ORIGINAL RESEARCH ARTICLE

Self-sampling for human papilloma virus DNA as a strategy to increase access to cervical cancer screening: patients' and providers' perspectives on facilitators and barriers to scale

DOI: 10.29063/ajrh2023/v27i12.13

Eva Lathrop[1], Marcos Chissano[2], Guilhermina Tevir[2], Yolanda Chongo[2], Elvira Cambe[2], Edson Chivambo[2], Hannah Hoover[2] and Paul Bouanchaud[3]*

Department of Sexual and Reproductive Health, Population Services International, Washington DC, USA[1]; Department of Research and Evidence, Population Services International, Maputo, Mozambique[2]; Department of Strategies and Insights, Population Services International, Washington DC, USA[3]

***For Correspondence:** Email: *elathrop@psi.org*; *evalathrop@hotmail.com*; Phone: +1 770 833 1884

Abstract

Self-sampling represents a high accuracy approach to human papilloma virus DNA (HPV-DNA) testing that allows for privacy and autonomy. As part of a larger study to evaluate cervical cancer screening in Mozambique, we explored user-driven facilitators and barriers to, and provider perspectives on, self-sampling. Our study was conducted in 4 public health facilities in 2 districts in Mozambique. Women aged 30-49 were prospectively enrolled for HPV screening and were offered provider or self-collected sampling. We used enrolment data from 9014 participants to examine characteristics of women choosing self-sampling and conducted in depth interviews with 104 women and 15 providers to understand facilitators and barriers to self-sampling. 97.5% of participants chose self-sampling over provider sampling. Participant-reported barriers included fear about technique, discomfort and inadequate training. Facilitators to self-sampling included increased privacy and having been exposed to a peer who previously self-sampled. Providers expressed concern about their limited role in the screening process with a self-sampling technique. Self-sampling for HPV is an acceptable approach to cervical cancer screening but barriers such as fear of sampling incorrectly and discomfort with their bodies remain. *(Afr J Reprod Health 2023; 27 [12]: 106-111)*

Keywords: Cervical cancer, Human Papilloma Virus, self-sampling

Résumé

L'auto-échantillonnage représente une approche de haute précision pour les tests d'ADN du virus du papillome humain (ADN-HPV) qui permet la confidentialité et l'autonomie. Dans le cadre d'une étude plus vaste visant à évaluer le dépistage du cancer du col de l'utérus au Mozambique, nous avons exploré les facilitateurs et les obstacles imposés par les utilisateurs, ainsi que les points de vue des prestataires sur l'auto-échantillonnage. Notre étude a été menée dans 4 établissements de santé publics dans 2 districts du Mozambique. Les femmes âgées de 30 à 49 ans ont été inscrites de manière prospective pour le dépistage du VPH et se sont vu proposer un prélèvement par un prestataire ou un prélèvement auto-collecté. Nous avons utilisé les données d'inscription de 9 014 participantes pour examiner les caractéristiques des femmes choisissant l'auto-échantillonnage et mené des entretiens approfondis avec 104 femmes et 15 prestataires pour comprendre les facilitateurs et les obstacles à l'auto-échantillonnage. 97,5 % des participants ont choisi l'auto-échantillonnage plutôt que l'échantillonnage par un prestataire. Les obstacles signalés par les participants comprenaient la peur concernant la technique, l'inconfort et une formation inadéquate. Les facilitateurs de l'auto-échantillonnage comprenaient une plus grande intimité et le fait d'avoir été exposé à un pair qui avait déjà effectué un auto-échantillonnage. Les prestataires ont exprimé leur inquiétude quant à leur rôle limité dans le processus de dépistage avec une technique d'auto-échantillonnage. L'auto-prélèvement pour le VPH est une approche acceptable pour le dépistage du cancer du col de l'utérus, mais des obstacles tels que la peur d'un prélèvement incorrect et l'inconfort avec leur corps demeurent. *(Afr J Reprod Health 2023; 27 [12]: 106-111).*

Mots-clés: Cancer du col de l'utérus, virus du papillome humain, auto-prélèvement

Introduction

Cervical cancer is a leading cause of death among women worldwide, with the vast majority of the over 300,000 deaths annually occurring in low and middle-income countries (LMICs)[1], yet the majority of cervical cancer deaths are preventable through vaccination against high-risk types of human papilloma virus or by screening for and treatment of precancerous lesions in women already infected with

HPV. While deaths from cervical cancer have declined dramatically in high-income and some middle-income countries, cervical cancer mortality has continued to increase in developing countries. Mozambique has one of the highest burdens of cervical cancer in the world[2]. The prevalence of HIV, a significant risk factor for cervical cancer is 12.4% nationally and >20% in some urban regions[3]. Mozambique has a shortage of medical providers with only three doctors per 100,000 people, only 15 pathologists (1 per 2 million) and three medical oncologists (1 per 9 million) in the entire country. There are currently no surgical oncologists or gynecologic oncologists in Mozambique. This severe shortage of health care workers coupled with low coverage for cervical cancer prevention means that Mozambique is poised to experience an increase in cases unless strategies to increase prevention are prioritized.

The global cervical cancer elimination strategy has a screening pillar which states that 70% of women should be screened with a high-performance test by age 35 and again by age 45. The current recommendation is that HPV DNA testing is used as the primary screening test for both the general population and women living with HIV[1]. The WHO recommends human papilloma virus (HPV) testing as the primary screening test for both the general population and for women living with HIV, and supports self-sampling of HPV-DNA[1]. Self-sampling, a technique where women can self-swab cervico-vaginal fluids rather than have a provider perform a speculum exam to collect the sample, is a highly accurate approach to HPV DNA testing and has been shown to be highly acceptable among both women and providers[4]. A recent systematic review of self-sampling for HPV testing 25 countries in Africa, the studies reviewed concordance in results between patient collected and provider collected samples was high and the quality of samples was similar. The review also found that a majority of studies showed self-sampling to be highly acceptable and preferred by women[4]. However, barriers remain, including lack of confidence in one's ability to correctly perform the procedure and desire for continued healthcare worker support. While there is a growing body of literature describing field experiences with HPV testing across sub-Saharan Africa (SSA)[4,5], questions remain regarding best-practices in design and implementation of HPV self-screening programs, Little is known about why fear of ability to sample correctly is the predominantly identified barrier and there are no existing studies examining factors that may be specific to the Mozambique context in terms of scaling an HPV self-sampling model of primary screening for cervical cancer prevention.

The objective of our overall study was to introduce and scale up cervical cancer innovations such as HPV DNA testing, self-sampling and thermo-ablation for the treatment of pre-cancerous lesions. The primary objective of this sub-study was to assess the acceptability of HPV DNA self-sampling among patients and providers and to identify facilitators and barriers to scale-up of self-sampling for cervical cancer screening programs in Mozambique.

Methods

This article reports on data analyzed from the MULHER study, Cervical cancer screening with primary HPV testing in Mozambique. The methods used to conduct the primary study have been previously reported[6] and will be described briefly. We conducted a prospective cohort study with women aged 30-49 in 4 public health facilities in Maputo City and Gaza Province, Mozambique. Eligible women were invited to participate in the study at the time of their clinic visit for cervical cancer screening, voluntary family planning services, HIV care or other reasons. Participants were offered cervical cancer screening or screening integrated with voluntary family planning (vFP) services. After consent to participate in the study, women were enrolled and completed an intake survey capturing medical history and demographic characteristics and were offered either provider collected HPV DNA testing or the option to self-sample for HPV DNA. We used a Viba-Brush (Rovers Medical Devices, The Netherlands) for sample collection, the PreservCyt Thin Prep system (Hologic Inc., Marlborough, MA, USA) and the GeneXpert system to test the samples for HPV DNA (Cepeheid Inc., Sunnyvale, CA, USA). Institutional Review Board approval from MD Anderson Cancer Center (2020-0651) and Comité Nacional de Bioética para a Saúde, Moçambique (IRB00002657) were obtained. This study is registered with ClinicalTrials.gov (NCT05359016).

In addition to using the participant intake survey to understand demographic and clinical characteristics of participants, we assessed the feasibility and acceptability of HPV self-sampling among MULHER study participants and health care providers who provided the cervical cancer screening using qualitative in-depth interviews with a sample of women and providers. The interviews included several modules that addressed participant experience with integrated cervical cancer screening and voluntary family planning, overall satisfaction with services, and experiences with self- sampling. The self-sampling module included domains addressing facilitators and barriers to self-sampling. Interviews with providers included modules addressing integrated care, experiences with thermo-ablation devices and perceptions of self-sampling for HPV -DNA screening. The module exploring self-sampling included domains examining provider perception of the value of or detraction of integrating self-sampling into their HPV screening approach. Women were recruited for in depth interviews if they agreed to a follow up interview on their intake form. Recruitment continued until saturation was reached. Providers involved in HPV-DNA screening for the MULHER study were invited to participate in an in-depth interview until thematic saturation was reached. All survey data, sample results and follow up care information were collected and managed using Research Electronic Data Capture (REDCap). Descriptive statistics were generated to describe demographic and clinical characteristics. In depth interviews were coded and analysed using a thematic approach in Dedoose, a qualitative analysis software.

Results

A total of 9014 women participated in the MULHER study. The mean age of was 37.7 years old, 46% (4122) of our sample were women living with HIV, 31.1% (2805) tested positive for high-risk HPV-DNA. Of 9014 participants in the MULHER study, 97.5% (8792) chose self-sampling over provider collected sampling for HPV-DNA testing. Some statistically significant differences were observed between those who did and did not self-sample (Table 1). Those living in Gaza Province were more likely to self-sample than those in Maputo (99.6% vs 95.7%, respectively), those self-sampling had higher parity on average than those who did not self-sample (3.2 vs 2,8 children, respectively), and were more likely to be married (64.1% of those who self-sampled vs. 47.8% of those who did not). Education level also differed between these two groups, but with no clear gradient. Women who self-sampled were more likely to have also received vFP counselling than those with a provider sample (88.1% vs 80.6%, respectively). Mean age, HIV and HPV status did not differ statistically significantly between the two groups. (Table 1)

Several common themes emerged around facilitation to self-sampling for women who participated in interviews, including fears about technique, discomfort with the act of sampling, and inadequate training to correctly perform sampling. Women expressed worry that they would not be able to sample correctly and that they would experience pain with the act of self-sampling. One woman stated:

"I worry about self-sampling – if I am doing it correctly and also it could be a bit painful."

Another stated:

"I cannot manage to do the self-sampling; it would be too difficult to see my genital organs. [I can only do it] if I have someone to help me collect."

Another women who self-sampled identified the facility as key to her decision to self-sample given the fear of doing the screening with our the support of providers:

"I prefer it [to self-sampling] in the hospital because at home I wouldn't have the courage and at the hospital the fear ends as they are the professionals." (Client)

Increased privacy was noted by several women and providers as a facilitator to self-sampling although provider support in the counseling on technique remained important. One provider stated:

"Women like to do self-sampling because from the moment that I explain to them how we should do their self-collection and she feels good when she does the self-collection alone, and from my experience I think that it is good for women to do the self-collections because they feel good about not

Table 1: Demographic and clinical characteristics of the study population by self and provider sampling of HPV DNA

		Self-sampled	Provider sampled	Sig.
Total	N	8792	222	
	%	97.5%	2.5%	
Age (Years)	Mean	37.7	37.9	non-sig
	s.d.	5.5	5.3	
Parity	Mean	3.2	2.8	p=0.013
	s.d.	1.8	1.6	
Province	Gaza	99.6%	0.4%	p<0.001
	Maputo	95.7%	4.3%	
Education (N missing = 3647)	No formal education	9.9%	4.5%	p = 0.015
	Primary	42.9%	55.2%	
	Middle school	8.8%	16.4%	
	Secondary	29.0%	17.9%	
	Technical/ higher	9.4%	6.0%	
Marital status (N missing = 106)	Married/ in union	64.1%	47.8%	p < 0.001
	Separated/ divorced	4.7%	14.4%	
	Single	25.4%	34.2%	
	Widowed	4.7%	2.7%	
	Missing	1.2%	0.9%	
HIV status	Positive	45.8%	51.8%	non-sig
HPV status	Positive	45.8%	51.8%	non-sig
Received vFP counselling?	Yes	88.1%	80.6%	p=0.001

being on a bed and saying position yourself here, because you have to spread your legs is something that women don't like."

Peer support was identified by both providers and women as an important facilitator in choosing and completing self-sampling. Providers observed women sharing their confidence in self-sampling with other women in the facility waiting area and this functioned as a tool to encourage others to self-sample. Women also identified that hearing the positive experience of peers and having their support gave them courage to self-sample. One provider stated:

"… when she does the self-collection alone she even goes outside afterwards and explains it to the others, 'they gave me and said do it this way and that way and I did it alone and I felt good'"

And another woman stated:

"I liked doing the self-sampling for the HPV. I did it alone and I had that [experience] of evaluating myself. I loved it and that's why, when I explain the mamas, I talk about how my experience was, I motivate and say that it doesn't hurt, it is simple and easy, you will be proud and say that I went to the hospital and did an exam alone to save my life.",

further supporting the importance of the peer referral as a facilitator to self-sampling for HPV-DNA. Providers considered HPV self-sampling to potentially speed up the screening process but had concerns that their role was being taken away, or that patients may sample incorrectly.

Discussion

This mixed methods study describes the demographic and clinical characteristics of a sample of 9014 participants of a prospective cohort study aimed to introduce and scale up cervical cancer innovations such as HPV DNA testing and self-sampling and participants' and health care providers' experiences with HPV self-sampling in order to explore facilitators and barriers to increasing access to cervical cancer screening and to expand the evidence base for HPV self-sampling. There were several significant differences in the background characteristics of those who chose to self-sample versus those who chose provider sampling for HPV screening, including level of

education, parity, marital status and province. However, these differences were all quite small, and in all groups, the overwhelming majority of women chose to self-sample (97.5% overall). We also note that having been counselled for family planning (FP) was more common in the self-sampling group, which suggests there is potential for integrating HPV DNA self-sampling with FP programs.

While several facilitators to self-sampling were identified by both participants and providers, despite the high proportion of women choosing self-sampling, barriers were also cited, indicating that self-sampling for HPV DNA testing as a primary method of cervical cancer screening has promise for scale-up, but careful design considerations must be taken in order to be responsive to women's perspectives and to maximize comfort, confidence, and self-efficacy as well as ensure provider buy-in for this approach.

In our study we found that while most women chose to self-sample, they also expressed fear and lack of confidence in their ability to perform the test correctly. This is consistent with other qualitative studies examining patients' experiences with self-sampling of HPV DNA[5] and is a call to awareness that strengthening self efficacy, bodily awareness, and the sense of agency to self-sample will be critical factors to enable the expansion of HPV self-sampling to scale, including though home-based models. Women in our study identified the provider instructions prior to collection and support during collection as key to their ability to choose and perform self-sampling. In order to expand self-sampling for HPV DNA testing for cervical cancer screening beyond health care facilities to home based models, it will be important to ensure that sampling instruction tools are comprehensive and accompaniment during sampling, by community health care workers or other companions is available to maximize the uptake and impact of self-sampling programs. The limited literature on follow-up after self-sampling demonstrates that there are not differences in clincal assessment or treatment for cervical lesions between those who self-sampled and those who received provider based sampling[7]. Ensuring strong linkages to results communication and follow up care are important considerations to safely implement a self-sampling for HPV DNA program to scale. during the design of any HPV self-sampling. Communicating the potential benefits of HPV self-sampling to providers, including the increased comfort of their patients, shorter times needed for consultation and therefore increasing time available for other activities may improve acceptance of this approach. Inclusion of self – sampling for HPV in national self-care guidelines will also support expansion of HPV self-sampling as a strategy to reach women who may otherwise be unable to access screening. The attention to careful instructions, accompaniment, strong linkages to follow up care and inclusion of a self-sampling approach in national guidelines has the potential to strengthen other self-care interventions across the sexual and reproductive health care spectrum.

Limitations

The analysis reported here comes from the wider MULHER study, which was primarily focused on clinical outcomes associated with CCS and treatment. The study was not primarily designed to examine differential take up rates of self- versus provider-sampling for HPV DNA. The data were collected from women recruited to a prospective cohort in two provinces of the country and are therefore not designed to be representative of the wider Mozambiquan population. Finally, given the very high adoption rates of HPV self-sampling in the study, we surmise that those electing to have a provider sample may be a somewhat special group. Further research might consider exploring this group's motivations and barriers to self-sampling specifically.

Conclusion

While our findings are not necessarily generalizable to other LMICs or beyond, they contribute to a nascent literature that gives a picture of the prevailing fears and barriers that can be addressed to advance a person-centered approach to delivering cervical cancer screening in Mozambique and across SSA. These findings have the potential to inform the design and implementation of self-care interventions across sexual and reproductive health. HPV self-sampling holds great promise in improving access to screening and in promoting equity by increasing control over where, when, and how women choose to be screened[6].

Acknowledgements

The authors would like to acknowledge the following colleagues for their contributions to this study: from The University of Texas MD Anderson Cancer Center: Kathleen Schmeler, Ellen Baker, Mila Pontremoli Salcedo; Universidade Eduardo Mondlane in Maputo, Mozambique: Nafissa Osman, Cesaltina Ferreira Lorenzoni, Celda Mavume; the Ministry of Health of Mozambique; the United States Agency for International Development: Kevin Peine, Megan Gomes; the National Academies of Science: Matthew Mbasu; TogetHER for Health: Heather White; and Populations Services International Mozambique: Donato Gulino, Mara Nhamuchue, Albertina Matola, Dorca Ribeiro and Igna Machava. Funding for this study was received from the USAID-PEER (Partnerships for Enhanced Engagement in Research)/National Academies of Science, Engineering and Medicine (NASEM), Award Number AID-OAA-A-11-00012.

References

1.WHO guideline for screening and treatment of cervical pre-cancer lesions for cervical cancer prevention, second edition. Geneva: World Health Organization; 2021.

2. Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, Parkin DM, Forman D and Bray F. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. Int J Cancer. 2015 Mar 1;136(5):E359-86.
3. WHO. HIV Country Intelligence: HIV Country profiles. 2017; Http://cfs.hivci.org/countryfactsheet.html)
4. Nodjikouambaye ZA, Adawaye C, Mboumba Bouassa RS, Sadjoli D and Bélec L. A systematic review of self-sampling for HPV testing in Africa. Int J Gynaecol Obstet. 2020 May;149(2):123-129.
5. Camara H, Zhang Y, Laffery L, Vallely, AY, Guy R and Kelly-Hanku A. Self-Collection for HPV-Based Cervical Cancer Screening: A Qualitative Evidence Meta-Synthesis. BMC Public Health. 2021 Aug 4;21(1):1503.
6. Salcedo MP, Lathrop E, Osman N, Neves A, Rangeiro R, Mariano AAN, Nkundabatware JC, Tivir G, Carrilho C, Monteiro ECS, Burny R, Thomas JP, Carns J, Andrade V, Mavume C, Paulo Mugolo R, Atif H, Hoover H, Chivambo E, Chissano M, Oliveira C, Milan J, Varon ML, Fellman BM, Baker E, Jeronimo J, Castle PE, Richards-Kortum R, Schmeler KM and Lorenzoni C. The Mulher Study: cervical cancer screening with primary HPV testing in Mozambique. Int J Gynecol Cancer. 2023 Dec 4;33(12):1869-1874. doi: 10.1136/ijgc-2023-004958. PMID: 37907263.
7. Yeh PT, Kennedy CE, de Vuyst H and Narasimhan Ml. Self-sampling for human papillomavirus (HPV) testing: a systematic review and meta-analysis. BMJ Global Health 2019;**4:**e001351.