

THE ROLE OF MOBILE LEARNING IN SUPPORTING COMMUNITY HEALTH WORKERS' CONTINUOUS LEARNING: A CASE OF A VILLAGE HEALTH TEAMS TRAINING APP.

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Key Words: Mobile Learning, continuous learning, Community of Practice

ABSTRACT

The purpose of this study is to assess the role of mobile learning in supporting Community Health Workers referred to as Village Health Teams in Uganda. Continuous learning with a smartphone application (App). The study aimed to objectify the concept of using Mobile learning to support CHWs' training, which is presently considered to be irregular, and underfunded. A Mobile App prototype is used as a study tool to digitize training content on the subject of diseases, reproductive health, sanitation, and family wellbeing. The study involved 41 respondent participants categorized as CHWs, paramedical students, and Community Health Leaders. The variables for the study included the prevalence of smartphone devices, ease of Mobile App use, challenges of the existing approach to training and information delivery, App accessibility issues, and anticipated technical challenges. Despite the conspicuous challenges of mobile technology, the study findings suggest that mobile learning is a favorable alternative to support the training of CHWs. The identified advantages relate to geographic convenience, numerous mobile services, ease of access, update, storage, and sharing of content. However, imminent challenges include the availability of devices among CHWs, lack of electricity, unreliable network, and lack of internet data. Interventions by stakeholders to mitigate challenges are highlighted and mobile learning recommendations are expanded.

1. INTRODUCTION

By the year 2012, the health sector in Uganda encountered numerous mobile pilot interventions (Mobile Health-mHealth) aimed at improving access to health information through basic-phone short messaging. The interventions from varying providers became excessive and did not scale (McCann, 2012). The challenges were related to repetition, cost, and the iterative process involved before an innovation is fully operational (Maternal Health Task Force, 2014). Telecom companies controlled 100 percent flow of content via basic cellular phones. Over 50, mHealth projects were piloting mobile messaging interventions before the imposition of a moratorium to streamline mHealth services in Uganda (Ndlovu et al., 2021). According to the Uganda Bureau of Statistics, the population of Uganda stands at 43 million with a growth rate estimated at 3 percent (UBOS, 2021). The doctor to patient ratio stands at 1:11,000 (Okiror, 2017), the nurse and midwife ratio is 1:1000 (World Bank, n.d.). There is a deficit of human resource personnel in the health sector which brings attention to the roles of Community Health Workers (CHWs) known as Village Health Teams (VHTs). They are the link to health services in the Ugandan community. VHTs are volunteer community members with expected high attrition and not likely to be a priority for regular access to training. The problem of exclusion from training drives a need to assess the role of mobile learning in supporting community health workers, continuous learning.

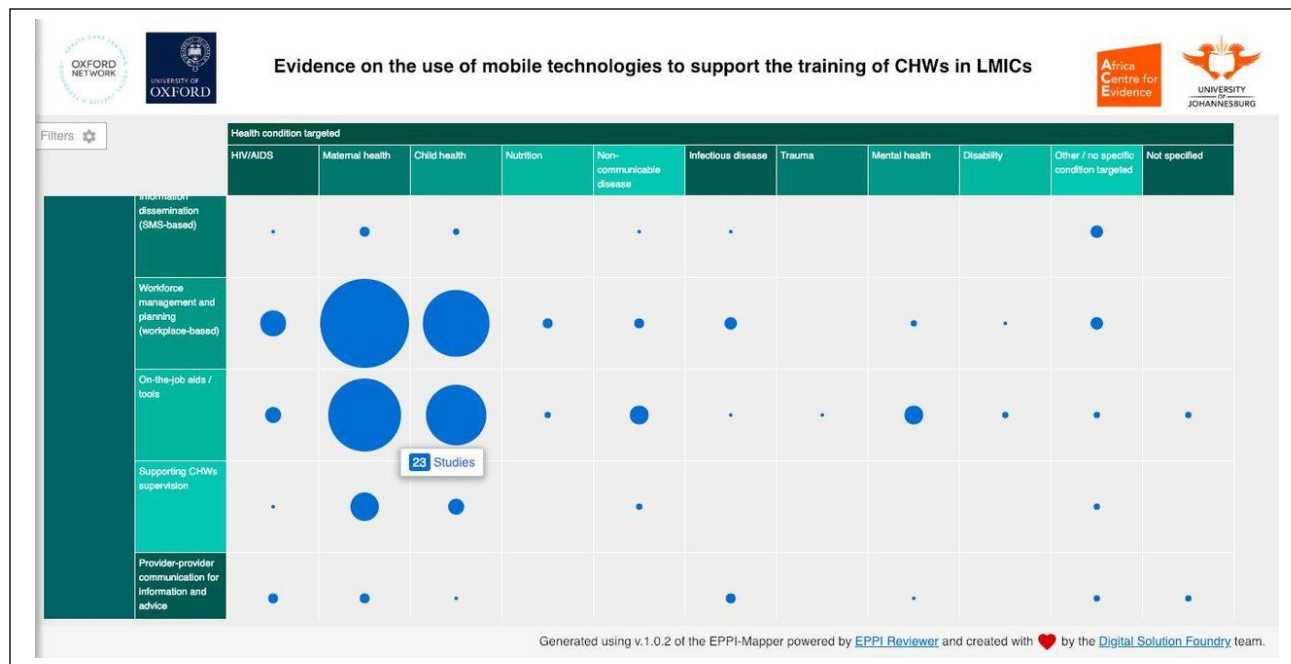
2. LITERATURE REVIEW

Mobile learning in health service

Mobile learning is a form of learning that affords liberty to learners to access learning objects from almost anywhere and anytime riding on the affordances of mobile technologies and the internet (Ozdamli & Cavus, 2011). Whereas early mHealth applications focused on the use of short text message services, smartphones are used extensively (Wilson, 2018) to include Apps used to assist Health Care Professionals (HCPs) in health record maintenance and access, communications and consulting, reference and information gathering, and medical continuing education and training (Ventola, 2014). In a study 'it's on my iPhone' (Wallace et al., 2012) results indicate that students 55 percent), and residents 95 percent having access to a mobile computing device had a positive educational effect associated with having rapid access to resources required for learning or clinical care procedures. However, the positive results of mobile learning in the health sector do not explicitly show CHWs to be benefiting from Mobile learning in Uganda despite Technology for development being a central pillar in the Vision2040 (National Planning Authority, 2020). Equally, the Uganda eHealth strategy highlights technology skills development and training as parts of the strategy implementation. (Ministry of Health Uganda, 2017).

Figure 1 below shows that CHWs in Low and Middle-Income Countries (LMICs) are not utilizing mobile technologies to benefit from continuous learning. The study acknowledges that the presence of many mobile-driven platforms disregards the inclusion of the CHWs training component in software applications (Winters et al., 2019).

Figure 1: Evidence on the use of mobile technologies to support the training of CHWs in LMICs



A part from the activities visible in the 2x2 dimension, there is sparse activities linked to CHW training and the use of Mobile technology.

Continuous training and High performance in health services

The Institute of Medicine (IOM) defines quality in healthcare as the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge. (IOM, 2013) in (Allen-Duck, et al., 2017). Continuous access to knowledge and skills is associated with a high performance of CHWs. In a study ‘Performance of community health workers and associated factors in a rural community in Uganda’, the researcher asserts that there was a statistically significant relationship between CHWs having attended additional refresher training and high performance, (Musoke, et al., 2019a). An assessment of health worker performance in the management of children with acute respiratory infections in Nigeria found many of the underperforming health workers had not attended a continuing education program in the previous two years. The study underpins the importance of continuous learning to be significant as original training (Lehmann & Sanders, 2007). In a controlled study in Uganda, high performance was registered from the majority of CHWs participants 292 (98 percent) after going through a series of refresher training that included diagnosis, record keeping, and referral of sick children, (Musoke et al., 2019b).

Mobile Technology devices and infrastructure in Uganda

The Uganda mobile broadband network¹ predominantly third-generation (3G), covers 135 districts. The 4G network is mostly found within urban locations and the 5G network is undergoing tests in Kampala city. The majority of the Ugandan population is presumed to stay in rural areas and 10 million out of 43 million people stay in urban locations (UBOS², 2021). According to the National Information Technology Authority, 15 percent of the surveyed population in the year 2018, owned a smartphone (NITA-U, 2018). In 2019, the Research ICT Africa noted in a policy paper that Uganda had a huge urban-rural gap in Internet use of 70 percent, where only 9 percent of Ugandans living in rural areas had access to the Internet (Gillwald et al., 2019). Since then, there has been some transformation in internet penetration trends. The 3Q21-report³ from the Uganda Communication Commission

¹ MTN telecom Uganda: [Coverage Map](#)
² Uganda Bureau of Statistics(UBOS)
³ 3Q21-3rd Quarter of the year 2021 Report

(UCC) shows that the penetration rate of fixed and cellular subscriptions is 69 percent, which means that 7 in 10 Ugandans (regardless of age) own a mobile phone of which 85 percent of new telephone subscriptions were data-enabled (Uganda Communication Commission, 2022). The internet subscription leap is attributed to the demand for mobile devices and data consumption due to prominence in supporting education services during the COVID19 pandemic lockdown (Kanaabi, 2020). The 3Q21-report estimates smartphone devices to be contributing 9.4 million of the total telephone connection in Uganda. The commission (UCC) has also championed the distribution of 1,400 solar power and tablet devices to rural dwellers as proof of ICT for the development concept (Uganda Communication Commission, 2021). However, there is no reliable record to suggest the prevalence of data and smartphones in the rural locations where CHWs are predominately located. Most feature phones equally subscribe to the internet.

3. RESEARCH METHODS

The study used a mixed-method approach to inform data collection and analysis. The study aimed at objectifying the concept of utilizing mobile learning to support the training of CHWs by responding to a general question; how can mobile learning technology on a smartphone device support the continuous training of CHWs? To understand the possible bottlenecks, the study considered both end-users and service provider challenges with the question; what challenges are faced by CHWs while using a smartphone to learn? What hindrances are expected to arise from mobile service provision? The study responds to five variables including the prevalence of smartphone devices, ease of Mobile App use, challenges of the existing approach to training and information delivery, App accessibility issues, and anticipated technical challenges.

The study focused on a smaller scope with 22 VHTs from the district of Agago, Patongo, and Lukole sub-counties. The other category of participants were 17 paramedical students from the Kampala School of Paramedicals in Kayunga district. Key informants were 2 Community Health Leaders (CHLs) from Agago district and Health Implementing Partner (HIP) Marie stopes-Uganda. The total number of study participants was 41.

A semi-structured questionnaire was used to collect both structured and unstructured responses from participants. Data was collected using a Google form integrated with the study Mobile App and hard copy forms were provided to participants without smartphones. Data entries were processed using Excel and the Statistical Package for the Social Sciences (SPSS). Secondary data was used to justify the study and to describe the primary data.

A simple Mobile App was designed and deployed on the smartphone devices of participants before the evaluation. The prototype contained training content on subjects such as Reproductive Health, Family Planning, and diseases.

4. THE MOBILE APP AND THE PROPOSED COMPONENTS

The Mobile App runs on the Android operating system which is predominantly used in Uganda. The Mobile App concept (Figure 1) integrates the components intended to enhance the Mobile learning user experience.

- a) **Community of Practice:** The cohesion of groups of people intentionally participating in collective and collaborated learning in a shared domain of human endeavor (Wenger-Trayner and Wenger-Trayner, 2015).
- b) **Skills and Scenario-based simulations:** As tools intended to influence the learning process to nurture procedural skills, team-based context, or responding to a crisis (Battista, 2017).
- c) **Sharable Content:** The intention is to engage users by creating content that generates user-initiated sharing on social networks (Young, 2016).
- d) **Diverse languages:** In a learner-centered approach to formal or informal learning, literacy and learning in the local language become a strategic component of the development plan (Trudell, B. 2009).

Figure 2: The Conceptual Framework of a Training App on a smartphone

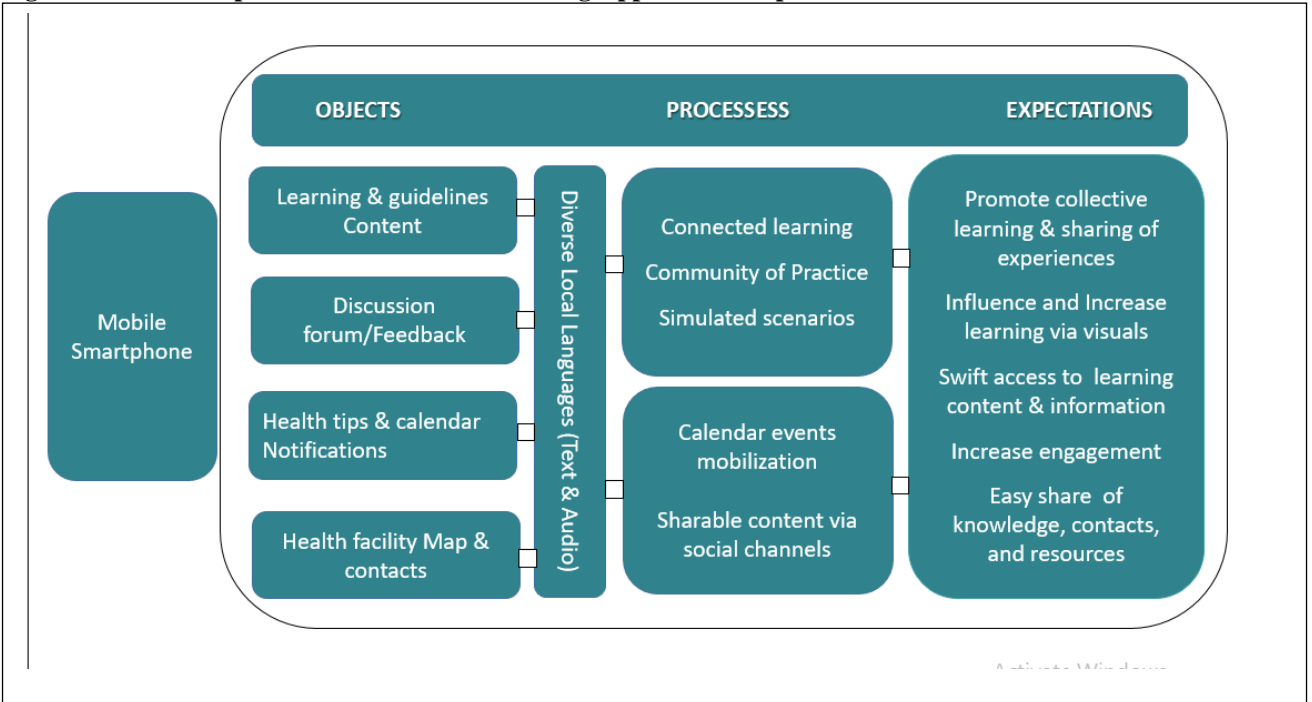
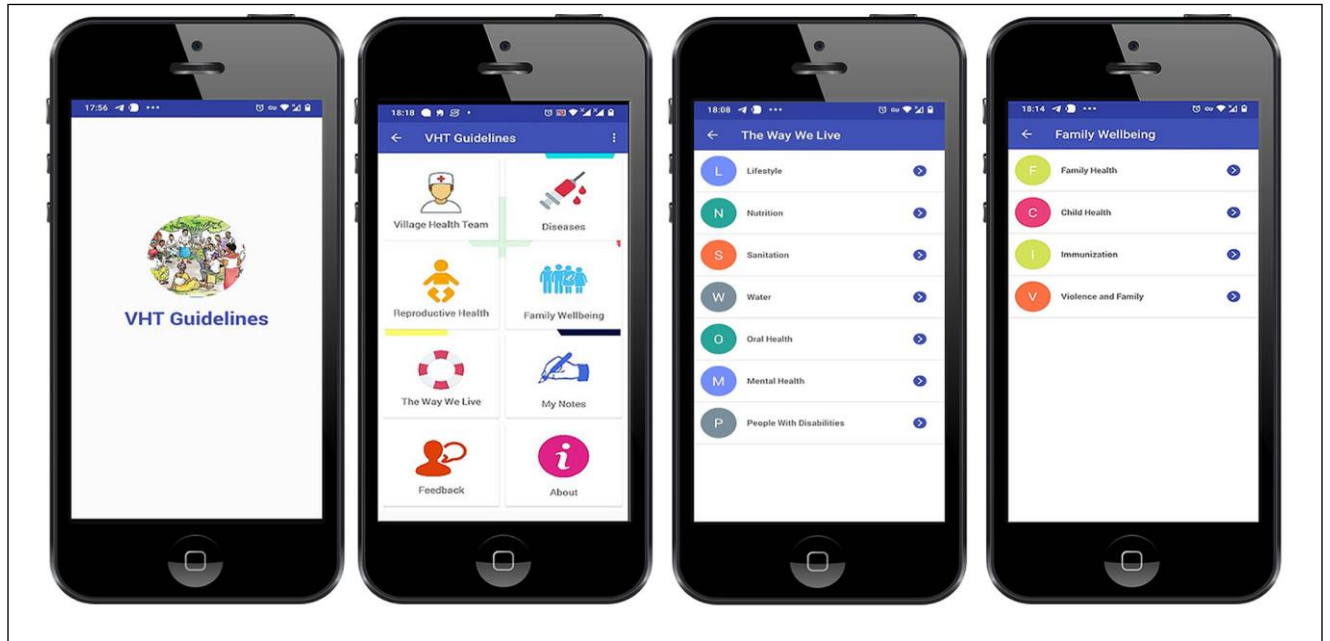


Figure 3: The App Prototype Graphical User Interface (GUI)



5. STUDY FINDINGS

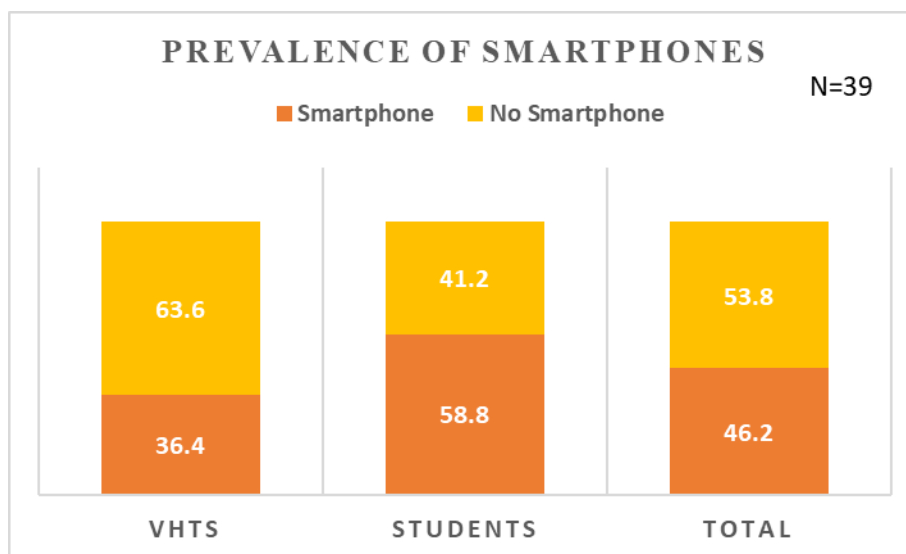
5.1 Findings from Community Health Worker (VHTs) and Paramedical Students

The study engaged 39 CHWs (VHTs) and Health students.

5.1.1 The prevalence of smartphone devices

Out of 39 participants, in the category of VHTs, (8) 36 percent had access to or owned a smartphone, and (14) 63 percent did not own or have access to a smartphone. Among students, (10) 58 percent had access to or owned a smartphone while (7) 41 percent had no access or owned a smartphone. Also, data from the survey indicates that male participants 52 percent did not own a smartphone while 60 percent of the female participants had no access or owned a smartphone.

VHTs participants attribute the low prevalence of smartphone devices to the cost of acquiring and maintaining a Smartphone. Whereas male students purchase to own a smartphone phone, their female counterparts depend on their parents to acquire a smartphone.



i. The need for the Mobile App, ease of use, and navigation

The majority of participants VHTs (Strongly Agree 43.5 percent, Agree 56.5 percent) and Students (Strongly Agree 25 percent, Agree 68.8 percent) indicate that the Mobile App is needed and useful to support the training of CHWs. However, 6.2 percent of students disagree that the App would be useful because most expected users including students do not own smartphone devices.

Participants (VHTs) indicate that the Mobile App is favorable because software content is preserved better, access to information is easy and available anytime since we move with our phones, the information in App is easier to follow during training, taking notes is safer, and easy to access, information can be easily updated and published, the App can be used as a tool for collecting data from the community, saves time transporting people for training, the easiest way to sensitize community members and technical terms can be searched and meaning acquired right away.

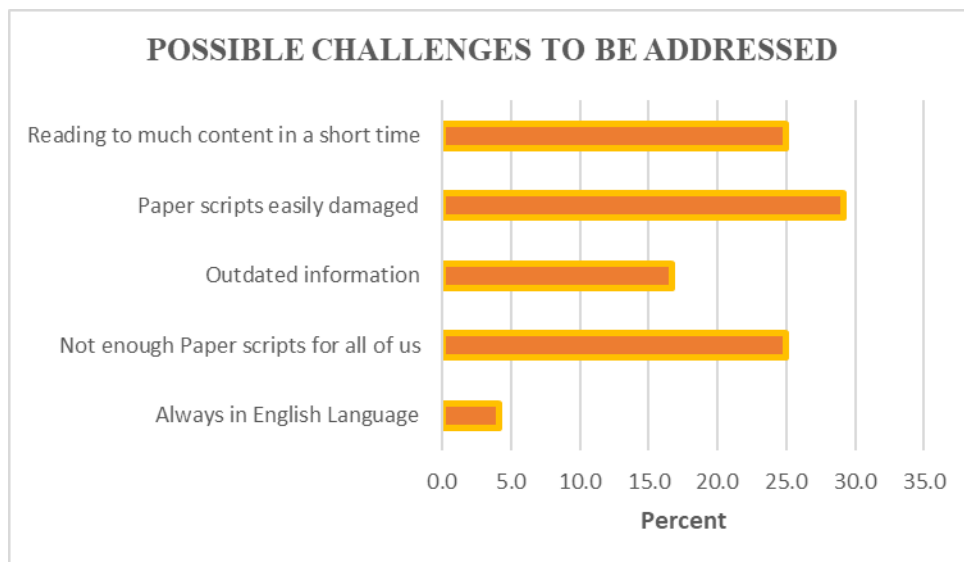
On the other hand, participants (Students) indicate that such a Mobile App and the content should be good for their studies.

5.1.2 Challenges of the existing approach to training delivery

A portion of the VHTs participants (30 percent) agree that the paper used in training is vulnerable to quick wear and tear in the village environment. Participants (29.2 percent) admit that it is not easy for all to return to training with previous training scripts without defects. They attribute paper damage to improper storage, children, termites, and the need for lighting fires. Also, participants (25 percent) assert that sharing limited scripts during training is a challenge. Some participants (16 percent) indicate that the content on paper is not easily updateable, therefore, it is

unlikely that they can receive updates in real-time about new procedures required to manage a situation such as the COVID19 pandemic.

VHTs indicate that they receive training but not regularly and the times they get to train, they are expected to learn too much information in a short period. The majority of participants regarded this as insufficient training.



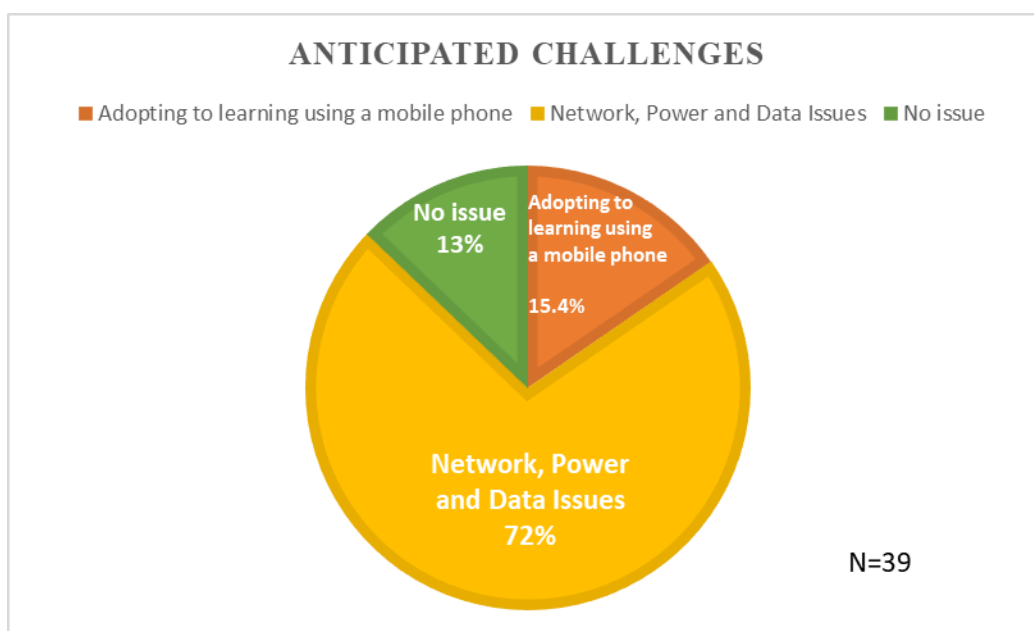
The attrition of VHTs is another challenge identified. According to the study data, the attrition rate of VHTs shows a mean of 3.33, with a standard deviation of 1.404 years. Also, the data indicate that VHTs volunteering is active at the age range of 25-34 (66.7 percent, n=16). In addition, 45.9 percent of the VHTs participants were serving in the 4th or 5th year. The results point to attrition of over 50 percent between 1 and 3 years. Other challenges pointed out include, the training funding gap, and the mobility of VHTs.

5.1.3 Accessibility and features of the Mobile App

The participants, CHWs, and Students (60 percent) point to the use of one language as a hindrance. CHWs contend that health-related terms need to be in the language they understand and easily explain to the community member. Other accessibility features suggested by the participants include a dictionary of terms to ease interpretation of strong words, descriptive images that paint and relate scenarios to ease understanding of situations, community members' communication links, and product illustrations on family planning commodities.

5.1.4 The main Anticipated technical challenges

Participants (CHWs and Students 71.8 percent) indicate that the expected challenges are related to mobile network, electricity, and data issues. This is attributed to the irregular power supply to charge phones and the absence of electricity in some rural areas. Internet data is mentioned to be costly for both CHWs and students which may hinder regular access by CHWs. Some participants (15.4 percent, n=6) expect to have adoption issues as a result of moving to use a Mobile App while a portion of participants (12.8 percent, n=5) do not expect technical issues to arise as challenges to using a Mobile App.



5.2 Findings from the Community Health Leaders (CHLs)

The discussion with the community health leaders was guided by the 5 variables used in the study.

5.2.1 Prevalence of smartphone devices among participants

CHLs agree that smartphone devices are scarce among rural dwellers. However, CHL-1 indicated the need for services delivered on smartphones such as data collection and reporting, Health Implementing partners (HIPs) have started providing smartphones to CHWs.

“Recently HIP provided 90 smartphone devices to CHWs in the Northern region of Uganda. This is intended to facilitate them with tools that can enable them to give us timely reports but also to easily collect data which we do regularly. The same devices can be used as training tools.” CHL-1.

CHLs asserts that if a CHW is provided with a smartphone device it is possible to push content from a centralized point to affect all parties. CHL-1 and CHL-2 acknowledge the task cannot be accomplished by one or two implementing partners but rather all stakeholders including the government of Uganda.

5.2.2 The need, ease of use, and navigation of the Mobile App

CHL stated that service delivery improvements such as Mobile learning using a smartphone are very welcome because they work with limited funding and personnel.

“I asked some VHTs in a training workshop to use the App to access the content on family planning training and they did not find any difficulty accessing the text. Those without smartphones, we gave them hard copies. It will be good if all had these devices.”CHL-2.

5.2.3 Challenges of the existing approach to training delivery

CHLs agree that VHTs are volunteer workers whose role is to support the health system in their communities. The attrition rate of VHTs is expected to be high.

“They choose to go whenever they have to do so and they do not need to make an official explanation. We hold no leverage to keep them working in community health apart from their conviction to serve the community.”CHL-2.

5.2.4 Accessibility issues of the Mobile App

CHLs agree that language should not be limited to English. The argument advanced is that the required education level of a VHT is Ordinary Level education but in rural, VHTs still struggle to comprehend English terms and have limited exposure to knowledge. The local language is seen as a remedy aimed at improving accessibility.

5.2.5 Technical challenges anticipated from using a Mobile App.

CHLs emphasize what VHTs and students anticipate as challenges. Electricity and network coverage are deemed a major hindrance to using electronics in rural areas.

6. DISCUSSION AND CONCLUSION

Mobile technologies are steadily gaining ground with the acceptance that they are part of daily life. This fact is held by both students and VHTs in both rural and urban settings. However, not much progress has been made in the deliberate use of mobile learning in education and training. Amongst the factors, this study identifies as hindrances include the absence of enabling policies, low prevalence of smartphone devices among users, and lack of awareness about Mobile learning. Even then, participants exhibited a clear understanding of the existing challenges of providing training and the role Mobile learning plays to reduce the challenges. Surprisingly, digital competence with smartphones was not among the challenges CHWs and students were expecting.

The identified merits relate to geographic convenience where Mobile learning responds to the tedious movement of CHWs from far locations to attend a training scheduled for a few hours of the day. This kind of training has been said to be inadequate and Mobile learning should be addressing the challenge. Coupled with the high attrition of CHWs volunteers, Mobile learning shadows the effects of losing volunteers after investing the limited resources. There is the benefit of easy update and access to content from a central location which circumvent the challenge of a fragmented approach to training CHWs from different HIPs but also give the VHTs the freedom to learn anytime. Also, it is not avoidable to emphasize the solution to the storage of learning materials where paper faces numerous challenges in a village environment. Additionally, higher performance is associated with continuous learning and Mobile learning offers the assurance of continuous learning provided that CHWs have smartphone devices.

However, Mobile technology infrastructure, especially networks coverage and consistency is challenging the rural communities every day. In addition, electricity is still inaccessible in the remote locations of Uganda. These threaten the use of Mobile learning technologies. Even so, the mobile technology infrastructure development in Uganda is improving. According to the commission (UCC), the government of Uganda announced the advanced stages of negotiations for international satellite capacity with a Japan partner including the revamping of the Mpoma Earth/Ground station. These decisions are in the right direction in the effort to cover the hard-to-reach areas of Uganda with an affordable broadband network.

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