TANZANIA MEDICAL JOURNAL
Malichewe et al. TMJ V 36 No. 4. December 2025

Original Research **Open Access**

Knowledge of Cervical Cancer and Prevention Methods among Women attending Reproductive Child Health Clinics in Tanzania: A Mixed-Method Study

Christina V. Malichewe[1]*, Veronica Mkusa[2], Margaret Ishengoma[2], Gregory Kabadi[3], Godlove Chila[3], Manase Kilonzi[4], Nathanael Sirili[5], Crispin Kahesa[6]

[1]*Department of Clinical Oncology, College of Medicine, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania*
[2]*Palliative Care Trainers and Researchers Network, Dar es Salaam, Tanzania*
[3]*Tawi Consult, Dar es Salaam, Tanzania*
[4]*Department of Clinical Pharmacy and Pharmacology, School of Pharmacy, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania*
[5]*Department of Development Studies, School of Public Health and Social Sciences, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania*
[6]*Directorate of Cancer Prevention Services, Ocean Road Cancer Institute, Dar es Salaam, Tanzania*

***Corresponding author:** Dr. Christina V. Malichewe, Email: christinamalichewe@gmail.com

Abstract

Background: Cervical cancer, despite being preventable, is the leading cause of death among women globally, with 10,241 new cases in Tanzania annually causing over 6,000 deaths. Despite the Human papillomavirus (HPV) vaccine as one of the effective strategies for cervical cancer, its uptake remains low. The latter happens amidst a low turnout of women for cervical cancer screening. Altogether, this poses a question of awareness and knowledge of women on cervical cancer prevention methods.

Objective: To analyze the awareness of cervical cancer and knowledge of preventive strategies among women of childbearing age in Tanzania.

Methodology: A hospital-based mixed-method study was conducted in May 2022 in Ilala municipal council, Dar es Salaam, Tanzania. A total of 404 women of childbearing age participated in a cross-sectional survey, while 46 women participated in six focus group discussions. Stata software 12 was used to analyze quantitative data, while qualitative data were analyzed thematically.

Results: Out of the 404 women interviewed, 259 (64.1%) were married, and 196(48.5) had primary education, while the majority 253(62.1%) were aged between 25 – 39 years. The majority, 314 (77.7%), had knowledge of cervical cancer, while 165 (40.8%) knew that cervical cancer is preventable, with only 48 (11.9%) ever been screened, and 21(5.2%) were vaccinated against HPV. Following thematic analysis, participants described how lack of knowledge can lead to fear of screening procedures, fear for diagnosis and worries on the anticipated cervical cancer treatment costs. Limited knowledge of the HPV vaccine is the primary reason for not being vaccinated and preventing their girls from being vaccinated.

Conclusion: Most women had the knowledge of the disease but unaware of the main risk factors, HPV infection, and vaccine availability, suggesting the need for frequent health education sessions and support for social and mass media to educate the community.

Keywords*: Cervical cancer, Screening, HPV vaccination, Preventive methods.*

Introduction

Cervical cancer is third cancer in women globally (1). An estimated 604,000 women worldwide were diagnosed with cervical cancer in 2020, and 342,000 died (2). Some strains of the human papillomavirus (HPV) are responsible for cervical cancer development. Cervical cancers and precancerous lesions are caused by 70% of the two types, HPV 16 and 18 (3). Africa is one of the continents with the highest prevalence of cervical cancer (4). Although cervical cancer typically progresses slowly from the pre-cancer stage to invasive cancer, it can be successfully treated if detected early. Cervical cancer can be prevented through the reduction of sexual transmission of HPV infection, i.e., safe sexual practices like the use of condoms, having a faithful sexual partner and HPV vaccination to girls before being sexually active. The uptake of the HPV vaccine and other preventive methods is low in developing countries, including Tanzania.

In Tanzania, 16.4 million women are estimated to be at risk of developing cervical cancer, and 10,241 women are diagnosed with cervical cancer yearly, resulting in 6,525 deaths (3). Unfortunately,80-85% of deaths are caused by a lack of access to cervical cancer screening, prevention, and early treatment (5, 6). Most women in Tanzania present to the hospital in the late stages of the disease. The late presentation is attributed to low knowledge of cervical cancer preventive methods such as regular screening and HPV vaccination (7).

In collaboration with stakeholders, the Tanzania Ministry of Health has incorporated education sessions on cervical cancer and its preventive measures for women visiting reproductive and child health clinics (RCH) through various platforms like radio, television and social media. In addition, through Ministry of Health and Immunization programs, the government offers free cervical cancer screening services for women ≥ 30 years and HPV vaccination to girls between (14 – 24 years of age). Despite the effort, still low uptake of screening and vaccination is reported. The study answered the question; “What is the knowledge of cervical cancer and knowledge on preventive methods among women of childbearing age in Tanzania?” Aiming at assessing the knowledge of cervical cancer and knowledge of preventive methods among women of childbearing age at Ilala Municipal Council, Tanzania. Specifically, the study analysed the knowledge of cervical cancer among participants, knowledge, and source of information on cervical cancer preventive methods.

Methods

Study area and population

This study was conducted in primary health facilities (PHF) providing RCH services within the Ilala municipal, Dar es Salaam, Tanzania mainland. Ilala Municipal is one of the five Municipal Councils in Dar es Salaam Region. The Municipal Council was selected as a study area because it is densely populated compared to other Municipalities. It has a population of 1,195,936 people (8) and has sixty-seven (67) PHFs providing RCH services. The PHF are the entry point where women receive sexual reproductive health (SRH) and HIV/AIDS education according to the National Health Policy; the health education facilitates the reduction of the SRH indicators such as the low

prevalence of contraceptives, high rates of maternal mortality, high rates of teen pregnancies, high rates of mother-to-child HIV transmission, pervasiveness of child and teen marriages, and the need for some girls to drop out of school because they became pregnant (9). The study targeted all women of childbearing age between 18 and 49 years of age. This particular population was selected because they are sexually active and vulnerable to sexually transmitted infections like human papillomavirus (HPV) and human immunodeficiency virus (HIV).

Study design

A concurrent mixed-method cross-sectional multicentre study design was conducted in May 2022. The participant's knowledge of cervical cancer and its preventive methods were assessed quantitatively using a structured questionnaire. To explore participants' deep insights on cervical cancer and its preventive strategies and reasons for low uptake of screening and vaccines, focus group discussions were conducted to some selected women. The study design was chosen because there was a need to validate the data produced from each method differently on the knowledge of cervical cancer and preventive procedures, and have a more substantial confidence with the evidence we have acquired, complimented by quantitative and qualitative studies.

Sampling methods and sample size

Ilala municipal council has 67 (sixty-seven) PHFs (50 Dispensaries and 17 health centres) which provide RCH services. The study employed a 2-stage sampling technique: the first stage was to sample health facilities (a health facility being the primary sampling unit) using Sampford's probability proportional to size (PPS) method without replacement (10). The second stage involved all targeted study participants attending RCH clinics as the sampling frame (with pregnant women or women with children under five years as the secondary sampling unit).

Precision criteria for sample size determination was used, and the study assumed that the dominant characteristic of the study was the awareness of cervical cancer, which was determined previously in Tanzania HIV/AIDS and Malaria Indicator Survey (Tanzania Commission for AIDS (11) (which showed 16.2%). We set the relative error margin on estimating the parameters at 4 percent and a 95 percent confidence level; the smallest number of persons to be sampled was 391 respondents.

We randomly selected 46 women for Focus Group Discussions (FGDs) who were 18-49 years old, available at the clinic on the day of data collection and consented to participate in the study. Saturation was reached at the sixth site; we had completed three (3) areas from urban and three (3) sub-urban settings. Approximately six to eight (6-8) participants were selected for FGDs from the respective sites. We conducted 408 quantitative interviews, but during data cleaning, four (4) interviews with incomplete data were excluded for analysis. Saturation was reached when similar themes were observed in the groups that had been interviewed, and no new themes were observed.

Data collection procedure

The study recruited women from 18-49 years who visited the RCH clinics on the days of data collection. The RCH nurse on duty identified the women and consented to participate in a quantitative survey or FGD. A closed-ended,

structured, self-made questionnaire for the quantitative study was used for data collection. The questionnaire was entered into the ODK system. Face-to-face interviews were employed; research assistants collected data using tablets. The questionnaire had four sections: social-demographic characteristics, awareness of cervical cancer, source of information on cervical cancer and knowledge of cervical cancer preventive methods. Five yes/no questions assessed awareness of cervical cancer among participants, and those who said that cervical cancer could be prevented were subjected to a 5-Likert scale option with five questions to evaluate their knowledge regarding cervical cancer prevention methods. Strongly agree was the highest score (5), and strongly disagree (1) was the lowest. Total scores were calculated for each participant and subjected to normality tests. Since the data were normally distributed, the mean was selected as a cut-off point whereby those who scored ≥ mean was regarded to have adequate knowledge of cervical cancer preventive methods, and vice versa was true.

For Qualitative, 6-7 women were grouped for FGDs. An interview guide explored the awareness, knowledge and reasons women do not adhere to cervical cancer preventive methods. Two researchers (C.M.) and (V.M.), one as an interviewer and another for taking notes during the discussions, conducted the six focus group discussions. The meetings lasted between 60-90 minutes. The recorders used were the same throughout all the FDGs. Days with high volume of clients were identified at each facility and conveniently used for data collection.

Data analysis

STATA software version 12 was used during quantitative data analysis. Categorical variables were summarised using frequency and percentages. The findings are presented using tables and bar graphs.

Regarding qualitative data analysis, six Swahili FGD transcripts were available. The codebook was developed both inductively, i.e., from the data, and deductively from the study's conceptual framework. The codebook was developed and refined (collapsing overlapping codes) based on one (1) FGD transcript. The final codebook was then used to ensure uniform use of codes across all transcripts, and two researchers coded the transcripts to ensure similar understanding and use of codes. The data was coded using the codebook, whereby all the responses with similar codes were systematically put together to create themes**.** Based on the research questions, "thematic analysis" was the primary data analysis technique. The constructivist approach, where meanings are constructed, was used to understand and interpret the findings.

Ethical Approval

The study obtained approval from the Muhimbili University of Health and Allied Sciences (MUHAS) Ethical Clearance Committee (Ref no. MUHAS-REC-04-2022-1092). Permission to conduct the study was sought from the President's Office, Regional Administration and Local Government (PORALG), Dar es Salaam Regional Authority and Ilala Municipal Authority. Written informed consent was obtained from all participants of the study. Clients were interviewed in private rooms, one client to one research assistant, to give them confidence and

to adhere to confidentiality procedures. The names of the participants did not appear on the analysis or the checklist. The consent for publication was included in the consent form of the participants.

Results

Social-demographic characteristics of study participants

Out of 404 respondents, the majority, 210(51.98%), were between 25 to 34 years of age and 259(64.1%) were married. Most 196(48.5%) participants had primary education and 206(51%) were self-employed. Only 91(22.5%) use condoms regularly, 46(13.1%) got their first pregnancy below 18 years of age and 10(2.5%) had 6-10 babies (Table 1).

Table 1: Socio-demographic characteristics of study participants (n=404)

Variables	N (%)
Age (years)	
15-24	133(32.92)
25-34	210(51.98)
35-44	52(12.87)
>45	9(2.23)
Marital status	
Married	259(64.1)
Not married	145(35.9)
Education level	
No formal education	7(1.7)
Primary education	196(48.5%)
Secondary education	167(41.3)
Tertiary education	34(8.4)
Occupation status	
Employed	44(10.9)
Unemployed	154(38.1)
Self -employed	206(51)
Religious status	
Christian	186(46)
Muslim	216(53.5)
No religion	2(0.5)
Practice using condom	
Yes	91(22.5)
No	313(77.5)
Years of first pregnancy (years)	
<18	46(13.1)
≥18	306(86.9)
Number of children	
≤ 2	283(70.1)
3 – 5	111(27.5)
>5	10(2.5)

Knowledge of cervical cancer among participants

Of the 404 women, 314(77.7%) had heard about cervical cancer (Table 2). From FGDs, women expressed mixed understanding of cervical cancer, and most of them described that cervical cancer affects the female genital part and mainly affects women who have ever given birth, and the disease affects the ability to conceive;

"…they are saying it is a disease that affects women at their reproductive age; it affects the door to the womb" (Participant 6, FGD 3).

And,

"It is a disease that attacks a woman at her reproductive age, and when you get that disease, you cannot conceive" (Participant 3, FGD 4).

And,

"…that is, I have never heard of it; just now, I heard that there is a disease called cervical cancer" (Participant 2, FGD 6).

Only 48 (11.9%) of the interviewed women had ever screened for cervical cancer (Table 2). From the FGDs, women expressed fear of the screening process, fear of being diagnosed, unaware of what is next after being diagnosed, and fear of treatment costs as barriers towards the uptake of cervical cancer screening. Other women expressed that they are unaware of the importance of cervical cancer screening.

"People fear, and the fear that it is a big issue that cannot be solved after being found with the disease, how will I get treatment and the cost of the treatment adds on anxiety, and I think I can die before the disease kill me" (Participant 3, FGD 1).

And,

"Something that you do not know creates fear; if we have enough knowledge on the screening procedures, then we will not have fear" (Participant 8, FGD 1).

Only 165 (40.8%) of the interviewed women believed cervical cancer is preventable (Table 2). During FGD, women demonstrated mixed knowledge of the risk factors that can lead to cervical cancer. Women expressed that starting sexual intercourse earlier, repeated bacterial and fungal infections, delayed treatment of bacterial and fungal infections, and having multiple partners may lead to cervical cancer. Moreover, women stated that cigarette smoking and inserting herbal products into the vagina to increase sexual intercourse also may cause cervical cancer.

"I heard that smoking leads to cancer; people think it is only lung cancer, but also, it can cause cervical cancer, like it is advised not to smoke a cigarette for pregnant women" (Participant 1, FGD 5).

And,

"…others say that having multiple male partners who are having infections in their male sexual organs can lead a woman to have problems in their cervix" (Participant 2, FGD 5).

Only 21(5.2%) of the interviewed women are vaccinated against HPV (Table 2). During FGD, some women said that they were not aware of the vaccine, others said they knew the vaccine but were unaware of the HPV vaccine, and some stated that they were not knowledgeable of the vaccine. Some women said that others are hesitating to take the HPV vaccine due to fear of not getting pregnant. However, those

vaccinated stated that cervical cancer is a deadly disease, and it is better to educate mothers so that they can influence girls to take the HPV vaccine.

> *"… that's it, parents, we fear telling our daughters to receive the vaccine because we do not know about it, and you cannot force your child to do something that you do not know the details; when I know, then will allow my child to receive the vaccine"* (Participant 2, FGD 6).

And,

> *"Me, to my ability, I will allow her, although I do not have much knowledge on cancer; still, I feel that it is a deadly disease"* (Participant 1, FGD 2).

And,

> *"People talk about vaccines, we do not know vaccines for what, there are many vaccines nowadays"* (Participant 4, FGD 6).

Table 2: Knowledge of cervical cancer preventive methods among participants

Questions	Response n (%)
Have you ever heard about cervical cancer	
Yes	314(77.7)
No	90(22.3)
Have you ever been screened for cervical cancer	
Yes	48(11.9)
No	356(88.1)
Have you ever been vaccinated with the HPV vaccine	
Yes	21(5.2)
No	383(94.8)
Do you think cervical cancer can be prevented	
Yes	165(40.8)
No	109(27)
I don't know	130(32.2)

Source of knowledge on cervical cancer prevention

The primary source of knowledge was from healthcare providers 27.6%, followed by Radio 22%, and relatives 12.6% (Figure 1). From FGD, most respondents stated that they usually get cancer information through watching television, mainly through films and drama sessions. Other women said they get information regarding cervical cancer through the social media pages of influential personnel.

> *"These days people have Televisions, when there is any new issue, you can see and listen from the Televisions, unlike the old days of writing letters. Various news and events we receive from the Televisions"* (Participant 5, FGD 6).

And,

> *"For example, on social media, people like Shilole and Zamaradi are inspiring and, if used, can motivate me to screen or receive vaccine"* (Participant 2, FGD 2).

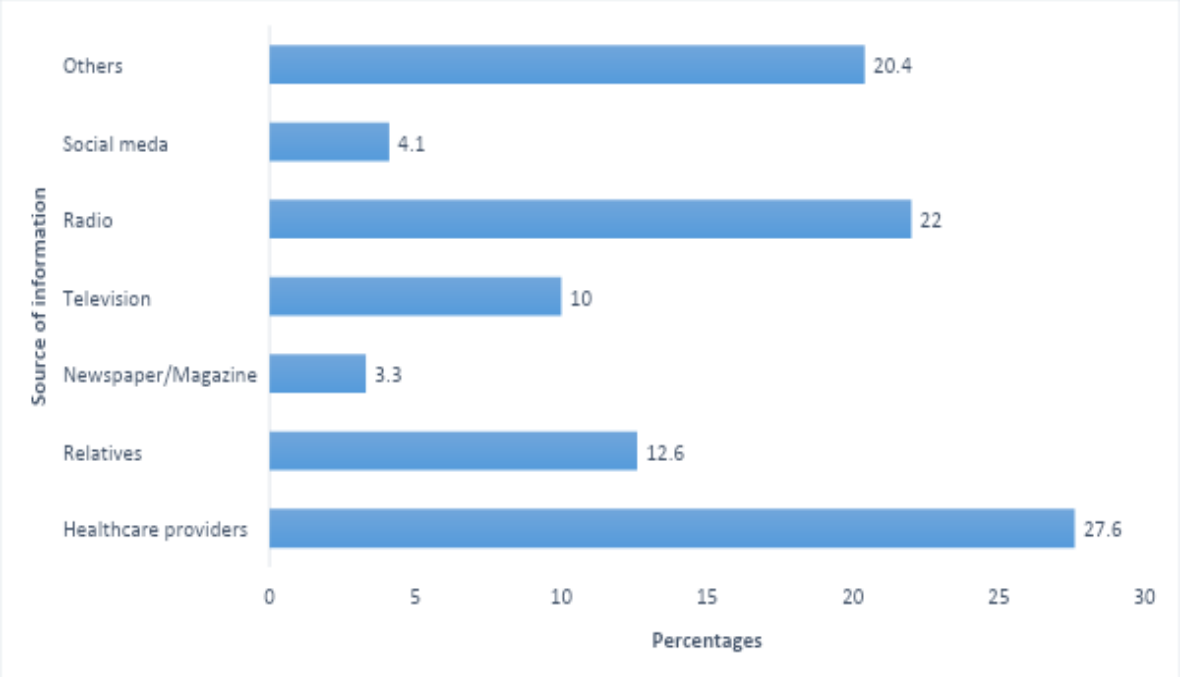

Figure 1. Source of knowledge on cervical cancer prevention among study participants (n=460)

Participants knowledge of cervical cancer preventive methods

Overall, 43(29.9%) participants had adequate knowledge of the cervical cancer preventive methods. The majority, 80(83%), expressly agree that the HPV vaccine is one of the methods for cervical cancer prevention, while 6(18%) disagree that sex at an early age is one of the risks. Also, 45(90%), 33(89%), and 9(64%) agreed that cervical cancer screening, sticking to one sexual partner, and avoiding smoking cigarettes are cervical cancer preventive methods, respectively (Table 3).

Table 3: Knowledge of cervical cancer preventive methods among participants (n=165)

Preventive methods	Responses n (%)				
	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
HPV vaccine	22 (23)	58 (60)	15 (16)	0 (0)	1 (1)
Avoid having sex at an early age	8 (24)	15 (45)	4 (12)	3 (9)	3 (9)
Cervical cancer screening	31 (62)	14 (28)	0 (0)	3 (6)	2 (4)
Sticking to one sexual partner	21 (57)	12 (32)	0 (0)	4 (11)	0 (0)
Avoid smoking cigarettes	7 (50)	2 (14)	3 (21)	1 (7)	1 (7)
Overall knowledge of participants on cervical cancer preventive methods n (%)					
Adequate knowledge					43 (29.9)
Inadequate knowledge					101 (70.1)

Discussion

The study aimed at analysing the knowledge of cervical cancer and its preventive methods among women of childbearing age which is essential to minimize the chances of developing cervical cancer in the population. In this study, the overall understanding of cervical cancer was 77.7%. In a study in Magu District in the Lake zone in Tanzania, 83.1% had heard of cervical cancer, (7). In other studies, in India, and Ethiopia, the awareness of cervical cancer was 40.2% (12), and 29% (13), respectively among women of childbearing age. The differences and similarities seen could be due to the majority of studies using women between 15-49 years; these women are in their reproductive ages and visit health facilities more often; therefore, easy to access health information, but also those with low awareness majority are women from rural areas (7). Our study was done in women from an urban area, expecting the general awareness to be higher. Knowing that there is cervical cancer is one thing, but more importantly, it can lead someone to acquire the disease.

The knowledge of cervical cancer preventive methods was identified by women who knew the risk factors. Only 165 (40.8%) of 404 women knew the risk factors. The mentioned risk factors include having sex at an early age, having multiple sex partners, smoking cigarettes, and lacking regular screening. In the study on the awareness of cervical cancer risk factors in Uganda women, according to a review of 18 publications, the understanding was low, ranging from 40-80% depending on where data was collected (14) i.e., women from rural villages to medical students and health care workers. There is poor awareness of cervical cancer risk factors among women of childbearing age particularly in sub-Saharan Africa. Evidence shows that a lack of awareness of cervical cancer preventive methods is among the barriers to utilizing cervical cancer preventive services in Low and middle-income countries (15). A robust public awareness campaign and persistent participation of local populations in preventative and risk factors are warranted.

HPV infection is known to be one of the significant risk factors for the development of cervical cancer (7, 12). The knowledge of how HPV infection is transmitted and its prevention can facilitate the reduction of cervical cancer development in most women. In our study, the general awareness of HPV vaccination was shallow, 5.2%, like in the majority of studies done in Africa (14) and Asia (12). One study found that one of the factors associated with an increased awareness of the HPV vaccine in sub-Saharan Africa is the level of education of the participants; a study done in Cameroon on "*Assessing the effectiveness of a community-based sensitization strategy in creating awareness about HPV, cervical cancer and HPV vaccine among parents*", the level of awareness was high such that 75.5% knew that HPV is among the sexually transmitted disease and 90.3% were aware that it could prevent cervical cancer (16). Following FGDs in our study, participants knew that the HPV vaccine could prevent cancer but also suggested that more health education on the HPV virus and vaccine is needed to increase its awareness. However, there were myths and misconceptions about the HPV vaccine.

The knowledge on screening for cervical cancer has been shown to increase early diagnosis of the disease and reduce the mortality of the illness (17). When screening programs are appropriately organized at the community level,

cervical cancer frequencies are reduced by 50% to 80%. Inequitable access to screening programs in primary care facilities causes a substantial rise in cervical cancer death and incidence (17). In this study, we assessed for knowledge of cervical cancer screening by asking the women if they had ever been screened. Very few participants, 12%, had ever screened for cervical cancer. The low screening awareness represents the case for many women in Sub-Saharan Africa and low-resource setting countries (18). The issue is different in developed countries such as the USA (19), where screening programs are well structured. Women need health education to improve their cervical cancer screening behaviours. Among the reasons for not screening revealed by FGDs were the lack of information on screening, fear of screening procedures, like with other studies (19, 20), and apprehensiveness of the result reported as a reason not to screen in our study. Due to fear, in this study, some women opted to wait for the symptoms of cervical cancer and then go for screening, as reported in another study by (20); this is a negative perception that must be addressed because it can fail the screening programs. Among the facilitators of cervical cancer screening include a recommendation to attend screening by the health provider (21), family experiences of the disease, and signs and symptoms of cervical cancer (22). Education on screening for women and clinicians has increased knowledge of cervical cancer screening (23). Health educational movements should urge women in their reproductive years to screen for cervical cancer at least once in their lifetime, as advised by the World Health Organization, with a preference for screening in asymptomatic women (24).

Most study participants received information on cervical cancer, HPV, and vaccines from their healthcare workers 27.6%; while, Mass media (Radio, Television, and Newspapers) and social media constitute 35.6% of the participants. Media utilization addressing various health issues has been shown to improve the awareness of the HPV vaccine, as has been evidenced in studies (25, 26) and our research. Media is a good source for disseminating health information concerning cancer prevention, management, and improvement of the Quality of life (25). Although media has positively impacted advocacy education to families, patients, and clinicians, the platforms should be used cautiously because some information may need to be more genuine for patient care (27). Healthcare professionals are another platform where most women receive information on the HPV vaccine and the availability of the services. Although a low level of knowledge in nurses and clinicians can act as a barrier to this information (28), another source of information for school girls could be from their parents and teachers at the schools, if these personnel are empowered with education on the HPV vaccine (29). There is a need to improve HPV and vaccine sources of information for our community using the mechanisms that are found effective in increasing the awareness and acceptance of the vaccine among our young girls.

Study Limitations

There were few representations of women aged 40 to 45, probably because the active childbearing age is below 35. The descriptive cross-sectional study failed to ascertain any factors associated with knowledge of cervical

cancer and preventive measures. However, the addition of qualitative discussion provided insights into why women are not willing to undergo cervical cancer screening and take the HPV vaccine.

Conclusion and recommendations

Most women had the knowledge of the disease but unaware of the main risk factors, HPV infection, and vaccine availability. This study evidenced that healthcare professionals' knowledge of cervical cancer risk factors helps disseminate the information to their clients. Therefore, there is a need to advocate for frequent health education sessions on cervical cancer in the facility health education talks. Social and mass media play a significant role in giving health information to the community when used correctly. We recommend the increase of knowledge of healthcare care workers through continuous medical education in their facilities, but also the use of social and mass media in educating the community on HPV infection transmission, the availability of HPV vaccine for school girls, and the importance of screening as very few participants had ever been screened for cervical cancer in our study.

Abbreviations

AIDS: Acquired Immunodeficiency Syndrome
FGD: Focus Group Discussion
HIV: Human Immunodeficiency Virus
HPV: Human papillomavirus
HPV: Human papillomavirus
MUHAS: Muhimbili University of Health and Allied Sciences
PHF: Primary Health Facilities
PORALG: President's Office, Regional Administration and Local Government
PPS: Probability Proportional to Size
RCH: Reproductive and child health clinics
SRH: Sexual reproductive health (SRH)

Declarations

Conflict of Interest

The authors disclose no conflicts of interest.

Acknowledgments

The authors are grateful to the study participants who gave their time to respond to the interviews and FGDs. The authors appreciate the excellent work of the research assistants in data collection. Also, they appreciate the Health Facility In-charges and reproductive and Child Health staff for coordinating the women at the health facilities. Special thanks to the President Office of Regional Administration and Local Government (PORALG), Regional Secretariat, and Ilala City Council for allowing the research to be conducted at Ilala Municipal Council and participating in supervising data collection activity. The authors thank the Muhimbili University of Health (MUHAS) for ethical clearance for the study.

Authors' Contributions

CVM contributed to the conception and design of the study, acquired, analysed and interpreted the data, and drafted and revised the manuscript. VM and MI contributed to the design of the study, data analysis and interpretation and critically revised the manuscript. GK, GC to MK contributed to the data analysis and interpretation and critically revised the manuscript. NS and CK contributed to the conception, design of the study, data interpretation and critically revised the manuscript. All authors read and approved the final manuscript.

References

1 Zhang X, Zeng Q, Cai W, Ruan W. Trends of cervical cancer at global, regional, and national level: data from the Global Burden of Disease study 2019. BMC Public Health. 2021;21(1):894.

2 Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA: A Cancer Journal for Clinicians. 2021;71(3):209-49.

3 Bruni LAGSBMMCJGDMJBFdSS. ICO/IARC Information Cente on HPV and Cancer (HPV Information Centre). 2021. Report No.: Summary Report 22 October 2021.

4 Brisson M, Kim JJ, Canfell K, Drolet M, Gingras G, Burger EA, et al. Impact of HPV vaccination and cervical screening on cervical cancer elimination: a comparative modelling analysis in 78 low-income and lower-middle-income countries. Lancet. 2020;395(10224):575-90.

5 Atun R, Jaffray DA, Barton MB, Bray F, Baumann M, Vikram B, et al. Expanding global access to radiotherapy. Lancet Oncol. 2015;16(10):1153-86.

6 Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, et al. Cancer incidence and mortality worldwide: Sources, methods and major patterns in GLOBOCAN 2012. International Journal of Cancer. 2015;136(5):E359-E86.

7 Mabelele MM, Materu J, Ng'ida FD, Mahande MJ. Knowledge towards cervical cancer prevention and screening practices among women who attended reproductive and child health clinic at Magu district hospital, Lake Zone Tanzania: a cross-sectional study. BMC Cancer. 2018;18(1):565.

8 Yusuf H. M.; Xiaoyum L. Limitations of E-Government Adoption by Local Governments: A Case Study of Ilala Municipal Council, Tanzania. Information and Knowledge Management. 2016;6(2):34-9.

9 HEARD. Country Factsheet: Tanzania, Durban: Health Economics and HIV/AIDS Research Division/. University of KwaZulu-Natal; 2015.

10 Sampford MR. On sampling without replacement with unequal probabilities of selection. Biometrika. 1967;54(3):499-513.

11 Tanzania Commission for AIDS(TACAIDS) ZAC, National Bureau of Statistics(NBS), Office of the Chief Government Statistician (OCGS), and ICF International. Tanzania HIV/AIDS and Malaria Indicator Survey 2011-12: Key Findings. Dar es Salaam, Tanzania: TACAIDS, ZAC, NBS, OCGS, and ICF International; 2013.

12 Taneja N, Chawla B, Awasthi AA, Shrivastav KD, Jaggi VK, Janardhanan R. Knowledge, Attitude, and Practice on Cervical Cancer and Screening Among Women in India: A Review. Cancer Control. 2021;28:10732748211010799.

13 Sudenga SL, Rositch AF, Otieno WA, Smith JS. Knowledge, attitudes, practices, and perceived risk of cervical cancer among Kenyan women: brief report. Int J Gynecol Cancer. 2013;23(5):895-9.

14 Jatho A, Tran BT, Cambia JM, Nanyingi M, Mugisha NM. Cancer Risk Studies and Priority Areas for Cancer Risk Appraisal in Uganda. Ann Glob Health. 2020;86(1):78.

15 Okolie EA, Barker D, Nnyanzi LA, Anjorin S, Aluga D, Nwadike BI. Factors influencing cervical cancer screening practice among female health workers in Nigeria: A systematic review. Cancer Rep (Hoboken). 2022;5(5):e1514.

16 Wamai RG, Ayissi CA, Oduwo GO, Perlman S, Welty E, Manga S, et al. Assessing the effectiveness of a community-based sensitization strategy in creating awareness about HPV, cervical cancer, and HPV vaccine among parents in North West Cameroon. J Community Health. 2012;37(5):917-26.

17 Charde SH, Warbhe RA. Human Papillomavirus Prevention by Vaccination: A Review Article. Cureus. 2022;14(10):e30037.

18 Anwar SL, Tampubolon G, Van Hemelrijck M, Hutajulu SH, Watkins J, Wulaningsih W. Determinants of cancer screening awareness and participation among Indonesian women. BMC Cancer. 2018;18(1):208.

19 Zorogastua K, Sriphanlop P, Reich A, Aly S, Cisse A, Jandorf L. Breast and Cervical Cancer Screening among US and non US Born African American Muslim Women in New York City. AIMS Public Health. 2017;4(1):78-93.

20 Umami A, Sudalhar S, Pratama TWY, Fitri I, Firmansyah A. Knowledge, barriers, and motivation related to breast and cervical cancer screening among women in Bojonegoro, East Java: A Qualitative Study. Journal of Health Promotion and Behavior. 2020;5(1):1-10.

21 Black E, Hyslop F, Richmond R. Barriers and facilitators to uptake of cervical cancer screening among women in Uganda: a systematic review. BMC Womens Health. 2019;19(1):108.

22 Ndejjo R, Mukama T, Kiguli J, Musoke D. Knowledge, facilitators and barriers to cervical cancer screening among women in Uganda: a qualitative study. BMJ Open. 2017;7(6):e016282.

23 Saei Ghare Naz M, Kariman N, Ebadi A, Ozgoli G, Ghasemi V, Rashidi Fakari F. Educational Interventions for Cervical Cancer Screening Behavior of Women: A Systematic Review. Asian Pac J Cancer Prev. 2018;19(4):875-84.

24 WHO. WHO guideline for screening and treatment of cervical pre-cancer lesions for cervical cancer prevention. Second ed2021.

25 Han CJ, Lee YJ, Demiris G. Interventions Using Social Media for Cancer Prevention and Management: A Systematic Review. Cancer Nurs. 2018;41(6):E19-e31.

26 Lama Y, Quinn SC, Nan X, Cruz-Cano R. Social media use and human papillomavirus awareness and knowledge among adults with children in the household: examining the role of race, ethnicity, and gender. Hum Vaccin Immunother. 2021;17(4):1014-24.

27 Hasty RT, Garbalosa RC, Barbato VA, Valdes PJ, Jr., Powers DW, Hernandez E, et al. Wikipedia vs peer-reviewed medical literature for information about the 10 most costly medical conditions. J Am Osteopath Assoc. 2014;114(5):368-73.

28 Thanasa E, Thanasa A, Kamaretsos E, Paraoulakis I, Balafa K, Gerokostas EE, et al. Awareness Regarding Human Papilloma Virus Among Health Professionals and Will to Accept Vaccination: A Systematic Review. Cureus. 2022;14(10):e30855.

29 Gualano MR, Stillo M, Mussa MV, Zotti CM. Cross-sectional study investigating the differences in knowledge and behaviors about HPV between vaccinated and non-vaccinated girls. J Prev Med Hyg. 2016;57(3):E121-e7.