

CLINICAL ARTICLE

Gynecology

Investigating the healthcare-seeking behaviors of mobile phone users to improve cervical cancer screening in rural Uganda

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Funding information

Canadian Institutes of Health Research, Grant/Award Number: CIHR FDN-143339; BC Women's Health Foundation

Abstract

Objective: Cervical cancer is the leading cause of cancer in low- and middle-income countries, despite being preventable. Uganda, which lacks an effective screening program, has one of the highest global cervical cancer incidence rates. Mobile health (mHealth) technology has the potential to improve healthcare-seeking behaviors and access. The present study describes the connection between mobile phone access and healthcare-seeking behaviors in rural Uganda.

Methods: Women were eligible for this cross-sectional study if they had no prior screening or treatment for cervical cancer in the past 5 years, were aged 30 to 49 years old, and were residents of the South Busoga Forest reserve. Survey data was analyzed using descriptive statistics and chi-square tests.

Results: Of the 1434 participants included in the analysis, 91.4% reported having access to a mobile phone. Most respondents were aged 30–40 years, had a partner, had ≤primary education, and were farmers. Participants with mobile phone access were significantly more likely to report attending a healthcare outreach visit (access = 87.3%, no access = 72.6%, $P < 0.001$) or visiting a health center (access = 96.9%, no access = 93.5%, $P < 0.001$). Participants in both groups had largely positive attitudes around and good knowledge of cervical cancer screening.

Conclusion: While attendance to healthcare services was high amongst participants, those with mobile phone access were more likely to seek healthcare services. Further inquiry into this association between mobile phone access and healthcare-seeking behavior is needed to optimize the improvements to cervical cancer screening when implementing interventions such as mHealth technology.

KEYWORDS

cervical cancer, human papillomavirus, mHealth, mobile health, Uganda

1 | INTRODUCTION

Cervical cancer is the second most common cancer affecting women in low- and middle-income countries (LMICs).¹ In 2020 alone, over 600 000 cases of cervical cancer were reported worldwide.² While largely considered preventable, immense disparities in the burden of disease remain, with the highest proportions of morbidity and mortality concentrated in LMICs.² The high rates of cervical cancer in LMICs can be attributed to inadequate screening.^{1,2} Uganda has one of the highest cervical cancer incidence rates in the world, with a rate three-times higher than the global average.^{3,4} The development of a comprehensive screening program in Uganda, which would alleviate the cervical cancer burden, has been hampered by economic and accessibility constraints including limited infrastructure and trained personnel.³⁻⁵ Consequently, cervical cancer in Uganda is often diagnosed at an advanced stage.^{3,4} As such, there is a need to better understand how to develop a more widespread, effective, and accessible cervical cancer screening program in Uganda and similar LMICs.

Healthcare-seeking behavior, defined as actions an individual takes when they self-identify as needing a health service or being in poor health, plays a critical role in the final decision to interact with health services.⁶⁻⁸ For cervical cancer screening, lower healthcare-seeking behavior often translates into lower intention to screen, and may result in lower screening uptake.⁹ Importantly, healthcare-seeking behavior has been found to be influenced by several factors such as community norms, provider availability, service costs and education.^{6,10-13} Previous enquiries into factors influencing healthcare-seeking behavior in Uganda have implicated cost of services, long travel times, income, and education as impactful.^{14,15} However, few studies in Uganda have probed the relationship between mobile phone access and healthcare-seeking behavior.

Mobile health (mHealth) technology, defined as the facilitation of healthcare or public health through mobile devices, has emerged as a promising tool to facilitate healthcare service usage and improve health outcomes in hard-to-reach, underserved populations.¹⁶ Mobile phone usage has grown immensely in Uganda in recent decades with 71% of Ugandans reporting mobile phone ownership in a 2018 report.¹⁷ Due to this widespread reach, mobile phones have been identified as a promising intervention for the delivery of health information and services in Uganda and other countries in Eastern Africa.¹⁸⁻²⁰ For instance, in their 2019 cluster-randomized trial, Huchko et al. found that women in rural Kenya with improved healthcare-seeking behavior, such as increased usage of family planning and HIV testing services, preferred receiving cervical cancer screening results via their mobile phone over receiving results through a home visit.²¹ However, there is a gap in understanding how this technology can be used in Uganda to improve healthcare seeking-behavior, including cervical cancer screening uptake, particularly in rural regions with limited access to screening services.²² As such, to optimize healthcare utilization in rural Uganda through the introduction of mHealth technology and facilitate the evaluation of these interventions, it is imperative to investigate existing

associations between access to technology and healthcare-seeking behavior. Consequently, the objective of this analysis is to describe the connection between mobile phone access and healthcare-seeking behaviors in rural Uganda.

2 | MATERIALS AND METHODS

2.1 | Design, setting and study population

This cross-sectional analysis utilizes survey data collected as part of a pragmatic trial in Malongo, an extremely rural subcounty of the Mayuge District in Eastern Uganda. The survey was administered to eligible women at baseline, after their enrollment in the trial. Women were eligible if they had no prior screening or treatment for cervical cancer in past 5 years, were aged 30 to 49 years old, and were residents of one of 11 selected villages in the South Busoga Forest reserve. Those who were pregnant, had a hysterectomy, and/or were unable to provide informed consent were excluded from the study. Recruitment into the study was done by trained village health teams (VHTs) through door-to-door home visits. VHTs collected survey data digitally on tablets using REDCap,^{23,24} a secure electronic data collection system. To ensure the inclusion of women with low literacy levels, surveys were administered orally by VHTs in Lusoga or English. Data collection started on January 23, 2023 and was completed on August 24, 2023.

2.2 | Survey

The data in this analysis was from a baseline survey that consisted of 43 main questions and 16 follow-up questions. It aimed to determine medical history and assess knowledge and attitudes surrounding cervical cancer and HPV prior to the intervention. The survey included questions on participant demographics, previous health services usage, and opinions on cervical cancer prevention and screening.

To determine mobile phone access, women were asked if they had access to a mobile phone, whether that be their own or through a family member, friend, or neighbor. Women had the option to select yes ("access"), no, or do not know. No and do not know options were combined and designated as not having mobile phone access ("no access").

Healthcare-seeking behavior was characterized as the outcome of this analysis and was conceptualized using several questions. Women were asked if they had ever attended a healthcare outreach visit, locales where otherwise absent services are brought into a community on a temporary or mobile basis, or a health center, permanent community clinics that offer primary and preventive care.^{25,26} The available answer options were yes, no, or do not know. The survey assessed attitudes surrounding cervical cancer prevention and curability. Women were asked about the importance of early detection, the curability of cervical cancer following early

detection, vaccinations against cervical cancer and, ultimately, if cervical cancer can be prevented. Response options for these questions were yes, no, do not know, or refused. Finally, women were asked about their choice to receive an HPV vaccine if one was available for their age group; participants answered on a five-point Likert scale, with response options varying from strongly agree to strongly disagree. Responses were recategorized to be dichotomous in which strongly agree and somewhat agree were labeled as yes and all other responses were recategorized as no.

In addition to the questions related to the exposure and outcome described above, the survey asked several demographic questions that were utilized to determine the characteristics of the women participating in the study. These included age, number of pregnancies, marital status, education level, current partner's education level (if applicable), and HIV status.

2.3 | Statistical analysis

Analysis of the relevant survey questions was conducted using R version 4.3.0²⁷ and R Studio.²⁸ Bivariate descriptive statistical analyses were conducted using chi-squared tests to compare the outcomes of those with mobile phone access and those without mobile phone access. *P* values less than 0.05 were considered statistically significant.²⁹ All missing data was included in the results.

2.4 | Ethics

Ethics approval was obtained from the University of British Columbia Children and Women's Research Ethics Board (H22-01634), Uganda Cancer Institute Research Ethics Committee (UCI REC) (UCI-2022-56), and the Uganda National Council for Science and Technology (UNCST). Participants were compensated 20000 UGX upon completion of the screening study procedures, which includes the baseline survey. All participants provided informed consent.

3 | RESULTS

A total of 1434 participants were included in the analysis. The majority of participants, 1310 (91.4%) in total, reported having access to a mobile phone, while 124 (8.6%) reported not having access to a mobile phone. Most respondents were between the ages of 30 and 40 years old ($n=929$), reported being married or in a relationship (access, $n=1133$, 86.5%; no access, $n=106$, 85.5%; $P=0.948$), had completed primary education or less (access, $n=1157$, 88.3%; no access, $n=114$, 91.9%; $P=0.434$), and reported farming as their occupation (access, $n=1114$, 85.0%; no access, $n=101$, 81.5%; $P=0.438$). A significantly larger proportion of women with HIV ($n=125$) were in the "no access" group (access, $n=102$, 7.8%; no access, $n=23$, 18.5%; $P<0.001$). Additional demographic characteristics are detailed in Table 1.

Amongst the women surveyed, 1143 (87.3%) of individuals in the access group and 90 (72.6%) of those in the no access group reported ever attending a healthcare outreach visit ($P<0.001$). Additionally, 96.9% ($n=1269$) of the access group and 93.5% ($n=116$) of the no access group reported that they had ever visited a health center ($P<0.001$).

Women in both groups were knowledgeable about cervical cancer prevention. A total of 1051 (80.2%) in the access group and 104 (83.9%) in the no access group identified that cervical cancer can be prevented ($P=0.656$). Moreover, 1188 (90.7%) in the access group and 111 (89.5%) in the no access group noted that that early detection of cervical cancer is important ($P=0.427$). Similarly, 1075 (82.1%) in the access group and 107 (86.3%) in the no access group correctly recognized that cervical cancer is curable if detected early ($P=0.035$). Finally, most women in both groups identified that one can be vaccinated against cervical cancer (access, $n=1042$, 79.5%; no access, $n=101$, 81.5%; $P=0.504$). Notably, there was a resoundingly positive response to enquiries about the acceptance of a preventative HPV vaccine in which 1309 (99.9%) women in the access group and 123 (99.2%) of women in the no access group agreed they would take a vaccine for their age group ($P=0.410$).

4 | DISCUSSION

The present study described the connection between mobile phone access and healthcare-seeking behavior of women in the rural, South Busoga Forest reserve in Malongo, Uganda. We found that, while the majority both groups reported attending a healthcare outreach visit or visiting a health center, a greater percentage in the access group had sought out these services. This finding is consistent with studies that have looked at mobile phone ownership and its impacts on reproductive and sexual health-related visits and behaviors.³⁰ For example, in a 2020 inquiry into the health outcomes of 15 LMICs including Uganda, LeFevre et al. found an association between mobile phone ownership and improved attendance to antenatal care clinic visits, increased uptake of vaccines during pregnancy, and improved postnatal care for both women and newborns.³⁰ Access to a mobile phone appears to be associated with increased usage of healthcare services and, as such, improved healthcare-seeking behavior.

Of women who had previously exhibited healthcare-seeking behavior, women in both groups were more likely to have visited a health center than have attended a healthcare outreach visit. Higher attendance at health centers could be due to the fact that residents are more likely to seek out services, typically at a health center, when needed; women are often required to travel outside of their communities, as opposed to waiting for outreach initiatives to come to the community.²² Due to the urban-rural health infrastructure disparities in Uganda, women in remote areas such as Malongo are often required to engage in active healthcare-seeking behavior to receive the necessary health services rather than passively attending outreach visits when available. Additionally, health centers are available

TABLE 1 Demographics of participants with and without mobile phone access.

	Total n = 1434 n (%)	Yes n = 1310 n (%)	No n = 124 n (%)	P value
Mobile phone access				
Yes	1310 (91.4)	1310 (100.0)	0 (0.0)	<0.001
No	124 (8.6)	0 (0.0)	124 (100.0)	
Language				
English	37 (2.6)	30 (2.3)	7 (5.6)	0.05
Lusoga	1397 (97.4)	1280 (97.7)	117 (94.4)	
Age				
30–34	611 (42.6)	556 (42.4)	55 (44.4)	0.973
35–39	318 (22.2)	291 (22.2)	27 (21.8)	
40–44	249 (17.4)	229 (17.5)	20 (16.1)	
45–49	256 (17.9)	234 (17.9)	22 (17.7)	
Marital status				
Married/in a relationship	1239 (86.4)	1133 (86.5)	106 (85.5)	0.948
Single	116 (8.1)	106 (8.1)	10 (8.1)	
Separated/divorced/widowed	78 (5.4)	70 (5.3)	8 (6.5)	
Missing	1 (0.1)	1 (0.1)	0 (0.0)	
Education				
≤Primary school	1271 (88.6)	1157 (88.3)	114 (91.9)	0.434
>Primary school	153 (10.7)	144 (11.0)	9 (7.3)	
Missing	10 (0.7)	9 (0.7)	1 (0.8)	
Partner education				
≤Primary school	1004 (70.0)	914 (69.8)	90 (72.6)	0.602
>Primary school	218 (15.2)	203 (15.5)	15 (12.1)	
Missing	212 (14.8)	193 (14.7)	19 (15.3)	
Occupation				
Farmer	1215 (84.7)	1114 (85.0)	101 (81.5)	0.438
Other	177 (12.3)	156 (11.9)	21 (16.9)	
Missing	42 (2.9)	40 (3.1)	2 (1.6)	
Number of pregnancies				
0–5	38 (2.6)	35 (2.7)	3 (2.4)	0.573
6–10	219 (15.3)	204 (15.6)	15 (12.1)	
>10	1177 (82.1)	1071 (81.8)	106 (85.5)	
Self-reported positive HIV test				
Yes	125 (8.7)	102 (7.8)	23 (18.5)	<0.001
No	1302 (90.8)	1202 (91.8)	100 (80.6)	
Missing	7 (0.5)	6 (0.5)	1 (0.8)	

continuously throughout the year while health outreach visits are established for temporary periods of time, potentially resulting in a greater percentage of respondents visiting health centers.²⁵

Women in both the access and no access groups predominantly had positive attitudes towards cervical cancer prevention and screening. This finding is both consistent with studies that have assessed attitudes surrounding cervical cancer and contradictory to studies that have assessed knowledge of the disease conducted in both urban and rural settings in Uganda.^{31–35} In

their 2017 cross-sectional study in Eastern Uganda, Mukama et al. found knowledge and attitudes around cervical cancer screening and vaccination to be mainly positive amongst the women surveyed.³¹ Similarly, a 2017 qualitative study conducted by Turiho et al. in western Uganda found largely favorable opinions of the HPV vaccine amongst young girls, their parents and communities, highlighting similar support for cervical cancers preventative measures as was found in our analysis.³² This recognition of the importance of cervical cancer screening and prevention amongst women

in Uganda is encouraging as these positive attitudes could manifest in increased support for and participation in preventative interventions. Given the low screening rates throughout the country that are often attributed to accessibility and economic constraints, these positive attitudes, when paired with interventions designed to address these limitations, could improve the cervical cancer screening uptake in the region. Contrastingly, Ndejjo et al., in their 2017 qualitative study in Eastern Uganda, found most participants had limited knowledge of cervical cancer prevention and had misconceptions surrounding causes of cervical cancer.³⁴ Similarly, a 2017 northern Ugandan cross-sectional study conducted by Waiswa et al. found lower knowledge of cervical cancer prevention and screening amongst participants.³⁵ These differences in results demonstrated in previous literature could be attributed to drastic differences in study design. Nonetheless, our study findings are promising due to the importance of prevention and early screening to positive cervical cancer outcomes.⁴

The present study was strengthened by the employment of VHTs who strengthen community engagement, sustainability, and cultural sensitivity as participants can respond in their preferred language to a fellow community member.³⁶ Furthermore, the study team consisted of diverse individuals with extensive knowledge of cervical cancer and experience conducting similar research. However, as individuals self-reported responses, recall bias could have influenced the results and is considered a limitation.³⁷ In addition, respondents delivered responses to survey questions to VHTs verbally which could result in social desirability bias.³⁷ Moreover, this study was conducted exclusively in the Malongo subcounty and may not represent experiences throughout the country or other rural LMIC settings. Finally, knowledge of the extent and amount of mobile phone usage and access by the women surveyed was limited in this study. Digital illiteracy, limited availability of chargers and electricity, expensive data and airtime costs, and unequal phone sharing have been documented throughout Uganda, especially in remote regions of the country.^{38–40} Consequently, it was assumed that mobile phone access equated to utilization in this inquiry.

While knowledge and attitudes surrounding cervical cancer prevention are largely supportive, a gap remains between these positive opinions and healthcare service uptake. The findings of our analysis suggest a need for interventions that improve cervical cancer accessibility and availability issues in rural Uganda. As access to healthcare services in rural regions such as Malongo remains limited, future research could investigate the potential impacts of “take-home” screening methods such as HPV-based self-collection for cervical cancer screening. HPV-based self-collection minimizes the staff and infrastructure required for screening and mitigate discomfort and privacy concerns surrounding traditional screening methods that require pelvic examinations.^{41,42} However, concerns surrounding the mechanisms of screening information and results delivery with HPV-based self-collected screening prevail; mHealth interventions to facilitate screening information and results delivery via mobile phones could address this limitation.^{42–44}

5 | CONCLUSIONS

The results of the present study demonstrated that while most women in rural Malongo attended a healthcare outreach visit or a health center, women with mobile phone access were more likely to utilize these services. Despite these differences, both women with and without mobile phone access had positive attitudes surrounding and knowledge of cervical cancer prevention. By continuing these enquiries into facilitators to increase uptake of screening measures, we can continue making progress towards the elimination of cervical cancer, both in Uganda and other LMICs.

AUTHOR CONTRIBUTIONS

Nelly Mwandacha: Formal analysis, writing—original draft, writing—review and editing. Hallie Dau: Formal analysis, writing—original draft, writing—review and editing. Maryam AboMoslim: Writing—review and editing. Priscilla Naguti: Project administration, data collection, writing—review and editing. Mia Sheehan: Formal analysis, writing—review and editing. Amy Booth: Writing—review and editing. Laurie Smith: Writing—review and editing. Jackson Orem: Writing—review and editing. Gina Ogilvie: Principal investigator, conceptualization, funding acquisition, writing—review and editing. Carolyn Nakisige: Conceptualization, project administration, writing—review and editing. All authors read and approved the manuscript, and fulfill all four criteria for authorship.

FUNDING INFORMATION

Funding for this project was provided by the Canadian Institutes of Health Research (CIHR FDN-143339) and BC Women's Health Foundation. Hallie Dau received a Canada Graduate Doctoral Award from the Canadian Institutes of Health Research for salary support. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no competing interests.

DATA AVAILABILITY STATEMENT

Data is not available for access as it contains human data that contains potentially identifying information about participants.

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How to cite this article: Mwandacha N, Dau H, AboMoslim M, et al. Investigating the healthcare-seeking behaviors of mobile phone users to improve cervical cancer screening in rural Uganda. *Int J Gynecol Obstet*. 2024;167:223-229. doi:[10.1002/ijgo.15577](https://doi.org/10.1002/ijgo.15577)