Institutional Review Board (IRB) of Uganda Christian University.

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Competing interests

The authors declare that they have no competing interests.

Authors' contributions

E.N., J.C., J.K.B., I.M., A.C., J.F.N., and M.G.M. conceived and designed this qualitative study. A.C. and J.F.N. led the

acquisition of focus group data with input from J.K.B. and E.N.; I.M., M.H., A.C., M.W., E.N., and J.K.B. were involved in the data analysis, interpretation of the data, drafting and revision of the manuscript. All authors read and approved the final version of the manuscript.

Consent to publish

Not applicable.

Availability of data and materials

Transcripts of the focus group discussions are available in figshare repository [https://doi.org/10.6084/m9.figshare.6076082.v1].[38]

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REFERENCES

1. WHO, UNICEF. *Countdown to 2015: accountability for maternal, newborn and child survival-the 2013 update*. 2013. 109, http://www.who.int/woman_child_accountability/ierg/reports/Countdown_Accountability_2013Report.pdf. [Accessed 5 November 2017].
2. WHO, UNICEF, UNFPA, World Bank. *Trends in maternal mortality: 1990 to 2015*. 2015. http://www.afro.who.int/sites/default/files/2017-05/trends-in-maternal-mortality-1990-to-2015.pdf. [Accessed 20 December 2017].
3. WHO. *Maternal mortality fact sheet 2016*. 2017. http://www.who.int/mediacentre/factsheets/fs348/en/. [Accessed 5 November 2017].
4. UBOS, ICF. *Uganda demographic and health survey 2016: key indicators report*. 2017. http://www.ubos.org/onlinefiles/uploads/ubos/pdf%20documents/Uganda_DHS_2016_KIR.pdf. [Accessed 26 January 2018].
5. Bhutta ZA, Das JK, Bahl R, Lawn JE, Salam RA, Paul VK, et al. Can available interventions end preventable deaths in mothers, newborn babies, and stillbirths, and at what cost? *Lancet* 2014;**384**(9940):347–70.
6. Requejo JH, Bryce J, Barros AJ, Berman P, Bhutta Z, Chopra M, et al. Countdown to 2015 and beyond: fulfilling the health agenda for women and children. *Lancet* 2015;**385**(9966):466–76.
7. Barnes-Josiah D, Myntti C, Augustin A. The "three delays" as a framework for examining maternal mortality in Haiti. *Soc Sci Med* 1998;**46**(8):981–93.
8. Ronsmans C, Graham WJ. Lancet Maternal Survival Series steering g. Maternal mortality: who, when, where, and why. *Lancet* 2006;**368**(9542):1189–200.
9. Pacagnella RC, Cecatti JG, Osis MJ, Souza JP. The role of delays in severe maternal morbidity and mortality: expanding the conceptual framework. *Reprod Health Matters* 2012;**20**(39):155–63.
10. Okong P, Byamugisha J, Mirembe F, Byaruhanga R, Bergstrom S. Audit of severe maternal morbidity in Uganda–implications for quality of obstetric care. *Acta Obstet Gynecol Scand* 2006;**85**(7):797–804.
11. Filippi V, Richard F, Lange I, Ouattara F. Identifying barriers from home to the appropriate hospital through near-miss audits in developing countries. *Best Pract Res Clin Obstet Gynaecol* 2009;**23**(3):389–400.
12. Cham M, Sundby J, Vangen S. Maternal mortality in the rural Gambia, a qualitative study on access to emergency obstetric care. *Reprod Health* 2005;**2**(1):3.
13. Roost M, Jonsson C, Liljestrand J, Essen B. Social differentiation and embodied dispositions: a qualitative study of maternal care-seeking behaviour for near-miss morbidity in Bolivia. *Reprod Health* 2009;**6**:13.
14. Hirose A, Borchert M, Niksear H, Alkozai AS, Cox J, Gardiner J, et al. Difficulties leaving home: a cross-sectional study of delays in seeking emergency obstetric care in Herat, Afghanistan. *Soc Sci Med* 2011;**73**(7):1003–13.
15. World Bank. *Internet and mobile phone access in Africa differ greatly 2016*. https://www.brookings.edu/wp-content/uploads/2017/01/global_20170109_foresight_africa_figure-3-1-full.pdf, 2017. [Accessed 20 February 2018].
16. UCC. *UCC access and usage survey 2014 Uganda communications commission*. 2015. http://ucc.co.ug/files/downloads/20150130-UCC-access-usage-dissemination.pdf. [Accessed 20 February 2018].
17. Kamukama E. *More Ugandans now own mobile phones. Daily Monitor [Internet]*. 2018 [cited 9 February 2019]. Available from: https://www.monitor.co.ug/Business/Technology/-Ugandans-mobile-phones–National-IT-Survey-NITA/688612-4334138-2fb1ruz/index.html.
18. Oyeyemi SO, Wynn R. The use of cell phones and radio communication systems to reduce delays in getting help for pregnant women in low- and middle-income countries: a scoping review. *Glob Health Action* 2015;**8**:28887.
19. Free C, Phillips G, Watson L, Galli L, Felix L, Edwards P, et al. The effectiveness of mobile-health technologies to improve health care service delivery processes: a systematic review and meta-analysis. *PLoS Med* 2013;**10**(1):11–23.
20. Rotheram-Borus MJ, Tomlinson M, Swendeman D, Lee A, Jones E. Standardized functions for smartphone applications: examples from maternal and child health. *Int J Telemed Appl* 2012;**2012**:973237.
21. Higgs ES, Goldberg AB, Labrique AB, Cook SH, Schmid C, Cole CF, et al. Understanding the role of mHealth and other media interventions for behavior change to enhance child survival and development in low- and middle-income countries: an evidence review. *J Health Commun* 2014;**19**(Suppl 1):164–89.
22. Fedha. Impact of mobile telephone on maternal health service care: a case of njoro division. *Open J Prev Med* 2014;**4**:365–76.
23. Watkins SC, Robinson A, Dalious M. *Evaluation of the information and communications technology for maternal, newborn and child health project*. 2013.
24. Ross R, Sawatphanit W, Suwansujarid T, Stidham AW, Drew BL, Creswell JW. The effect of telephone support on depressive symptoms among HIV-infected pregnant women in Thailand: an embedded mixed methods study. *J Assoc Nurses AIDS Care. Elsevier Ltd* 2013;**24**:e13–24. https://doi.org/10.1016/j.jana.2012.08.005. PMID: 23260038.
25. Hurt K, Walker RJ, Campbell JA, Egede LE. mHealth interventions in low and middle-income countries: a systematic review. *Glob J Health Sci* 2016;**8**(9):54429.
26. Sondaal SF, Browne JL, Amoakoh-Coleman M, Borgstein A, Miltenburg AS, Verwijs M, et al. Assessing the effect of mhealth interventions in improving maternal and neonatal care in low- and middle-income countries: a systematic review. *PLoS One* 2016;**11**(5):e0154664. https://doi.org/10.1371/journal.pone.0154664.

27. Chamberlain J, Nakabembe E. Moving goals and policy into effective action for mothers and newborns around the world: the mother- and baby-friendly hospital initiative. *J Obstet Gynaecol Can* 2015;**37**(1):14–5.
28. UBOS. National Population and Housing Census 2014. *Area specific profile series, Mukono district. Uganda Bureau of Statistics*. 2017.
29. UBOS. National Population and Housing Census 2014. *Area specific profile series, Buikwe district. Uganda Bureau of Statistics*. 2017.
30. McHugh ML. *Interrater reliability: the kappa statistic*. Internet. Biochem Medica; 2012. p. 276–82. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3900052/.
31. Mojekwu J, Ibekwe U. Maternal mortality in Nigeria: examination of intervention methods. *Int J Humanit Soc Sci* 2012;**2**(No. 20). Special Issue – October 2012.
32. Chib A, Lwin M, Ang J, Lin H, Santoso F. *Midwives and mobiles: using ICTs to improve healthcare in aceh besar*. 2008. p. 348–64. Indonesia.
33. Molesworth K. *Mobility and health: the impact of transport provision on direct and proximate determinants of access to health services*. Basel: Swiss Tropical Institute; 2005. p. 26.
34. Huq NL, Azmi AJ, Quaiyum MA, Hossain S. Toll free mobile communication: overcoming barriers in maternal and neonatal emergencies in Rural Bangladesh. *Reprod Health* 2014;**11**:52.
35. Jareethum R, Titapant V, Chantra T, Sommai V, Chuenwattana P, Jirawan C. Satisfaction of healthy pregnant women receiving short message service via mobile phone for prenatal support: a randomized controlled trial. *J Med AssocThail = Chotmaihet thangphaet* 2008;**91**(4):458–63.
36. Ngabo F, Nguimfack J, Nwaigwe F, Mugeni C, Muhoza D, Wilson DR, et al. Designing and Implementing an Innovative SMS-based alert system (RapidSMS-MCH) to monitor pregnancy and reduce maternal and child deaths in Rwanda. *Pan Afr Med J* 2012;**13**:31.
37. Kaplan WA. Can the ubiquitous power of mobile phones be used to improve health outcomes in developing countries? *Glob Health* 2006;**2**(1):9.
38. Mwase I, Hutchins M, Cameron A, Ware M, Nakanwagi JF, Nakabembe E, et al. *Experiences of using the toll free telephone line to access maternal and newborn health services in Central Uganda: a qualitative study*. figshare. Fileset. 2018. https://doi.org/10.6084/m9.figshare.6076082.v1.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.puhe.2019.09.015.