

RESEARCH

Open Access



Feasibility of the use of WhatsApp messaging technology to facilitate obstetric referrals in rural Ghana

Veronica Millicent Dzomeku^{1*}, Adwoa Bemah Boamah Mensah¹, Emmanuel Kweku Nakua², Pascal Agbadi^{1,3}, Joshua Okyere^{1,4}, Alex Kumah⁵, Jacob Munukpa⁶, Anthony Adofo Ofofu⁷, Nancy Lockhart⁸ and Jody R. Lori⁸

Abstract

Background Obstetric referrals thrive on rapid transfer of information and data, and effective communication in order to reduce delays in receiving of quality care once the woman reaches the facility. We explored health care workers' perception of the feasibility and acceptance of WhatsApp messaging technology to facilitate obstetric referrals in selected health facilities in rural Ghana.

Methods The study used a qualitative research method and adheres to the interpretivist ideology. This study was conducted in the Sene East District (SED) and Sene West District (SWD) in the Bono East region of Ghana. Sixteen healthcare facilities were sampled. In-depth interviews and focused group discussions were conducted. QSR NVivo-12 for data management and analysis. Collaizzi's descriptive phenomenological technique of analysis was used to analyse the data.

Results From the analysis, three main themes emerged. The themes included the HCWs' perceptions of the feasibility of WhatsApp messaging technology (sub: optimist and pessimist perspectives), challenges to the acceptance of WhatsApp messaging technology (sub: challenge with getting data, network challenges, and risk of platform used for unintended purposes), and the HCWs' perceptions of the acceptance of WhatsApp messaging technology (sub: easy communication and information sharing, improvement in quality of service, and tracking referred clients' compliance).

Conclusion We conclude that the implementation of WhatsApp messaging technology in obstetric referral is feasible and acceptable to HCWs in rural healthcare facilities in Ghana. To promote the acceptance and use of WhatsApp messaging technology in obstetric referrals, there is a need to build the capacity of HCWs and provide a working guideline to regulate the platform. The government and its partners must consider providing internet data and airtime, as well as dedicated phones to support the implementation of the use of WhatsApp messaging technology in promoting effective obstetric referral.

Keywords Acceptability, Feasibility, Obstetric referrals, WhatsApp

*Correspondence:

Veronica Millicent Dzomeku
vmdzomeku@gmail.com

Full list of author information is available at the end of the article



© The Author(s) 2023. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

Background

Globally, preventable maternal and new born morbidities and mortalities are critical public health concerns [1]. This is evident in global estimates that show that nearly 800 women die every day as a result of pregnancy-related and childbirth-related complications [2]. The situation is worse off in low-and-middle-income countries (LMICs) where most countries, including Ghana was unable to meet targets 4 and 5 of the Millennium Development Goals (MDGs) which ended in 2015 [1]. Ending the era of the MDGs, the United Nations introduced the 17 sustainable development goals (SDGs) of which targets 3.1 and 3.2 focus on reducing maternal mortality (i.e., reduce to less than 70 per 100,000 live births) and neonatal-and-under-five mortalities respectively by the year 2030 [3, 4].

Ghana as a country has made some efforts to reduce both maternal and new born deaths through the implementation of policies such as the national health insurance, free maternal healthcare policy and the community and Community-based Health Planning and Services (CHPS) initiative [3, 5]. Despite these policies and interventions, maternal mortality remains unacceptably high; it stands at 310 per 100,000 live births [6]. Evidence suggests that this unacceptably high rate of maternal mortality in Ghana is attributable to the lapses in the provision of quality care for high-risk obstetric patients, especially along the referral pathway [7, 8]. For instance, the MDG Acceleration Framework in Ghana reported that weakened obstetric referral system was a major challenge that inhibited the country from achieving MDG 4 and 5 [9]. Consequently, new interventions were rolled out to enhance obstetric referrals in Ghana. These interventions included the “implementation of maternal death audits and the use of audit findings to inform referral institutions, the establishment of referral ledgers” [7]. Nonetheless, obstetric referrals are still sub-optimal, particularly in rural communities.

One of the main challenges affecting quality of obstetric referrals in Ghana is the inter-professional and inter-institutional communication between healthcare providers at primary level health centres and district hospitals to senior clinicians at a large regional hospital [7, 10]. Obstetric referrals thrive on rapid transfer of information and data, and effective communication in order to reduce type III delays (i.e., delays in receiving of quality care once the woman reaches the facility) as identified by Thaddeus and Maine in their three delay model [11]. As such, there has been an increasing interest in how technology can be leveraged to advance obstetric referrals.

Social networking or instant messaging technological platforms such as WhatsApp, Viber and Telegram have begun to take centre-stage in the discourse of revolutionising obstetric referrals through technology. However,

with WhatsApp's dominance over the global instant messenger market [12], its prospects in advancing obstetric referral systems is undeniable. A related study conducted in the Greater Accra region of Ghana has revealed that the intent of using WhatsApp in obstetric referrals is to promote effective communication among healthcare workers in order to facilitate early identification of cases that warrant referrals, guide treatment interventions, speed up inter-institutional information and data transfers, promote feedback, and improve the overall system-level accountability [7].

The adoption of WhatsApp in obstetric referral hinges on evidence from empirical research. Yet, to the best of our knowledge, only one study in Ghana has investigated the feasibility of using WhatsApp in strengthening obstetric referrals [7]. This previous study, however, was conducted in the Greater Accra region which is predominantly urban. Meanwhile, there is plethora of evidence that shows that obstetric complications are more profound among women residing in rural communities [13–15]. This presents a significant gap in what is already known about the feasibility of using WhatsApp in promoting effective obstetric referrals in Ghana. To bridge this gap, the present study explores healthcare workers' (HCWs) perception of the feasibility and acceptance of WhatsApp messaging technology to facilitate obstetric referrals in selected health facilities in rural Ghana. The study was set within a framework where the following questions were addressed:

1. What is HCWs' perception of the feasibility of WhatsApp messaging technology to facilitate obstetric referrals in selected health facilities in rural Ghana?
2. What is HCWs' perception of the acceptance of WhatsApp messaging technology to facilitate obstetric referrals in selected health facilities in rural Ghana?
3. What is HCWs' perception of the challenges to the acceptance of WhatsApp messaging technology to facilitate obstetric referrals in selected health facilities in rural Ghana?

Theoretical perspectives

This section provides a theoretical perspective to the issues under study. The study is underpinned by two main theories, namely, the feasibility theory and the technology acceptance model. Feasibility, as a concept, refers to the practicability of a proposed intervention or project [16]. This is evidence in four main dimensions: the economic, technical, legal and operational feasibility of a proposed intervention [17]. Within the context of this study, HCWs' perceptions of the practicality of using

WhatsApp messaging technology to facilitate obstetric referrals represent the feasibility of the intervention. This is synonymous with the Cohn et al.'s [18] feasibility theory that describes what is known as the “curse of dimensionality”.

Technology acceptance model (TAM), was propounded by Davies [19]. It was originally developed to present a generic explanation of the factors influencing computer acceptance and describe the user's behaviour. Over time, the application of TAM had been extended to other forms of technologies including the use of mobile phone applications [20], telemedicine [21], and most recently, e-learning [22]. Principally, TAM postulates that an individual's acceptance to use a new technology hinges on the perceived ease of use (PEU) and perceived usefulness (PU) [23].

The individual's PEU denotes the belief or perception regarding how easy it will be to accept and use a given technology. That is, higher PEU translates to an increase likelihood to accept and use a technology while a lower PEU would imply a lower likelihood to accept and use a technology [24]. On the other hand, PU refers to the extent to which an individual believes that an acceptance and use of a technology would be beneficial [24]. Hence, individuals are more likely accept and use a technology when they have a higher PU. Therefore, in the context of this study, the acceptance of WhatsApp messaging technology in facilitating obstetric referrals would be premised on the PEU and PU of the HCWs. However, the study acknowledges that existing and perceived challenges about the technology has the potential to influence HCWs PEU and PU. Where these challenges are perceived to be surmountable, there would be higher PEU and PU that would foster the acceptance of WhatsApp messaging technology in facilitating obstetric referrals in rural settings.

Methods

Study design and source of data

The study used a qualitative research method and adheres to the interpretivist ideology. Descriptive phenomenology design was specifically employed as the qualitative research method of enquiry. From literature, it is indicative that “descriptive phenomenological approach is used when little is known about an issue and the aim of the study is to make clear and understand the most essential meaning of a phenomenon of interest from the perspective of those directly involved in it” [25]. Given that less is known about the about the acceptance and use of WhatsApp messaging technology in facilitating obstetric referrals in rural areas, this design was the most appropriate. Moreover, the study explored the perspectives of the

HCWs who are directly involved in the obstetric referral process.

Study setting

This study was conducted in the Sene East District (SED) and Sene West District (SWD) in the Bono East region of Ghana. SED has a population of about 61,076 people with Kajaji as its capital [26]. The district is primarily agrarian with over 70% of their population being employed in skilled agricultural, forestry or fishery [26]. A total of 620 deliveries and 728 deliveries were reported in the year 2020 and 2021 in SED. Between January and March, 2022, 174 deliveries had been reported in SED. However, at the end of March, 2022, there were 18 midwives within the SED [Sene East District Health Service Records, 2022].

The SWD was created by the Legislative Instrument (LI) 2088 and has Kwame Danso as its capital. The 2010 Population and Housing Census estimates the population of the SWD to be 57,734 [27]. The population is predominantly engaged in skilled agricultural forestry and fishery (77%). A total of 407 deliveries and 558 deliveries were reported in the year 2020 and 2021 within the SWD. Between January and March, 2022, 184 deliveries had been reported in SWD. However, at the end of March, 2022, there were 16 midwives within the SWD [Sene West District Health Service Records, 2022].

There are 16 rural health care facilities in the SED and SWD. This study considered all of these facilities. Out of these 16 healthcare facilities, 9 of them were from SWD while the remaining 7 facilities were from SED. The healthcare facilities included in this study ranged from CHPS compounds to health centres. These facilities are usually staffed by a community health nurse who provides basic emergency obstetric and newborn care (BEMONC). These two districts were selected as study sites due to certain attributes that they possess. The rural nature of both districts was one factor; in the SWD and SED district, all the rural healthcare facilities referred obstetric cases only to Kwame Danso and Kajaji, respectively. Also, the high mobile phone penetration in the two districts in comparison to other rural districts in the Bono East region was a motivating factor to study the feasibility and acceptance of WhatsApp messaging technology in facilitating obstetric referrals.

Study population and sampling

The target population for this study was made up of healthcare workers (HCWs) such as community health nurses, general nurses and midwives permanently working in the 16 rural healthcare facilities within the SED and SWD. We used purposive sampling to identify and recruit a total of 37 HCWs to participate in-depth

interviews (IDIs), $n=25$ and focused group discussion (FGDs), $n=12$. Only HCWs who were directly involved in the management of obstetric cases and obstetric referrals were sampled to participate in the study.

Data collection

Data was gathered between August 1 and October 31, 2021. The data collection instrument for the study were an IDI guide and a FGD guide. The data collection instruments were taught to a research assistant (RA) having expertise conducting IDIs and FGDs and fluency in both English and Twi. VMD, ABBM and EKN coordinated and worked alongside the RA to conduct the interviews and FGDs. A maximum of two interviews were done each day on average. IDIs and FDGs were conducted in either English or Twi, depending on the preferences of the participants. Participants were given an information sheet as well as an informed consent sheet. The information sheet described the study’s goal as well as its potential benefits, dangers, and length. Prior to the commencement of the interview, all participants signed their agreement. The IDI sessions were audio recorded using a digital tape recorder. The participants preferred to be interviewed at their healthcare facility. Hence, each IDI was conducted in a closed room within the respective healthcare facilities to ensure the privacy of the participant. A semi-structured interview guide was used as the study instrument, with the IDIs lasting between 40 and 60 min.

Two FGDs were conducted; one in the SED and another in the SWD. The group for the FGDs were composed of six participants each. Similar to the IDIs, the FGDs were conducted at the premise of the healthcare facilities in a room that guaranteed the privacy and comfort of the participants. The FGDs lasted about 105 min. The sessions were all audio captured on a digital audio recorder. A semi-structured FGD guide was developed purposely for this study (see Supplementary File). After each day’s interview, the audio data was transcribed verbatim and encrypted to prevented unauthorised access to the data.

Data management and analyses

The first author (VD) reviewed all of the IDI and FGD transcripts before JO imported them into QSR NVivo-12

for data management and analysis. Collaizzi’s descriptive phenomenological technique of analysis was used to analyse the data, which comprises familiarising with the data, recognising significant statements, constructing meanings, producing themes, and confirming the facts [28]. This analytical technique was employed because it was the most appropriate approach for a study to relied on a descriptive phenomenological design. First, the transcripts were assigned unique identifiers “IDI-SWD-1 to IDI-SWD-13” which means in-depth interview participants in Sene West District. The identifier “IDI-SED-1 to IDI-SED-12” represents in-depth interview participants in Sene East District. “FGD-SWD-1 to FGD-SWD-6” represents focus group discussion participants in Sene West District, while “FGD-SED-1 to FGD-SED-6” represents focus group discussion participants in Sene East District. To emphasise compelling issues, codes were assigned to significant statements using the ‘nodes’ function in QSR NVivo-12. JO coded all of the transcripts. Emerging patterns from the initial coding were categorised to constitute the themes and sub-themes. Where consensus was not arrived as to how to categorise the themes, the coding extract were shared with the rest of the team for discussion and final decision on what to do with the codes. This debate strengthened the trustworthiness of the findings. All of the authors discussed and reviewed the emerging themes and sub-themes. The final themes and sub-themes are presented in Table 1.

Rigor

This research’s reliability was verified by adhering to recognised phenomenological study criteria and techniques. The study findings were transferable and confirmable due to the detailed description of the study circumstances and techniques. We did member-checking with five of the participants to establish credibility; this was done one week following transcription so that participants could confirm the transcripts correctly reflected the interview material. No one submitted revisions or raised issues about the content of the interviews. After each interview, field notes were taken and referred to during the analysis, which included the participants’ nonverbal cues and gestures. The interviews were conducted by a trained

Table 1 Emerging themes and sub-themes

Themes	Sub-themes
HCWs’ perceptions of the feasibility of WhatsApp messaging technology	Optimist perspective Pessimist perspective
Challenges to the acceptance of WhatsApp messaging technology	Challenge with getting data Network challenges Platform used for unintended purposes
HCWs’ perceptions of the acceptance of WhatsApp messaging technology	Easy communication and information sharing Improvement in quality of service Tracking referred clients’ compliance

healthcare researcher with substantial experience in conducting IDIs and FGDs.

Ethical approval

All of the procedures used in this study adhere to the international ethical standards outlined in the Helsinki Declaration and the Belmont Declaration [29, 30]. Ethical approval was granted by the Ghana Health Service Ethics Review Committee (GHS-ERC) [ID: GHS-ERC 004/03/21]. All participants were given an information sheet that explained the purpose of the study, the methods, potential risks and benefits, and the need of protecting the participants' autonomy, confidentiality, and privacy. All participants voluntarily participated in this study. Pseudonyms were used to anonymise the transcripts prior to data analysis. Audio records and transcripts (without any identifying information) were stored on a password protected computer. We followed the Standards for Reporting Qualitative Research [31].

Results

Table 2 provides the distribution of the socio-demographic characteristics of all participants in this study. In the SWD, 13 IDIs were conducted. Of this number, 11 of them were females while the remaining two were males. These constituted midwives ($n=5$), general nurses ($n=5$), and community health nurses ($n=3$). In the SED, a total of 12 IDIs were conducted. Of this number, only one of them was a male while the remaining 11 were females. Their educational attainment included diploma ($n=8$), certificate ($n=3$), and degree ($n=1$). This included midwives ($n=5$), general nurses ($n=4$), and community health nurses ($n=3$).

Main findings

From the analysis, three main themes emerged. The themes included the HCWs' perceptions of the feasibility of WhatsApp messaging technology (sub: optimist and pessimist perspectives), challenges to the acceptance of WhatsApp messaging technology (sub: challenge with getting data, network challenges, and risk of platform used for unintended purposes), and the HCWs' perceptions of the acceptance of WhatsApp messaging technology (sub: easy communication and information sharing, improvement in quality of service, and tracking referred clients' compliance).

HCWs' perceptions of the feasibility of WhatsApp messaging technology

This section describes the HCWs' perceptions regarding how practical and feasible it would be to use WhatsApp messaging technology in facilitating obstetric

Table 2 Participants' socio-demographic characteristics

Break down for in-depth interviews				
IDs	District	Sex	Education	Qualification
IDI-SWD-1	Sene West	Female	Certificate	Community health nurse
IDI-SWD-2	Sene West	Female	Diploma	General nurse
IDI-SWD-3	Sene West	Female	Diploma	Community health nurse
IDI-SWD-4	Sene West	Female	Certificate	Community health nurse
IDI-SWD-5	Sene West	Female	Diploma	General nurse
IDI-SWD-6	Sene West	Male	Diploma	Midwife
IDI-SWD-7	Sene West	Female	Diploma	Midwife
IDI-SWD-8	Sene West	Female	Diploma	General nurse
IDI-SWD-9	Sene West	Female	Diploma	General nurse
IDI-SWD-10	Sene West	Female	Certificate	General nurse
IDI-SWD-11	Sene West	Female	Degree	Midwife
IDI-SWD-12	Sene West	Female	Diploma	Midwife
IDI-SWD-13	Sene West	Male	Diploma	Midwife
IDI-SED-1	Sene East	Female	Diploma	Midwife
IDI-SED-2	Sene East	Female	Diploma	Midwife
IDI-SED-3	Sene East	Female	Degree	Midwife
IDI-SED-4	Sene East	Female	Certificate	Community health nurse
IDI-SED-5	Sene East	Female	Certificate	Community health nurse
IDI-SED-6	Sene East	Female	Diploma	General nurse
IDI-SED-7	Sene East	Female	Diploma	General nurse
IDI-SED-8	Sene East	Female	Diploma	General nurse
IDI-SED-9	Sene East	Female	Diploma	General nurse
IDI-SED-10	Sene East	Female	Diploma	Midwife
IDI-SED-11	Sene East	Female	Certificate	Community health nurse
IDI-SED-12	Sene East	Male	Diploma	Midwife
Break down for focused group discussions				
FGD-SWD-1	Sene West	Female	Diploma	Midwife
FGD-SWD-2	Sene West	Female	Diploma	General nurse
FGD-SWD-3	Sene West	Female	Diploma	General nurse
FGD-SWD-4	Sene West	Female	Certificate	General nurse
FGD-SWD-5	Sene West	Female	Degree	Midwife
FGD-SWD-6	Sene West	Female	Certificate	Community health nurse
FGD-SED-1	Sene East	Female	Certificate	Community health nurse
FGD-SED-2	Sene East	Female	Certificate	Community health nurse
FGD-SED-3	Sene East	Female	Diploma	General nurse
FGD-SED-4	Sene East	Female	Diploma	General nurse
FGD-SED-5	Sene East	Female	Diploma	Midwife
FGD-SED-6	Sene East	Female	Diploma	General nurse

referrals in rural settings. The study revealed that HCWs had both an optimistic and pessimistic view about the feasibility of using WhatsApp messaging technology. This perception was reflective in both the SED and SWD.

Optimists' perspective

Healthcare workers (HCWs) perspectives about interventions are critical to the utilisation of healthcare services. The findings from this revealed that HCWs had optimistic perspectives about the use of WhatsApp in the obstetric referral process. For HCWs who ascribed to an optimists' viewpoint, the introduction of WhatsApp in obstetric referral is an innovative idea that has potential to enhance the referrals process. The assertion that the implementation of WhatsApp messaging technology in obstetric referral was a good idea that would promote safe delivery is represented in the following narrations:

"I think it will be a very good idea because transferring a patient to a bigger facility it's good to inform them early and it can cause a safe delivery and also when questions and other things are posted in the group it will help us learn more so in case you are faced with any case you might know how to go about it" (IDI-SED-4).

"a WhatsApp platform will be good for the health workers and a few focal people in the community. If all the health workers around this area are on the platform and there is a referral to Kwame Danso and the person ends up at Limu, the Limu people will know that the person is not at the right referral centre" (FGD-SWD-4).

The use of WhatsApp in obstetric referrals was also reported to be feasible and applicable because it has been introduced in some healthcare facilities:

"It's a great idea because when we go to Krachie they have such a thing like the WhatsApp group where if you have a client you just put everything in the group so that they will wait for the person and if there are any questions they will put it on the WhatsApp page so something like that here will be very helpful but with the community workers they are old women so I don't know how they can use WhatsApp, maybe we can train them and I think they will be able to do it" (IDI-SED-7).

Pessimists' perspective

Although some HCWs held the view that the use of WhatsApp in obstetric referral was a good innovation, others were of the perspective that it was not a good idea. This pessimist viewpoint emanated from two main

factors: clients' misperception about HCWs who use WhatsApp or phones during work hours, and the fact that not all HCWs use a smart phone. Thus, to this category of HCWs, the disadvantages of using WhatsApp in obstetric referral far exceeded the benefits:

"This idea will cause a lot of problem because when we were in school, they used to call us WhatsApp nurses because we don't interact with patient, we don't have time for the patient so it will bring the chance of using phones whiles patients are dying" (IDI-SWD-8).

"Not all the members in the community are using android phones and this setting for instance most of them are not educated and cannot read or write and even for some who can read may not be able to understand it well as you can so I don't think it's a good idea" (FGD-SWD-6).

HCWs' perception of the acceptance of WhatsApp messaging technology

The participants in this study reported that the use of WhatsApp in obstetric referral was important in different ways. Among the emerging usefulness of WhatsApp in obstetric referrals were: easy communication and information sharing; improvement in quality of service; and, tracking referred clients' compliance.

Easy communication and information sharing

According to the HCWs who participated in the study, implementing WhatsApp use in the obstetric referral process was going to make communication easier and enhance information sharing. In the HCWs' perspective, the use of WhatsApp will make it easier for HCWs to share referral information between themselves, as well as between the referral facility and the receiving facility. Some participants opined that during the process of obstetric referral, HCWs at the referral facility can snap pictures of the referral sheet and share on the WhatsApp platform to seek advice from other colleagues before finally deciding to refer.

"I will say that it's easy to communicate with them, let's say you're referring a case you snap the referral sheet and put it there they can ask any question and even if they forget to ask a question they can come back and ask and you reply right away" (IDI-SWD-11).

"Creating the WhatsApp group for the health workers will help us to solve most of our cases. At times the money may not be there at that time for the client but if the issue is posted on the platform maybe someone who has an in-depth knowledge about it

will show you how to manage the case to save the client and whoever is involved and also it will help us prepare and wait for the referred client” (FGD-SED-2).

Another issue that emerged was that the use of WhatsApp messaging technology in obstetric referral can serve as a platform to share health information that will enhance the capacity of HCWs who are involved in the referral process: *“it can also serve as a learning ground for us, example if a referral case is put on the platform, then the necessary intervention will also be put there and it will help us learn. What I mean is that it may not necessarily be me doing the ref but the district so I can learn the whole situation and the interventions that were provided for the case as they post everything on the platform” (IDI-SED-1).*

Improvement in quality of service

From the analysis, it was revealed that the use of WhatsApp messaging technology to facilitate obstetric referrals had the potential to improve the quality of service. Reducing delays is recognised as an important indicator of quality of obstetric referral services. The participants expressed that by incorporating WhatsApp messaging technology in obstetric referrals, the time spent would be drastically reduced because all documentations can be sent to the receiving healthcare facility via the messaging technology platform. Hence, reducing delays and enhancing the overall quality of service.

“One is it will make the work easier for us because when you’re referring someone to the referral point and you know someone from that place within a twinkle of an eye you can contact the person and tell them the arrival of the person and the person is going to receive a good treatment there” (IDI-SWD-3).

“Why I think is good is, first you need to take your referral from right, do documentation which I think will cause delays. Sometimes you can even do a voice SMS on that WhatsApp group that it’s midwife so and so, in-charge speaking on a client for referrals so they should prepare. So, I think that will be faster than we writing” (IDI-SED-12).

Tracking referred clients’ compliance

HCWs in rural healthcare facilities shared the perspective that the use of WhatsApp messaging technology in obstetric referral would enable HCWs at the referral and receiving facilities to effectively monitor and track the compliance of clients. According to the participants, with the current status quo, they are unable to track clients who do not comply with referrals. However, with the

use of WhatsApp messaging technology, the referral and receiving healthcare facilities can keep in touch in real time; allowing them to track the level of compliance with referrals:

“If all the health workers around this area are on the platform and there is a referral to Kwame Danso and the person ends up at Limu the Limu people will know that the person is not at the right referral centre”. (FGD-SED-5).

“After referring you can get the feedback from the same WhatsApp group” (FGD-SWD-3).

Challenges to the acceptance of WhatsApp messaging technology

In the implementation of innovative health interventions, there are some issues that may be of concern to the end users. Although HCWs perceived the implementation of WhatsApp messaging technology in obstetric referral as feasible and acceptable, they had concerns about four main issues: access to data, network challenges, the use of the platform for unintended purposes, and slow responses from end users.

Challenge with getting data

A recurring theme across all of the interviews was the issues of internet data. Most of the HCWs were concerned about the quantum of data that would be required to effectively use WhatsApp messaging technology in facilitating obstetric referrals. For some HCWs, using their own financial resources to pay for the cost of internet so that they can use WhatsApp to refer a client was a disincentive to their acceptance and utilisation of this messaging technology. Also, there were concerns that should the receiving healthcare facility lack access to internet data on their phones, then it will be difficult to use WhatsApp messaging technology to facilitate obstetric referrals:

“It’s not a bad idea but if you’re referring a case to a different facility and those on the WhatsApp page, they don’t have their data on then they wouldn’t know that you’re sending a case. We have a page like that with Krachie and sometimes they complain that their data weren’t on so the client will get there and they wouldn’t know that a client is coming” (IDI-SWD-1).

“I have the phone but I don’t have data I may have credit for calls but I don’t mostly have data bundle and as for me I don’t usually go to social media plus the nature of our work I can’t leave a patient and listen to calls” (IDI-SED-2).

Network challenges

Corollary to the issue of no internet data, HCWs were concerned about the poor nature of the telecommunication networks in rural areas. The study revealed that in the districts where their facilities are located, there are many zones where there is no network to connect to the internet. As such, they have to cover some distance to get to points where they can have internet connectivity. Therefore, implementing the use of WhatsApp messaging technology in such areas is likely to be challenging:

“For this community the only challenge is the network because I would be the only person taking care of the client so I have to leave the client get to a good network zone for me to send any message across so that’s the only challenge and trans well because maybe you tell them that the client will get there at 5:00pm but for the delay in transport the person leaves her at 5:30pm. So, transportation and network problems are the challenges here” (IDI-SED-4).
“The only challenge is that here our network is very bad we have to move to some places in order to get network because sometimes we may have a meeting or an important message and because of network we might miss out” (IDI-SWD-7).

Platform used for unintended purposes

Our study also revealed that HCWs were concerned about the likelihood of WhatsApp messaging technology platform to be used for unintended purposes. According to the participants, if there are no guidelines and laws to regulate how the WhatsApp messaging technology should be used, then HCWs would post unnecessary things that may derail from the purpose of the intervention:

“My concern will be on what we post there. I am sure that some people may want to use the platform to post non-relevant issues there. When that happens, the platform will lose its usefulness as a healthcare intervention.” (FGD-SWD-1).
“Many people enjoy reading group messages based on what has been posted. There are some people that post unnecessary things on the page. In our own small groups, somebody going to a funeral will post it on the page. Sometimes, some people will post the goat that they see and add laughing emoji’s. So, when you download it, all your data will be gone. So, if there are no rules to regulate the operation of the WhatsApp platform, then it will become ineffective.” (FGD-SWD-2).

Discussion

In many countries, including Ghana, access to timely obstetric care is significantly delayed as a result of poor referral systems [7, 32, 33]. This often exacerbates the risks of obstetric complications and increases maternal mortality. Hence, evidence-based research is needed to develop locally-driven remediating strategies to enhance obstetric referrals in rural settlements. Therefore, we explored health care workers’ perception of the feasibility and acceptance of WhatsApp messaging technology to facilitate obstetric referrals in selected health facilities in rural Ghana. Regarding the perceptions of the feasibility of WhatsApp messaging technology, our study revealed that HCWs are both optimistic and pessimistic about the use of WhatsApp messaging technology in facilitating obstetric referrals. Perhaps, this dual perspective about the feasibility of using WhatsApp messaging technology could be due to the HCWs’ concerns about the economic, technical, and operational practicability of implementing this intervention [17]. The findings are similar to that of another study that revealed that HCWs’ perceptions of the feasibility of implementing an intervention of this nature hinges on their concerns about the resources needed for implementation [34].

Consistent with the tenets of the TAM [23, 24], the present study affirms that the PU and PEU of the HCWs influenced the acceptance of WhatsApp messaging technology as a tool to facilitate obstetric referrals. In both districts, WhatsApp messaging technology was viewed as an effective means of communicating and sharing health information necessary to reduce delays that have to do with documentation and bureaucracies. This finding is synonymous with Owen et al.’s [7] study that showed that WhatsApp can be utilised as a communication medium for high-risk obstetric referrals. A plausible explanation for this finding could be that, it is a common practice within health service delivery to share information between institutions and HCWs [35]. As such, WhatsApp messaging technology provides a faster way of communicating and sharing information between the referral and receiving health facilities, and among HCWs [36, 37]. These PU informed HCWs’ acceptance of WhatsApp messaging technology in facilitating obstetric referrals in rural settings.

The findings from this study indicate that WhatsApp messaging technology has the capacity to improve the overall quality of health service delivery. Ordinarily, the quality of health services that can be provided by HCWs in resource-constrained settings, as in the case of rural areas, is significantly impacted by their lack of access to training and reference materials, poor communication systems for feedback from experts or supervisors in the

diagnosis and management of complex cases, and difficulty keeping patients within the continuum of care through referrals [38, 39]. However, WhatsApp provides the appropriate technology to link all actors within the continuum of obstetric care service delivery [7]. Thus, facilitating faster response time and reducing at the point of receiving care. This is likely to increase clients' satisfaction and reflects in an overall improvement in the quality of health service delivery throughout the referral process.

In line with the third objective of this study, we found that HCWs' had some perceived challenges to the acceptance of WhatsApp messaging technology to facilitate obstetric referrals. As with other messaging technologies, WhatsApp relies on the use of wireless connection or data to be operational [40]. Hence, the perceived fear of experiencing poor network or not having money to purchase internet data to operate the WhatsApp platform was a major concern to HCWs' and their willingness to use WhatsApp messaging technology to support obstetric referrals. The study also revealed that HCWs had concerns about the WhatsApp platform being used for unintended purposes. This is major concern because unlike other internet services, WhatsApp messaging technology does not have any standards or requests for comments defining a set of communication norms that must be abided [41]. This situation opens up an opportunity for the platform to be used for unintended purposes. Such actions exacerbate the likelihood for a breach of confidential health information to relating to the patient [42, 43]. From the perspective of the TAM, the perceived challenges adversely affect the individual's PEU which tends to make them hesitant to accept the use of a given technology [44]. This may explain the reinforcement of HCWs' pessimistic views in relation to the acceptance of WhatsApp messaging technology to facilitate obstetric referrals.

Implications for policy and practice

This study has several implications for policy and practice. First, our study indicates that the implementation of WhatsApp messaging technology use in facilitating obstetric referrals would require that the districts provide HCWs with the necessary resources including internet data and dedicated mobile phones. Also, given that there were concerns about the use of the WhatsApp messaging technology for unintended purposes, there is a need for a guideline that would streamline the use of the platform to be able to guarantee the privacy, confidentiality and data safety of patient as well as the HCWs who would use the platform to facilitate obstetric referrals. At the broader level, it is imperative for the government of Ghana through its agencies improve the internet stability in rural communities to support the implementation

of WhatsApp messaging technology as a tool to facilitate obstetric referrals.

Implications for methodology and theory

Our findings support the TAM that argues that an individual's PU and PEU influences their acceptance of a given technology [17]. While this is true, the qualitative research method use did not allow us to explore the extent to which the two factors (i.e., PU and PEU) influenced HCWs' acceptance of WhatsApp messaging technology to facilitate obstetric referrals in a rural setting. Hence, a quantitative study may be needed to determine the predictive effect of these factors on the acceptance of WhatsApp messaging technology to facilitate obstetric referrals.

Limitations and future research

The strength of this study lies in the rigorous qualitative methodology followed. Also, we performed member-checking and an audio audit trail of all the interviews which adds to the rigour and trustworthiness of the study. Yet, there are some limitations that should be considered. We employed qualitative research approach. Hence, we are unable to generalise the study findings. Also, the scope of the study was delimited to only HCWs. As such, patients' perspectives about the feasibility and acceptance of WhatsApp messaging technology in obstetric referrals could not be assessed. Future studies must include patients and policy makers. Also, future research must endeavour to widen the scope by including other districts, municipalities and regions to develop a comprehensive understanding of the feasibility and acceptance of WhatsApp messaging technology in facilitating obstetric referrals.

Conclusion

In summary, this study explored HCWs' perceptions of the feasibility and acceptance of WhatsApp messaging technology to facilitate obstetric referrals in selected health facilities in rural Ghana. HCWs had both optimist and pessimist perspectives about the feasibility of WhatsApp messaging technology in promoting obstetric referrals. The optimism stems from the perceived benefits of its use (i.e., easy communication and information sharing, improvement in quality of service, and tracking referred clients' compliance), while the pessimism emanates from the concerns associated with the use of WhatsApp messaging technology in delivering obstetric referrals (i.e., challenge with getting data, network challenges, and risk of platform used for unintended purposes). We conclude that the implementation of WhatsApp messaging technology in obstetric referral is feasible and acceptable to HCWs in rural healthcare facilities in Ghana. To promote

the acceptance and use of WhatsApp messaging technology in obstetric referrals, there is a need to build the capacity of HCWs and provide a working guideline to regulate the platform. The government and its partners must consider providing internet data and airtime, as well as dedicated phones to support the implementation of the use of WhatsApp messaging technology in promoting effective obstetric referral.

Abbreviations

BEmONC	Basic Emergency Obstetric and Newborn Care
CHPS	Community Health Planning and Services
FGDs	Focused Group Discussions
GHS-ERC	Ghana Health Service Ethics Review Committee
HCWs	Healthcare Workers
IDIs	In-depth Interviews
KNUST	Kwame Nkrumah University of Science and Technology
MDGs	Millennium Development Goals
SDGs	Sustainable Development Goals
SED	Sene East District; SWD: Sene West District

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s44247-023-00012-5>.

Additional file 1.

Acknowledgements

We acknowledge all of our participants for their time spent in this study

Authors' contributions

VDM led the study and was responsible for acquiring funding. VMD, ABBM, EKN and JRL substantially contributed to the conceptualisation and design of the study. VDM, ABBM and PA provided methodological insights. VMD, ABBM and EKN coordinated data collection. JO carried out the initial analysis and drafted the initial manuscript. VMD, ABBM, EKN, AAO, JO and JRL discussed the results and critically reviewed its intellectual contents. All authors critically reviewed and revised and then approved the final manuscript as submitted.

Funding

USAID/NSF funded they study to examine the use of mHealth to increase continuity and access to quality maternal care connecting community midwives at rural health facilities, with personnel at district hospital for obstetric referral (USAID/NSF PEER 9–518). The funding body did not play any role in the design of the study and collection, analysis, and interpretation of data and in writing the manuscript.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

All methods and procedures complied with the Helsinki Declaration. The protocol for this study was reviewed and approved by the Ghana Health Service Ethics Review Committee (GHS-ERC) on 29th April 2021, with the ethical approval identification number GHS-ERC 004/03/21. All participants gave written informed consent prior to the interviews and individual names were withheld from the transcripts.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹Department of Nursing, College of Health Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. ²Department of Epidemiology and Biostatistics, School of Public Health, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. ³Department of Sociology and Social Policy, Lingnan University, 8 Castle Peak Road, Tuen Mun, Hong Kong. ⁴Department of Population and Health, University of Cape Coast, Cape Coast, Ghana. ⁵Sene West District Health Directorate, P. O. Box 35, Kwame Danso, Ghana. ⁶Sene East District Health Directorate, P. O. Box 38, Kajaji, Ghana. ⁷Ghana Health Service, Private Mail Bag, Ministries Post Office, Accra, Ghana. ⁸School of Nursing, University of Michigan, Ann Arbor, USA.

Received: 8 November 2022 Accepted: 9 March 2023

Published online: 06 April 2023

References

- Oduro-Mensah E, Agyepong IA, Frimpong E, Zweekhorst M, Vanotoo LA. Implementation of a referral and expert advice call Center for Maternal and Newborn Care in the resource constrained health system context of the Greater Accra region of Ghana. *BMC Pregnancy Childbirth*. 2021;21(1):1–6.
- World Health Organisation. Media centre: Maternal Mortality. 2015. <http://www.who.int/mediacentre/factsheets/fs348/en/>. Accessed 10 Feb 2016.
- Dzomeku VM, Duodu PA, Okyere J, Aduse-Poku L, Dey NE, Mensah AB, Nakua EK, Agbadi P, Nutor JJ. Prevalence, progress, and social inequalities of home deliveries in Ghana from 2006 to 2018: insights from the multiple indicator cluster surveys. *BMC Pregnancy Childbirth*. 2021;21(1):1–2.
- Hodin SM, Caglia JM, Baye M, Bewa J, Waiswa P, Langer A. From MDGs to SDGs: implications for maternal newborn health in Africa. *Afr J Reprod Health*. 2016;20(3):26–8.
- Koduah A, van Dijk H, Agyepong IA. The role of policy actors and contextual factors in policy agenda setting and formulation: maternal fee exemption policies in Ghana over four and a half decades. *Health Res Policy Syst*. 2015;13(1):27.
- Ghana Health Service. Ghana Annual Report 2019. WHO | Regional Office for Africa. 2020 [cited 2021 Feb 21]. Available from: <https://www.afro.who.int/publications/ghana-annual-report-2019>.
- Owen MD, Ismail HM, Goodman D, Batakji M, Kim SM, Olufolabi A, Srofeyoh EK. Use of WhatsApp messaging technology to strengthen obstetric referrals in the Greater Accra Region, Ghana: Findings from a feasibility study. *PLoS ONE*. 2022;17(4):e0266932.
- Daniels AA, Abuosi A. Improving emergency obstetric referral systems in low and middle income countries: a qualitative study in a tertiary health facility in Ghana. *BMC Health Serv Res*. 2020;20(1):1.
- United Nations Development Planning Commission. Ghana Millennium Development Goals Report 2015. [Cited 202 March 31]. Available from: [https://www.gh.undp.org/content/dam/ghana/docs/Reports/UNDP_GH_MDG%202015%20\(June%2025\).pdf](https://www.gh.undp.org/content/dam/ghana/docs/Reports/UNDP_GH_MDG%202015%20(June%2025).pdf).
- Shaarani I, El-Kantar A, Hamzeh N, Jounblat M, El-Yaman T, Habanjar M, Halawi N, Itani A, Soubra R. Interprofessional communication of physicians using whatsapp: physicians' perspective. *Telemed J E Health*. 2020;26(10):1257–64.
- Thaddeus S, Maine D. Too to walk : maternal mortality in. *Soc Sci Med*. 1994;38(8):1091–110.
- Sutikno T, Handayani L, Stiawan D, Riyadi MA, Subroto IM. WhatsApp, viber and telegram: Which is the best for instant messaging?. *International Journal of Electrical & Computer Engineering* (2088–8708). 2016 Jun 1;6(3).
- Pervin J, Nu UT, Rahman AM, Rahman M, Uddin B, Razzaque A, Johnson S, Kuhn R, Rahman A. Level and determinants of birth preparedness and complication readiness among pregnant women: a cross sectional study in a rural area in Bangladesh. *PLoS ONE*. 2018;13(12):e0209076.
- Sumankuuro J, Mahama MY, Crockett J, Wang S, Young J. Narratives on why pregnant women delay seeking maternal health care during delivery and obstetric complications in rural Ghana. *BMC Pregnancy Childbirth*. 2019;19(1):1–3.

15. Aborigo RA, Moyer CA, Gupta M, Adongo PB, Williams J, Hodgson A, Allote P, Engmann CM. Obstetric danger signs and factors affecting health seeking behaviour among the Kassena-Nankani of northern Ghana: a qualitative study. *Afr J Reprod Health*. 2014;18(3):78–86.
16. Bowen DJ, Kreuter M, Spring B, Cofta-Woerpel L, Linnan L, Weiner D, Bakken S, Kaplan CP, Squiers L, Fabrizio C, Fernandez M. How we design feasibility studies. *Am J Prev Med*. 2009;36(5):452–7.
17. Putri NK, Sujiwa A. Health students' perspectives on the feasibility of telemedicine implementation in Indonesia. *European Journal of Molecular & Clinical Medicine*;7(05):2020.
18. Cohn BA, Szedlák M, Gärtner B, Valero-Cuevas FJ. Feasibility theory reconciles and informs alternative approaches to neuromuscular control. *Front Comput Neurosci*. 2018;12:62.
19. Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q*. 1989;1:319–40.
20. Min S, So KK, Jeong M. Consumer adoption of the Uber mobile application: Insights from diffusion of innovation theory and technology acceptance model. In *Future of Tourism Marketing 2021 Jun 14* (pp. 2–15). Routledge.
21. Kamal SA, Shafiq M, Kakria P. Investigating acceptance of telemedicine services through an extended technology acceptance model (TAM). *Technol Soc*. 2020;1(60):101212.
22. Sukendro S, Habibi A, Khaeruddin K, Indrayana B, Syahrudin S, Makadada FA, Hakim H. Using an extended Technology Acceptance Model to understand students' use of e-learning during Covid-19: Indonesian sport science education context. *Heliyon*. 2020;6(11):e05410.
23. Abdullah F, Ward R, Ahmed E. Investigating the influence of the most commonly used external variables of TAM on students' Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) of e-portfolios. *Comput Hum Behav*. 2016;63:75–90.
24. Worthington AK. Technology Acceptance Model. *Persuasion Theory in Action: An Open Educational Resource*. 2021 May 30.
25. Penner JL, McClement SE. Using phenomenology to examine the experiences of family caregivers of patients with advanced head and neck cancer: Reflections of a novice researcher. *Int J Qual Methods*. 2008;7(2):92–101.
26. Ghana Statistical Service. 2010 Population and Housing Census, District Analytical Report, Sene East District. 2014.
27. Ghana Statistical Service. 2010 Population and Housing Census, District Analytical Report, Sene West District. 2014. Available at: https://www2.statsghana.gov.gh/docfiles/2010_District_Report/Brong%20Ahafo/SENE%20WEST.pdf.
28. Morrow R, Rodriguez A, King N. Colaizzi's descriptive phenomenological method. *Psychologist*. 2015;28(8):643–4.
29. General Assembly of the World Medical Association. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. *J Am Coll Dent*. 2014;81(3):14–8.
30. Irving DN. Need to know: nuremberg code, declaration of helsinki, belmont report, ohrp.
31. O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. *Acad Med*. 2014;89(9):1245–51.
32. Raykar NP, Ng-Kamstra JS, Bickler S, Davies J, Greenberg SL, Hagander L, Johnson W, Leather AJ, McQueen KK, Mukhopadhyay S, Suzuki E. New global surgical and anaesthesia indicators in the World Development Indicators dataset. *BMJ Glob Health*. 2017;2(2):e000265.
33. Kyei-Nimakoh M, Carolan-Olah M, McCann TV. Access barriers to obstetric care at health facilities in sub-Saharan Africa—a systematic review. *Syst Rev*. 2017;6(1):1–6.
34. Patel SJ, Subbiah S, Jones R, Muigai F, Rothschild CW, Omwodo L, Ogolla T, Kimenju G, Pearson N, Meadows A, Nour NM. Providing support to pregnant women and new mothers through moderated WhatsApp groups: a feasibility study. *Mhealth*. 2018;4.
35. Carmona S, Alayed N, Al-Ibrahim A, D'Souza R. Realizing the potential of real-time clinical collaboration in maternal-fetal and obstetric medicine through WhatsApp. *Obstet Med*. 2018;11(2):83–9.
36. Ogundaini OO, de la Harpe R, McLean N. Integration of mHealth Information and Communication Technologies into the Clinical Settings of Hospitals in Sub-Saharan Africa: Qualitative Study. *JMIR Mhealth Uhealth*. 2021;9(10):e26358.
37. Williams V, Kovarik C. WhatsApp: an innovative tool for dermatology care in limited resource settings. *Telemed J E Health*. 2018;24(6):464–8.
38. Orton M, Agarwal S, Muhoza P, Vasudevan L, Vu A. Strengthening delivery of health services using digital devices. *Glob Health Sci Pract*. 2018;6(Supplement 1):S61–71.
39. Bogan M, van Esch J, Mhila G, DeRenzi B, Mushi C, Wakabi T, Lesh N, Mitchell M. Improving standards of care with mobile applications in Tanzania. In *W3C workshop on the role of Mobile Technologies in Fostering Social and Economic Development in Africa 2009 Apr 1*.
40. Mars M, Scott RE. WhatsApp in clinical practice: A literature. *The Promise of New Technologies in an Age of New Health Challenges*. 2016;24:82.
41. Masoni M, Guelfi MR. WhatsApp and other messaging apps in medicine: opportunities and risks. *Intern Emerg Med*. 2020;15(2):171–3.
42. Opperman CJ, Janse van Vuuren M. WhatsApp in a clinical setting: The good, the bad and the law. *South Afr J Bioeth Law*. 2018;11(2):102–3.
43. Giordano V, Koch H, Godoy-Santos A, Belangero WD, Pires RE, Labronici P. WhatsApp messenger as an adjunctive tool for telemedicine: an overview. *Interact J Med Res*. 2017;6(2):e6214.
44. He Y, Chen Q, Kitkuakul S. Regulatory focus and technology acceptance: Perceived ease of use and usefulness as efficacy. *Cogent Business & Management*. 2018;5(1):1459006.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more biomedcentral.com/submissions

