


Research Article

Knowledge and Attitudes towards Cervical Cancer Screening and Acceptability of HPV Self-Sampling (HPV-SS) Among Under or Never Screened Racialized Immigrant Women in GTA, Ontario, Canada

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Abstract

Background: Although Cervical cancer (CC) screening with the Papanicolaou (Pap) test has been effective in reducing CC incidence and mortality, the benefits have not equitably been distributed across different social strata. Immigrants and refugees, particularly South Asian (SA) and Sub-Saharan African (SSA) women, are among the most under-screened groups in Ontario. Little is known about the SA and SSA's beliefs about CC and screening or the acceptability of utilizing HPV self-sampling (HPV-SS), an alternative method of screening for CC. This on-line community-based mixed methods pilot study aimed to address this knowledge gap.

Methods: Thirty under and never screened SA and SSA women 25-69 years old, residing in Greater Toronto Area were recruited by study community champions. Study participants completed an online survey, viewed a short video about HPV-SS and participated in online focus groups.

Results: Participants had limited knowledge and negative attitudes towards CC and screening. Sexually transmitted infections were viewed as a stigmatized concept. Multiple barriers to screening were identified like time constraints, limited availability of female healthcare providers, family beliefs and restrictions imposed by husbands in undergoing screening, and modesty in exposing private parts during a pelvic examination. Participants expressed preference for screening conducted by healthcare professionals for their knowledge and expertise while they were open to HPV-SS due to its convenience and privacy. The need for training about how to conduct the HPV-SS was highlighted.

Conclusion: The results emphasize the urgent need for targeted, family-centred, and culturally safe CC screening awareness campaigns for SA and SSA immigrant women.

Keywords: Cervical cancer screening; Knowledge; Attitudes; Stigma surrounding sexually transmitted infection; Human papillomavirus self-sampling (HPV-SS).

Abbreviations

HPV: Human papillomavirus

HPV-SS: Human papillomavirus Self-Sampling

Pap test: Papanicolaou test

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SA: South Asian

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SSA: Sub-Saharan African

STIs: Sexually transmissible/transmitted infections

UNS: Under or never screened

Introduction

Cervical cancer (CC) remains a global public health issue even though scientific advancements have made the disease virtually preventable. In Canada CC incidence and mortality have been dropping steadily over the past few decades mainly on account of screening with the Papanicolaou (Pap) test which is performed by a clinician in a clinical setting [1-4]. This enables identification of the disease at an early stage of its growth when it can be contained using available cancer treatments. However, empirical evidence shows low uptake of screening among certain women subgroups including racialized immigrants from regions like South Asia and Sub-Saharan Africa [5-20]. The underutilization of screening among these hard-to-reach women is attributed to systemic barriers (e.g., lack of a family physician, inconvenient clinic hours, transportation cost, difficulty taking time off from work), prevailing discourses that discourage open dialogue about sexualities, limited knowledge about reproductive health, and strict sociocultural norms regarding modesty, premarital virginity, and sexual behaviour [5-16]. Racism and racialized stereotypes may in turn refrain women from seeking sexual health information or accessing CC screening [17-20].

The perseverance of CC screening disparities suggests that innovative and woman centered methods are needed to address these structural barriers. HPV self-sampling (HPV-SS) has been proven to be effective in removing reported socioeconomic, geographic, and cultural barriers associated with the uptake of CC screening by marginalized populations [21-32]. While the province of British Columbia has recently incorporated HPV-SS into its provincial screening program, and the Canadian Partnership Against Cancer is encouraging provinces to implement it, HPV-SS is still minimally available across the country. HPV-SS enables women to self-collect samples in the privacy of their homes without requiring pelvic examinations by health care providers. There is solid evidence of the validity of HPV-SS compared to clinician-collected cervical samples, as well as of high acceptance and positive attitudes of women toward HPV-SS [26-30]. However, little is known about the South Asian (SA) and Sub-Saharan African (SSA) women's beliefs and values about CC and screening or the acceptability of utilizing HPV-SS as an alternative method of screening for CC.

Our pilot community-based mixed methods study aimed to explore racialized immigrant women's values and beliefs about CC & screening and explore their willingness, acceptability, and concerns related to use of HPV-SS.

Materials and Methods

Study Design & Target Population

An on-line community-based mixed methods pilot study was conducted in the Greater Toronto Area (GTA) to explore SA and SSA immigrant women's perspectives on CC screening and the acceptability of HPV sampling either by self or a clinician as an alternative method of CC screening.

Study Sample

A purposive sample of 30 women which included an equal number of SA and SSA immigrant women was recruited through community champions (i.e. trusted members of communities). The inclusion criteria included: 1) self-identify as SA or SSA; 2) living in the GTA; 3) age 25-69 years, in line with provincial guidelines on HPV testing for CC screening; 4) under or never screened; self-report of >4 years since last Pap test, including no history of Pap test; 5) have ever been sexually active; 6) able to communicate in English; 7) able to provide informed consent; and 7) willing to share contact information with the study team. Exclusion criteria included having a history of hysterectomy, being diagnosed with CC, and never being sexually active.

Recruitment Strategies & Data Collection

Recruitment took place from January 2023 to April 2023. Women were approached and informed about the study by our hired community champions, 2 SA and 2 SSA women who had established connections with local community groups in GTA. Our community champions recruited participants through various venues such as neighbourhood associations, places of worship, cultural entertainment events, community organizers, and organizations with culturally specific programming and mandates. They explained the study, highlighted the eligibility criteria for participation, and provided potential participants with the study flyer. Women interested and eligible in participating were asked to contact the study research assistant (RA) through the email provided on the study flyer.

Once the women initiated the contact, the study RA arranged for a meeting either by phone or zoom. The RA explained the study, addressed questions, and verified the women's eligibility for participation. When eligibility for the study was determined, participants then provided online consent and completed an interviewer-administered online survey. The 30-minute survey explored participants' socio-demographic characteristics, CC screening practices, knowledge and attitudes about CC & screening, the stigma surrounding sexually transmitted infections (STIs) including HPV, and their preferred HPV testing (self-sampling / administered vs. provider administered).

After completion of the online survey, a link to a short video about HPV-SS was sent to the participants. They were

then invited to take part in one of four 90–120-minute online focus groups using Zoom video conferencing. Focus groups were held during the month of March and April 2023. Each focus group consisted of 7-8 women. Three focus groups were conducted in English and the fourth was conducted in Arabic, due to the limited English proficiency of those participants. All focus group discussions were audio-recorded with the participant's permission. The focus groups were facilitated by two members of the research team and were conducted using a semi-structured interview guide. The focus group discussion aimed to elicit participants' beliefs and values about CC and screening, acceptability of HPV sampling, preference for either self-collect or clinician-collected HPV sampling, perceived barriers and facilitators surrounding these two methods of screening and potential ways to address these barriers. A short video about HPV-SS which was sent to participants prior to focus group, was again presented during the focus group.

All women were offered \$70 as an incentive for their participation in the study as well as the cost of internet usage if that was required.

Ethics

The study protocol was reviewed and approved by Toronto Metropolitan University (REB#2022-410) and Women's College Hospital (REB#2022-1051-E).

Data Analysis

I) Survey

Participants completed surveys on Qualtrics which were then downloaded in IBM Statistical Package for Social Sciences (SPSS) version 28.0. Descriptive statistics (e.g., frequency, mean, median, mode, standard deviations) overall and by subgroups (i.e., SA and SSA participants) were conducted to summarize participants' socio-demographic, self-reported health characteristics, sexual health practices, CC knowledge and attitudes and stigma surrounding STIs. Bivariate statistics (chi-square and Mann-Whitney U tests for categorical variables) were used to compare the knowledge, attitudes and STI stigma across the two subgroups and assess whether the population mean ranks differed. A threshold of 0.05 was used to determine the level of significance for all p-values.

For *knowledge about CC and screening* the overall score was calculated by taking the sum of correct responses where the correct response was assigned as 1 and the incorrect response and the "do not know" responses were assigned as 0. The scale included 18 questions with the total scores ranging from 0 to 18.

For *CC screening attitudes* (PAP Test) and Stigma about STIs, a 5-point Likert scale was used across several domains. The overall score was calculated by taking the sum

of the question's responses where the "strongly disagree" was assigned as 1 and the "strongly agree" was assigned as 5. The scale included 15 questions and the total score of each participant ranged between 1 to 75. For *Stigma surrounding STI*, it included 10 questions and the total score of each participant ranged between 10 to 50.

II) Focus Group

The audio recordings of the focus groups were transcribed by a member of the research team, and subsequently analyzed in NVivo 12 by two members of the team independently. One of the focus groups which was conducted in Arabic was first transcribed in Arabic and then translated into English. Open coding was applied to all the transcripts, followed by an inductive thematic analysis to identify emerging themes.

Results

Survey

Participant Sociodemographic and Clinical Characteristics

The overall average age of participants was 41 years with SSA women being slightly younger than SA participants (38.5 vs. 44.0 years). Most participants were landed immigrants/ Canadian citizens and had lived in Canada for more than 10 years. While most SA women were married, SSA women were more likely to be single/ divorced/ widowed. Most participants (i.e., 24 (80%)) had children and of those about 71% had 2 or more children. The sample population reported to be highly educated with most (about 87%) having completed college or university education. Most participants reported their English literacy as good or excellent. SA and SSA participants had similar patterns of full-time employment. However, more than half of SSA participants reported being unemployed. The most common countries of origin in the SA group were India and Pakistan. The SSA participants' most common birthplaces were Sudan and Eritrea. Baseline demographic characteristics across the two groups were not significantly different. Approximately 73% of participants had a Pap test over 3 years ago, with about 7% of participants have been diagnosed previously with an STI (Table 1).

Access to Health Care Services:

Forty percent of respondents rated the availability of health services as "Fair/Poor". About 10% of participants reported having challenges in accessing health services which involved accessing female gynecologists or female primary care providers. 13% had no access to a family doctor. SA participants reported fewer challenges with accessing care relative to SSA participants (Table 2).

CC and Screening Knowledge:

Overall participants had partial knowledge of CC and screening with a mean score of 9.9 ranging from 4-16 (median and mode 9, standard deviation of 2.99); no participant

Table 1: Baseline Socio—demographics and Health Characteristics

Sociodemographic Characteristics	South Asian Participants (N=15)	Sub-Saharan Africans Participants c (N=15)	Total (N=30)	P values (Chi-square)
Age, mean (SD) Range	44 (8.62) (30, 60)	38.47 (10.84) (26, 59)	41.23 (10.02) (26,60)	0.26
Length of time in Canada				0.0885
0-4 years	1-5*	1-5 *	1-5*	
5-9 years	1-5*	1-5*	6 (20%)	
10+ years	10 (66.7%)	12 (80%)	22 (73.3%)	
Immigration status				0.1116
Landed immigrant/ Canadian citizen	12 (80%)	12 (80%)	24 (80%.00)	
Temporary Migrant	0 (0.%)	0 (0%)	0 (0%)	
Refugee applicant	1-5*	1-5*	1-5*	
Permanent resident	1-5*	1-5*	1-5*	
Other (e.g., Protected person)	1-5*	1-5*	1-5*	
Current Relationship Status				0.2686
Single/ never married	1-5*	1-5*	1-5*	
Married/ common law	12 (80%)	7 (46.7%)	19 (63.3%)	
Divorced/ separated	1-5*	1-5*	7 (23.3%)	
Widowed	1-5*	1-5*	1-5*	
Do you have children?				0.3613
Yes	13 (86.7%)	11 (73.3%)	24 (80%)	
No	1-5*	1-5*	6 (20%)	
English Proficiency				0.2701
Poor	1-5*	1-5*	1-5*	
Fair	1-5*	1-5*	1-5*	
Good	1-5*	1-5*	11 (36.7%)	
Excellent	7 (46.7%)	7 (46.7%)	14 (46.7%)	
Educational Attainment				0.1193
Less than high school	1-5*	1-5*	1-5*	
Highschool	1-5*	1-5*	1-5*	
College or university	11 (73.3%)	10 (66.7%)	21 (70%)	
Post-graduation	1-5*	1-5*	1-5*	
Employment status				0.3719
Unemployed	1-5*	1-5*	13 (43.3%)	
Part-time	1-5*	1-5*	7 (23.3%)	
Full-time	1-5*	1-5*	10 (33.3%)	
Self-Reported Health Status				0.4779
Poor	0 (0.00)	0 (0.00)	0 (0.00)	
Fair	1-5*	1-5*	1-5*	
Good	11 (73.3)	9 (60.0)	20 (66.7)	
Very Good	1-5*	1-5*	7 (23.3)	
Excellent	1-5*	1-5*	1-5*	

*Small cells less than 6 have been suppressed due to upholding participants' confidentiality.

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obtained a perfect score. Thirty percent of the participants had a low level of knowledge (less than 9 out of 18), with SA participants on average having less knowledge than SSA participants (i.e., 9.47 vs. 10.33) (See Table3). However the difference was insignificant (Mann Whitney U = 99, z=-0.565, p= 0.572).

Most participants did not know about the risk factors and the signs and symptoms of CC. For instance, 80% did not know that early intercourse increases the risk of CC. Two-thirds of participants did not know that bleeding and feeling pain after intercourse, spotting between menstrual periods,

bleeding and spotting after menopause, and having pelvic pain may be symptoms of CC. Furthermore, most women did not know about CC screening guidelines which recommend screening every 3 years starting at age 25 once a person has been sexually active. More than 90% of participants thought that a Pap test is recommended only for older women and about 87% believed that a Pap test should be performed only if infection and bleeding were present. Interestingly, 73% believed that a Pap test should not be performed among pregnant women.

Table 2: Perceived Quality of Health Services

N (%)	South Asian Participants (N=15)	Sub-Saharan African Participants (N=15)	Total (N=30)	P values (Chi-square)
Quality of Health Services				
Poor	1-5*	1-5*	1-5*	0.385
Fair	1-5*	1-5*	6 (20.0)	
Good	8 (53.33)	6 (40.00)	14 (46.7)	
Very Good	1-5*	1-5*	1-5*	
Excellent	1-5*	1-5*	1-5*	
Challenges Accessing Health Care				
Yes	1-5*	1-5*	1-5*	0.5428
No	14 (93.33)	13 (86.67)	27 (90.00)	
Access to a Family Doctor				
Yes	15 (100.00)	13 (86.67)	28 (93.33)	0.3425
No	1-5*	1-5*	1-5*	

*Small cells less than 6 have been suppressed due to upholding participants' confidentiality.

Table 3: Level of cervical cancer and screening knowledge

Participants	Knowledge score		
	Mean, Median, Mode	Standard Deviation (SD)	Minimum, Maximum
Overall	9.9, 9.0, 9.0	2.99	4,16
SA	9.5, 9.0, 9.0	2.95	4,14
SSA	10.3, 9.0, 9.0	3.1	6,16
Low-Medium-High knowledge scores			
Participants	Low (4-8)	Medium (9-12)	High (13-16)
Overall	9 (30.00)	15 (50.00)	6 (20.00)
SA	5 (33.33)	8 (53.33)	2 (13.33)
SSA	4 (26.67)	7 (46.67)	4 (26.67)

Table 4: Participants' attitudes towards Pap-test

	Mean Score ± (SD)	Minimum, Maximum Score
Overall	41.57 (5.76)	29,53
SA	41.20 (5.80)	33, 53
SSA	41.93 (5.90)	29, 53

Attitudes toward Pap-test:

Both groups had similar attitude means score of about 41 suggesting similarities in participants’ overall attitudes toward Pap tests (see Table 4). Mann Whitney U-test revealed the mean rank difference was insignificant between the 2 groups (U= 96.5, z=-0.666, p= 0.506).

Seventy percent of the participants did not feel comfortable about pap tests being conducted by a male physician and almost one-quarter believed that Pap tests were related to sexual promiscuity. About half of the participants (43.3%) believed that the pap test was painful and about two-thirds felt that Pap tests can cause short-term discomfort. Furthermore, 40% believed that they should consult their partner before receiving a Pap test and more than 30% felt that the Pap test was physically invasive and emotionally intimate (see Table 5).

The attitude means score across the 15 items ranged from 2.13 (disagree) to 4.17(agree). Responses were homogeneous across the majority of the items as SD ranged from 0.63-1.17 (see Table 6).

The overall mean score of STI stigma was 29.9. SA participants had a higher mean score (mean: 30.9) relative to SSA participants (mean: 28.93) suggesting a more stigmatizing attitude towards STIs (see Table 7). However, the difference was insignificant (Mann Whitney U = 93, z=-0.812, p= 0.417).

More than two-thirds of participants felt that, if they had an STI, people would think badly of them, not want to be friends with them, be disgusted with them, not be comfortable around them and feel they have poor morals (see Table 8).

The mean scores across the 10 items ranged from 2.20 (disagree) to 3.8 (agree). Responses were homogeneous across most of the items with SD ranging from 0.89-1.28 (see Table 9).

Perspectives on HPV screening: Self-Sampling vs. Clinician collected sample:

Of the total participants, more than half of the participants (57%) preferred clinician-collected HPV screening over HPV-SS. The main issue as a barrier to self-sampling was perceived limited skills and competency in collecting the sample and the need for proper training (see Table 10).

Table 5: Attitudes toward Pap-test

	Strongly Disagree N (%)	Disagree N (%)	Neutral N (%)	Agree N (%)	Strongly Agree N (%)
Pap tests are super painful					
Overall	2 (6.7)	11 (36.7)	4 (13.3)	11 (43.3)	0 (0.00)
SA	2 (13.33)	4 (26.67)	3 (20.00)	6 (40.00)	0 (0.00)
SSA	0 (0.00)	7 (46.67)	1 (6.67)	7 (46.67)	0 (0.00)
Pap tests are safe					
Overall	0(0.0)	1 (3.3)	1 (3.3)	21(70)	7 (23.3)
SA	0 (0.00)	1 (6.67)	1 (6.67)	10 (66.67)	3 (20.00)
SSA	0 (0.00)	0 (0.00)	0 (0.00)	11 (73.33)	4 (26.67)
Pap tests can cause short-term discomfort					
Overall	0 (0.0)	4(13.3)	2 (6.7)	19 (63.3)	5 (16.7)
SA	0 (0.00)	2 (13.33)	2 (13.33)	9 (60.00)	2 (13.33)
SSA	0 (0.00)	2 (13.33)	0 (0.00)	10 (66.67)	3 (20.00)
Pap tests can cause lasting health problems					
Overall	4(13.3)	21 (70)	2 (6.7)	3 (10)	0 (0.0)
SA	2 (13.33)	11 (73.33)	1 (6.67)	1 (6.67)	0 (0.00)
SSA	2 (13.33)	10 (66.67)	1 (6.67)	2 (13.33)	0 (0.00)
Pap tests can increase likelihood of cervical cancer					
Overall	4 (13.3)	22 (73.3)	3 (10)	1 (3.3)	0 (0.00)
SA	2 (13.33)	12 (80.00)	1 (6.67)	0 (0.00)	0 (0.00)
SSA	2 (13.33)	10 (66.67)	2 (13.33)	1 (6.67)	0 (0.00)
Pap tests are too time-consuming					

Overall	2 (6.7)	23 (76.7)	4 (13.3)	1 (3.3)	0 (0.00)
South Asian	1 (6.67)	10 (66.67)	3 (20.00)	1 (6.67)	0 (0.00)
Black	1 (6.67)	13 (86.67)	1 (6.67)	0 (0.00)	0 (0.00)
It takes too long to receive the results of a Pap test					
Overall	0 (0.00)	13 (43.3)	12 (40)	5 (16.7)	0 (0.00)
SA	0 (0.00)	7 (46.67)	6 (40.00)	2 (13.33)	0 (0.00)
SSA	0 (0.00)	6 (40.00)	6 (40.00)	3 (20.00)	0 (0.00)
You should consult with partner before receiving a Pap test					
Overall	4 (13.3)	14 (46.7)	0 (0.00)	9 (30)	3 (10)
SA	2 (13.33)	6 (40.00)	0 (0.00)	5 (33.33)	2 (13.33)
SSA	2 (13.33)	8 (53.33)	0 (0.00)	4 (26.67)	1 (6.67)
You partner would have a problem with you receiving a Pap test					
Overall	9 (30)	17 (56.7)	1 (3.3)	3 (10)	0 (0.00)
SA	5 (33.33)	7 (46.67)	1 (6.67)	2 (13.33)	0 (0.00)
SSA	4 (26.67)	10 (66.67)	0 (0.00)	1 (6.67)	0 (0.00)
Pap tests are too physically invasive					
Overall	0 (0.00)	19 (63.3)	2 (6.7)	8(26.7)	1 (3.3)
South Asian	0 (0.00)	10 (66.67)	2 (13.33)	3 (20.00)	0 (0.00)
Black	0 (0.00)	9 (60.00)	0 (0.00)	5 (33.33)	1 (6.67)
Pap tests are too emotionally intimate					
Overall	2 (6.7)	13 (43.3)	3 (10)	10 (33.3)	2 (6.7)
SA	1 (6.67)	8 (53.33)	2 (13.33)	4 (26.67)	0 (0.00)
SSA	1 (6.67)	5 (33.33)	1 (6.67)	6 (40.00)	2 (13.33)
You do not feel comfortable receiving a Pap test from a male clinician					
Overall	0 (0.00)	0 (0.00)	3 (10)	10 (33.3)	14 (46.7)
SA	0 (0.00)	0 (0.00)	1 (6.67)	6 (40.00)	8 (53.33)
SSA	0 (0.00)	3 (20.00)	2 (13.33)	4 (26.67)	6 (40.00)
Pap tests are related to sexual promiscuity					
Overall	4 (13.3)	15(50)	4 (13.3)	6 (20)	1 (3.3)
SA	0 (0.00)	8 (53.3)	3 (20.00)	4 (26.7)	0 (0.00)
SSA	4 (26.67)	7 (46.67)	1 (6.67)	2 (13.33)	1 (6.67)
You do not know where you can receive a Pap test					
Overall	4 (13.3)	21 (70)	2 (6.7)	3 (10)	0 (0.00)
SA	2 (13.33)	11 (73.33)	1 (6.67)	1 (6.67)	0 (0.00)
SSA	2 (13.33)	10 (66.67)	1 (6.67)	2 (13.33)	0 (0.00)
You do not have sufficient information to decide if you should receive a Pap test					
Overall	3 (10)	17 (56.7)	1 (3.3)	9 (30)	0 (0.00)
SA	0 (0.00)	12 (80.00)	1 (6.67)	2 (13.33)	0 (0.00)
SSA	3 (20.00)	5 (33.33)	0 (0.00)	7 (46.67)	0 (0.00)

Table 6: Descriptive Statistics of Participant Attitudes Towards Pap-Test Stigma Surrounding STIs

	Pap tests are painful	Pap tests are safe	Papa test can cause short-term discomfort	Pap tests can cause lasting health problems	Pap tests can increase likelihood of cervical cancer	Pap tests are too time-consuming	It takes too long to receive the results of a Pap test	You should consult with partner before receiving a Pap test	Your partner would have a problem with you receiving a Pap test	Pap tests are too physically invasive	Pap tests are too emotionally intimate	You do not feel comfortable receiving a Pap test from a male clinician	Pap tests are related to sexual promiscuity	You do not know where you can receive a Pap test	You do not have sufficient information to decide if you should receive a Pap test
N	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Mean	2.93	4.13	3.83	2.13	2.03	2.13	2.73	2.77	1.93	2.7	2.9	4.17	2.5	2.13	2.53
Median	3	4	4	2	2	2	3	2	2	2	2.5	4	2	2	2
Mode	4	4	4	2	2	2	2	2	2	2	2	5	2	2	2
Std. Deviation	1.05	0.63	0.87	0.78	0.61	0.57	0.74	1.3	0.87	0.99	1.16	0.99	1.07	0.78	1.04
Minimum	1	2	2	1	1	1	2	1	1	2	1	2	1	1	1
Maximum	4	5	5	4	4	4	4	5	4	5	5	5	5	4	4

Table 7: Stigma surrounding Sexually Transmitted Infections (STIs)

	Mean Score (SD)	Minimum, Maximum Score
Overall	29.93 (5.82)	18, 40
SA	30.93 (5.27)	22, 38
SSA	28.93 (6.34)	18, 40

Table 8: Stigma surrounding Sexually Transmitted Infections (STIs)

	Strongly Disagree N (%)	Disagree N (%)	Neutral N (%)	Agree N (%)	Strongly Agree N (%)
If someone you know had a STI, would you avoid that person?					
Overall	7(23.3)	13 (43.3)	1(3.3)	7(23.3)	2 (6.7)
SA	5 (33.33)	4 (26.67)	1 (6.67)	3 (20.00)	2 (13.33)
SSA	2 (13.33)	9 (60.00)	0 (0.00)	4 (26.67)	0 (0.00)
If someone had a STI, would you think he/she is unclean?					
Overall	5 (16.7)	15 (50)	4 (13.3)	5 (16.7)	1(3.3)
SA	4 (26.67)	6 (40.00)	3 (20.00)	1 (6.67)	1 (6.67)
SSA	1 (6.67)	9 (60.00)	1 (6.67)	4 (26.67)	0 (0.00)
If you had a STI, would other people think badly of you?					
Overall	0 (0.00)	4 (13.3)	3 (10)	17 (56.7)	6 (20)
SA	0 (0.00)	1 (6.67)	3 (20.00)	6 (40.00)	5 (33.33)
SSA	0 (0.00)	3 (20.00)	0 (0.00)	11 (73.33)	1 (6.67)
If you had a STI, would other people not want to be friends with you?					
Overall	1 (3.3)	5 (16.7)	5 (16.7)	16 (53.3)	3 (10)
SA	0 (0.00)	1 (6.67)	4 (26.67)	7 (46.67)	3 (20.00)
SSA	1 (6.67)	4 (26.67)	1 (6.67)	9 (60.00)	0 (0.00)
If you had a STI, would other people be disgusted by you?					
Overall	0 (0.00)	7 (23.3)	2 (6.7)	20 (66.7)	1 (3.3)
SA	0 (0.00)	2 (13.33)	2 (13.33)	10 (66.67)	1 (6.67)
SSA	0 (0.00)	5 (33.33)	0 (0.00)	10 (66.67)	0 (0.00)
If you had a STI, would other people be uncomfortable around you?					
Overall	1 (3.3)	4 (13.3)	2 (6.7)	22 (73.3)	1 (3.3)
SA	0 (0.00)	1 (6.67)	2 (13.33)	11 (73.33)	1 (6.67)
SSA	1 (6.67)	3 (20.00)	0 (0.00)	11 (73.33)	0 (0.00)
If you had an STI, would you feel ashamed?					
Overall	2 (6.7)	10 (33.3)	2 (6.7)	14 (46.7)	2 (6.7)
SA	1 (6.67)	6 (40.00)	2 (13.33)	5 (33.33)	1 (6.67)
SSA	1 (6.67)	4 (26.67)	0 (0.00)	9 (60.00)	1 (6.67)
Getting examined for a STI makes people think you have poor morals					
Overall	2 (6.7)	10 (33.3)	2 (6.7)	15 (50)	1(3.3)
SA	1 (6.67)	3 (20.00)	1 (6.67)	9 (60.00)	1 (6.67)
SSA	1 (6.67)	7 (46.67)	1 (6.67)	6 (40.00)	0 (0.00)
Getting a STI means a person is dirty					
Overall	7 (23.3)	15 (50)	3 (10)	5 (16.7)	0 (0.00)
SA	3 (20.00)	8 (53.33)	2 (13.33)	2 (13.33)	0 (0.00)
SSA	4 (26.67)	7 (46.67)	1 (6.67)	3 (20.00)	0 (0.00)
Do you think having a STI is a sign of weak character?					
Overall	8 (26.7)	13 (43.3)	4 (13.3)	5 (16.7)	0 (0.00)
SA	4 (26.67)	5 (33.33)	3 (20.00)	3 (20.00)	0 (0.00)
SSA	4 (26.67)	8 (53.33)	1 (6.67)	2 (13.33)	0 (0.00)

Table 9: Descriptive Statistics of Participant Attitudes Towards Pap-Test

	If someone you know had a STI, would you avoid that person?	If someone had a STI, would you think he/she is unclean?	If you had a STI, other people would think badly of you?	If you had a STI, would other people not want to be friends with you?	If you had a STI, would other people be disgusted by you?	If you had a STI, would other people be uncomfortable around you?	If you had a STI, would you feel ashamed?	Getting examined for a STI makes people think you have poor morals?	Getting a STI means a person is dirty?	Do you think having a STI is a sign of weak character?
N	30	30	30	30	30	30	30	30	30	30
Mean	2.47	2.4	3.83	3.5	3.5	3.6	3.13	3.1	2.2	2.2
Median	2	2	4	4	4	4	4	4	2	2
Mode	2	2	4	4	4	4	4	4	2	2
Std. Deviation	1.279	1.07	0.913	1.009	0.9	0.894	1.167	1.125	0.997	1.031
Minimum	1	1	2	1	2	1	1	1	1	1
Maximum	5	5	5	5	5	5	5	5	4	4

Table 10: Perspectives on HPV Self-Sampling

Which method of HPV screening would you prefer?)	South Asian Participants (N=15)	SSA Participants (N=15)	Total (N=30)	P value (Chi-square)
HPV self-sampling	7 (46.7%)	5 (33.3%)	12 (40%)	0.394
Clinician-collected sample	7 (46.7%)	10 (66.7%)	17(56.7%)	
Neither	1 (6.7)	0 (0.0)	1 (3.3%)	

II) Focus Groups

A total of four focus groups (n=28 total participants) were conducted via Zoom video conferencing. two participants were unable to attend due to other competing priorities.

Two focus groups consisted of self-identifying SA women (n=14), and two focus groups consisted of self-identifying SSA women (n=14). Across the focus groups, several themes surfaced, including perceptions of cancer and CC, beliefs about CC risk factors and screening, barriers to screening, perceived advantages and disadvantages to HPV –SS and clinic-based HPV testing, and strategies to overcome barriers to HPV screening.

Perceptions of Cancer and CC:

Both SA and SSA women expressed limited knowledge and awareness, fear and stigmatization surrounding CC in their communities. The following statements reflect SSA and SA participants’ limited knowledge and awareness about CC and screening:

"Of course, when we hear the word "cancer", in our opinion, in the past it was something really big and we didn't really know what cancer was. We did not really know about cancer until recent years...a big thing for example, in our countries in Africa, in our countries here, they are not vigilant in putting in efforts to conduct frequent testings [tests]; every 6 months for example, or every year" (SSA2-P8).

“Regarding cervical cancer, I've not heard much I think. Maybe in terms of, yes, you can go and you can Google anything, but it's not there in general like when you're sitting in a subway, you will have a poster on cancer. You'll have a poster on smoking, but we've not seen something like that” (SA2-P9).

We don't talk about these things within the family, right? So the awareness is not there, even if you are willing to know you don't have the courage, or I mean whatever it takes to ask someone

you don't have. That's why. So you don't get the information (SA1-P1).

Cancer was described as a challenging journey, involving high treatment costs, changes in life patterns, stress on family members and caretakers, and fear of recurrence. One SSA participant described it as follows: *“a long journey ahead... a total upheaval of life” (SSA1-P1)*. SA participants described cancer as scary and taboo, often leading to mortality: *“Cancer is something still a taboo like people get very scared including me and it's just like its first thought is this end of the life. No matter what we doctors are trying to treat you, but eventually you have to die.” (SA1-P1)*.

Despite the fear described in both populations, several participants described their beliefs in modern medicine advancements, and the possibility to detect and cure cancer in general. However, SA participants were unsure of CC when describing their beliefs: *“I've had friends who've had cancer and who have kind of really come out of it so, but regarding cervical cancer, I've not heard much I think.” (SA2-P3)*.

Beliefs about Risk Factors for CC:

Several risk factors for CC were discussed. SSA participants identified “carelessness” as a contributing factor to the development of CC: *“What I know about cancer generally... comes from the result of carelessness” (SSA2-P8); I know with cervical cancer they say that sometimes, there are a lot of things that cause it. Carelessness is the main thing that causes it.” (SSA2-P3)*.

Some perceived that women in Africa do not take care of their health, and this can lead to the development of cancer: *“In Africa, generally, the women do not care about their health, they don't care at all. Here, once someone is 18 years of age, a woman goes and gets tests done for her entire body and does check-ups but in countries in Africa, they are not taken care of. The women generally, do not take care of their physical bodily health nor their mental health.” (SSA2-P2)*.

Both SA and SSA women described promiscuity and unsanitary environments as potential risk factors for contracting HPV: *“I think that it comes from having multiple sexual relationships or unsanitary environments. For example, when someone is not in a clean environment. I think*

these two would be the reasons.” (SA1-P13). “Talking about how many partners you've been with or what your condition or marital status is ... really deters us from even going forward and going through with that test or getting information on it. It's a private thing and it's always kept private and in our like South Asian cultures. (SA2-P11).

Some women also believed that there were no apparent risk factors for CC: *“It's just like COVID like you just get it. Yeah, you you just get.” (SA2-P5)*

All groups recognized that CC is often detected and diagnosed late. The absence of regular screenings was identified as the main contributing factor. A participant from the Sub-Saharan African group stated:

“And I know that probably the late detection was due to probably not doing annual Pap smears and so forth. But the symptoms did not show until it was too late for them. So that's my experience with it. It's very [important] for me as I said the symptoms took so long to show to raise any concerns. So to me, it's a very [important] what I term a sneaky time type of cancer, yes.” (SSA1-P1).

Misdiagnosis or confusion with other conditions like fibroids, endometriosis, infections (e.g. genital warts) or menstrual issues was also described as risk factors for late detection. Some participants discussed how symptoms associated with CC, such as bleeding, spotting between periods, and lower abdominal pain, were more closely associated with other health conditions like fibroids or endometriosis:

“Because normally for us, when we think of Bleeding, spotting in between periods, lower abdominal pain. As I said earlier, we're just thinking about fibroids or endometriosis or something like that. The last thing at the back of our minds about cervical cancer” (SSA1-P1)

They noted that these symptoms led individuals to seek care for fertility issues rather than considering them as potential signs of CC.

Beliefs about CC Screening:

There were many beliefs that participants had about CC screening, including the similarity between different types of screening, and misconceptions about symptoms. Some participants believed that HPV and Pap tests were the same or very similar. When speaking about CC screening, many participants stated that doctors and awareness campaigns highlight the importance of getting Pap tests and not HPV. The lack of general awareness regarding screening tests for CC was voiced by both SA and SSA participants. The following statements illustrate cultural taboos surrounding screening and participants' limited awareness of the importance of CC screening:

“In Africa, we have the screening but I would be so shy.

Even if the doctor is a female, we feel shy there. Because we have been accustomed to the teaching of not exposing ourselves except to our husbands. So it's these ways of teaching and being raised where we feel shy and scared as well. (SSA2- 11)

"For us, we usually just think about the Pap smear...that is what is put to us in our television ads. What we see when we visit our doctor's offices. And so that is what is...I think I probably only ever seen in my lifetime just one advertisement or a poster in one doctor's office, something about doing HPV test, but everywhere else everything that is thrown at us is about doing our Pap smear." (SSA1-P1)

"Every time you hear about women's healthcare, you would hear about the Pap smear test and that's about it. And honestly, I'm not too much informed about all that. So it's like. Even in my understanding, I thought that was all the same like the same thing." (SSA1-P3)

Some SA participants also expressed a lack of general awareness regarding screening tests for CC.

Barriers to CC screening:

Time:

Several participants described time as the main barrier to getting screened for CC. They expressed challenges in finding accessible screening locations, and long wait times to see the doctor. *"Also, here in Canada, when you come to take an appointment with the doctor they take months. These things need to change because when you take months, even if it's for simple things, it can get worst." (SSA2-P11)*. Some SA participants were willing to pay for screening in order to receive the test faster. They highlighted that lack of choices for private care in Canada causes long wait times to receive required health services. They expressed a desire to get privately screened: *"So I think one of the biggest challenges is like we cannot get private tests done right...Say my doctor even without the doctor. If I see that OK, I'm just fifty. I'm prone to this. I don't mind spending the money because it's for my own good, [but] I have nowhere to go. And I cannot at the channel has to be through a family doctor, which is a barrier, right? So not having the choice." (SA2-P3)*

Female Healthcare Provider Availability:

Several participants described a preference for female doctors when undergoing CC screening. This was described as a major barrier to being screened as participants would specifically look for female providers, often extending the amount of effort and time needed to find and book a screening appointment. The comparative availability of female doctors to male doctors was noted by one participant: *"Unfortunately we all know that the ratio of female doctors to male doctors is very less so that itself becomes a barrier, and then some doctors. I have experienced that they [male doctors] take*

the effort of having a female nurse or a female colleague there, just to make you more comfortable, but not everybody. (SA1-P10). The preference for a female doctor was also described as culturally motivated due to the importance of privacy and religion: *"For cervical cancer screening, in our minds, as Muslim women, for us, it's a bit private because it is a sensitive area. So, a person would be scared and she would be more alert about going and making sure to do the screening at a female doctor and things like this. It's not about anything else, it's not about fear or anything like this, we are just more protective about making sure we do it at a female doctor than it is about fear. It's not about fear at all, we just take care of the things that have to do with our religion, but besides that, there are no problems." (SSA2-P9)* Generally, participants described that a female doctor performing screening would be more comfortable: *"Finding a female doctor feels more comfortable, I would say, yeah. I just feel more comfortable. The female doctor. So then finding those in the area. Sometimes are hard. But otherwise, once you find them it's great. Like otherwise it's fine." (SA2-P2)*.

Some participants also noted the lack of attention from primary care providers regarding CC screening with female providers being slightly better than male providers. One participant noted that when they came to their doctor with concerns, they were brushed off: *"...doctors don't help, they never answered." (SA2-P1)*

Sociocultural Gender-based Restrictions:

Sociocultural factors played a significant role in women's perceptions of health and access to care. SSA participants perceived women's health as neglected in African countries, with limited emphasis on physical and mental well-being. One participant expressed, *"In Africa, generally, the women do not care about their health, they don't care at all.."* (SSA2-P3) Another participant noted the sociocultural norms related to privacy: *"In Africa, we have the screening, but I would be so shy. Even if the doctor is a female, we feel shy there." (SSA2-P11)*

Some participants reported challenges in accessing screening due to restrictions imposed by their husbands or family members, who sometimes disapproved of or hindered their participation in CC screening. This was described as a major challenge for new immigrants to Canada in the SA population. One participant noted that, *"there's a lot of challenges that their husbands are not allowing them to do that. This is something bad. They are shying, and they take a lot of time at least one or 2 years to come out of the culture shock to come, to get to a little bit normal with the new environment, with the new method of the doctors... So these are some issues with the families that especially husbands, are very restricted with these things." (SA1-P7)*

Fear and Discomfort Around CC Screening:

Several SA and SSA participants expressed fear and

discomfort associated with CC screening: *"In my opinion, I feel like a Pap Smear is a very invasive procedure, so a lot of women in the. The community would probably feel uncomfortable or [have] thoughts of it being painful. So I think that kind of deters women from going to seek that type of screening. Out of fear that it'll cause them pain."* (SSA1-P6) Participants also mentioned fear of receiving a positive diagnosis or hearing bad news: *"Number one for me is the fear, that is the thing. That is the reason I haven't gotten it done. Still. I am like totally petrified of thinking about what they're going to insert there, and how it's going to feel. And what would I do? I would be like starting to cry, and they'll I don't know what... Number one thing is fear and the uncomfortable feeling that you're going to get. How do you overcome that?"* (SA1-P9)

Impacts of COVID-19:

Participants identified several impacts of COVID-19 on CC screening. They described long wait times for appointments and difficulties accessing healthcare services due to the shift to phone consultations and limited in-person visits: *"Probably the longer wait for appointment times... Those have been affected."* A few participants mentioned the challenges of getting a hold of the family doctor through phone appointments, stating, *"Maybe, the one thing would be that the doctors should tell us. Even getting a hold of the family doctor through the phone would be so hard except by appointment. Which is why, this would cause a person during the covid period to not get tested. Last year, I went and spoke to the doctor and they told me that the next time I come they will do the test for me since I could not do it last year due to circumstances."* (SSA2-P8), and *"Even getting a hold of the family doctor through the phone would be so hard except by appointment."* (SA2-P13).

Similarly, participants experienced challenges accessing screening during the pandemic as a result of virtual care: *"For me, the last time I did the screening was before COVID-19... because of the situation with COVID-19 and not being able to see the doctor except through the phone, I did not go and do it... And yeah, and I think that's the case with most of the doctors. So yeah, it kept delaying, and I didn't get to go like it's been a while."* (SA1-P5). Some participants were uncomfortable visiting healthcare providers in general due to the COVID-19 pandemic. They described discomfort with crowded waiting rooms and questioned the importance of screening versus the risk of contracting a virus: *"And also after COVID, the whole dynamics have changed... If I don't have an issue, do I really want to put myself there?"* (SA2-P6).

Perceived Advantages and Disadvantages of HPV-SS

Participants discussed the advantages of screening by a professional over HPV-SS. Most participants in all focus groups preferred screening by a healthcare professional, citing credibility, timing, safety, trustworthiness, and accuracy.

Many participants expressed a preference for CC screening by doctors due to the assurance and credibility associated with testing being conducted by a professional: *"I feel like with the HPV test then, like by a doctor, it would assure you that it would be done right, and you would be sure that your results would be back in a more timely manner."* (SSA1-P3). They described that doctors are more precise and trustworthy: *"When the screening happens at the doctor's office, it's better... The specialists are more precise."* (SSA2-P13), and *"I think it is more safe and more authentic."* (SA1-P3). Participants who preferred screening by a doctor expressed concerns about self-sampling safety and cleanliness. They believed that testing conducted by doctors would ensure safety and reduce the risk of mistakes: *"Yeah, I think if the doctor conducts it, then it's safer, and less mistakes would be there."* (SA1-P9), and *"At the doctors, they have specific ways and they know what they are doing in a way where it is safe and clean."* (SSA2-P8). Participants also believed that testing with their doctor would be more accurate: *"I can be like, you know, she knows what she's doing or he knows what he's doing, and the results are probably accurate."* (SA2-P5).

Some participants expressed concerns about the time-consuming nature of making appointments for screening: *"With the doctors, it's difficult to make an appointment; that could be one of the cons, time-consuming."* (SSA1-P2). One SA participant mentioned the inability to self-detect CC and highlighted the need for medical professionals to conduct screening tests. They stated, *"This is a place where you have to get it tested by a medical professional"* (SA2-P5).

There were several concerns expressed by participants for HPV-SS. A common concern was the potential for sample contamination or loss. Participants described, *"If it's like a mail issue... you have to worry about mailing it and God forbid, it gets lost in the mail."* (SSA1-P3) and *"The sample could get contaminated... it might drop on the floor, and then you just lost your sample."* (SSA1-P2).

In contrast, some participants identified several benefits of HPV-SS. One advantage was the time-efficiency of performing the test at home, and the potential to lessen the burden of appointment wait times: *"If you're doing it on your own by yourself, it's quick."* (SSA1-P2), and *"If there is the at-home option... this is a mission for me. Sometimes when a person gets lazy or has a busy schedule with other things to do; like kids or at home, it makes things easier."* (SSA2-P13). Participants also described the convenience of not having to explain the need for testing to healthcare professionals. There were also financial advantages suggested: *"It's also financially wise since you don't have to... go in your car or on a bus. And it's easily accessible."* (SSA2-P13). Additionally, participants described the convenience and control of self-sampling, stating, *"It's more convenient for us... we don't need to complain for our doctor's office and doctors."* (SA2-P1). Despite concerns about contamination, participants also

highlighted the importance of embracing change and the potential to learn from any mistakes made during a potential rollout of HPV-SS: "...I have full control, the second is it saves time, keeps it confidential and if instructions are there like hey guys like before COVID, we didn't do so much online shopping...if we can do COVID test on our own with instruction. I don't think this would be that difficult, so I would. Be more in". (SA2-P3). The need for training and proper instructions to conduct the HPV-SS was highlighted.

Overcoming Barriers to CC Screening and Self-sampling Acceptability

Several strategies were identified to overcome barriers to CC screening and HPV-SS:

Lack of Awareness

Many participants acknowledged an overall lack of awareness in their communities surrounding CC screening in general and HPV-SS. They emphasized the need for raising awareness about HPV-SS and its relation to CC: "I think just raising awareness about the HPV sampling. I feel like a lot of people are not aware of. The sampling and UM how it relates to cervical cancer. And I guess the video that you sent me in my e-mail was a really good illustration of how it can be done. And I feel like just having that visual would be really helpful in learning how to self-sample." (SSA1-P6).

Participants also expressed the importance of healthcare providers and the government, in raising awareness about CC screening. Various methods were suggested to raise awareness, such as visual marketing campaigns, and advertising in community centers, non-profit settlement agencies, schools, libraries, and television shows.

Family-centred approaches

Participants recommended initiating conversations about CC and screening within families and friend circles to share knowledge and raise awareness: "You can start from your family, from your friends when you have that together... more that way, you can share the knowledge" (SA1-P3); "From your family friend circle, you can start" (SA1-P3).

Community-based Approaches

Targeted community-based approaches were recommended to disseminate information and provide educational materials on CC screening and HPV-SS. Community-based workshops in places of worship, schools, and community centres were suggested. Additionally, participants highlighted the importance of healthcare providers in raising awareness and recommended workshops and training sessions conducted by healthcare professionals.

Specific approaches such as camps, "Having frequent camps... just the idea that there are going to be more women like me... I don't feel isolated" (SA1-P10), booths, "More

like sign booths... wherever there is a public event... going to big crowd or places... we can start from that" (SA2-P6), and workshops, "There should be workshops in order to raise awareness... if there are these awarenesses such as workshops, it would be good" (SSA2-P11), were suggested.

Reminder Systems

A common barrier discussed was the lack of prompts for screening. Participants expressed the importance of consistent reminder systems implemented by healthcare providers to prompt women for screenings. They suggested reminders through phone calls, texts, emails, and utilizing existing systems in doctors' offices: "When someone comes to the doctor's office, the doctors should tell them that they need to come for screenings... they should call and remind the patients" (SSA2-P9); "Even improving the overall system... reminders... phone reminder for especially older women" (SA2-P6).

Discussion

Our study revealed several key findings regarding personal perceptions and preferences, sociocultural beliefs, and systemic barriers related to CC screening and HPV-SS among under or never screened SA and SSA women. Overall, participants' perceptions, attitudes, and knowledge towards cancer and CC revealed a complex interplay of fear, stigma and limited awareness. The study results confirmed inadequate knowledge and negative attitudes about CC and screening despite participants' high level of education. Most participants were unaware of the risk factors, signs, and symptoms of CC. They also did not know about screening guidelines for CC. Fear of having the procedure which they believed was invasive and receiving a positive test result was identified as a major deterrent to uptake of CC screening. Our findings corroborate earlier studies exploring the barriers about underutilization of cervical screening among marginalized women (5-9, 15-16, 18-19). Interestingly, many participants confused the signs and symptoms of CC with other conditions like fibroids, endometritis, other infections, and menstrual issues. The limited knowledge about signs and symptoms were similar across both groups. These findings highlight the need for targeted community-based sexual health education that are culturally and literacy appropriate to promote awareness about CC and screening.

Many participants reported that they will be stigmatized if they had STIs. Considering the patriarchal system that is prevalent in South Asia and Sub Saharan countries women are often perceived as tainted, being immoral and having loose character when diagnosed with a STIs like HPV as these infections are societally linked to sexual misbehaviour and promiscuity [33-36]. It is interesting to note that although the majority of participants "agreed" or "strongly agreed" with stigmatizing attitudes that they face if they have ever been

diagnosed with a STI, they were accepting of others with STIs. It indicates that women across both groups appear to be at risk of self-stigmatization which may deter their uptake of CC screening for the fear of being labelled as having an STI.

Our study highlighted the role that family members, particularly male partners, play in hindering access to screening. Growing up in gender-biased social environments where men's privileges under shadows women's rights related to sexual and reproductive health family centered sexual health education is imperative as recommended by The World Health Organization [37]. The involvement of male partners and family members has been recommended as an important strategy in promoting women's sexual and reproductive health outcomes and access to health services [38-41]. Family centered sexual health education will be a useful strategy in promoting CC screening for SA and SSA immigrant women.

Multiple systemic barriers to screening were identified, including time constraints, limited access to female healthcare providers, family beliefs and restrictions, and fear and discomfort associated with the screening process. The influence of the COVID-19 pandemic were also recognized as significant factors affecting screening behaviours. Many stated that due to the pause of non-emergent services during COVID 19 accessing cervical screening was difficult as they were not able to meet their primary care providers in person.

Considering that currently there is no national policy that includes HPV screening as part of routine CC screening, participants were unaware of this new method of screening. However, if HPV screening is part of routine CC, it would require public health communication efforts to promote its use. SA and SSA women in this study expressed a preference for screening conducted by healthcare professionals, as they perceived them to be credible, knowledgeable, competent, and trustworthy. They believed that testing conducted by doctors would ensure safety and reduce the risk of mistakes. The primary concern about HPV-SS was the required competency in conducting the test and the potential for sample contamination during the collection of the sample. However, participants also identified several benefits of HPV-SS One advantage was the time efficiency of performing the test at home, and the potential to lessen the burden of appointment wait times. Some argued that with proper training and appropriate instructions as to how to conduct the HPV-SS this option would be a viable choice.

Several strategies were identified to overcome barriers to CC screening and HPV-SS. These included raising community awareness about HPV-SS and its relation to CC, using a family-centred approach to raise sexual health knowledge of the family including male partners and family members, and finally targeting community-based approaches (e.g. community-based workshops in places of worship,

schools, and community centres) to disseminate information and provide sexual health education on CC screening and HPV-SS. The importance of consistent reminder systems implemented by healthcare providers was emphasized.

Despite the study's contribution to the body of literature in this area there are a few limitations that should be considered when reviewing the results. First, the small sample size, lack of probability sampling may prevent the results from being generalizable to the total population of SA and SSA immigrant women. Although not ideal, the use of nonprobability sampling was necessary because no sampling frame is available for our selected population. Second, our study's online design may have limited access for most marginalized women who did not access to computer or internet.

Despite these limitations, our mixed-method study emphasizes the urgent need for targeted, family-centred, and culturally safe CC screening awareness campaigns and screening approaches for SA and SSA immigrant women.

Conclusion

Our findings contribute to the growing literature on CC screening barriers among marginalized women and have implications for the continual improvements in cancer prevention efforts. With proper training of women, HPV-SS may be a viable screening approach not only to remove longstanding structural barriers to screening but also to facilitate access to screening during pandemics and other crises.

Competing interests

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Authors' Contributions

MV took primary responsibility for the design of the study, analysis of survey, interpretation of data, drafting and revising the article. NK led the analysis of qualitative data from focus groups and drafted the results. JW and AL provided input and direction for the study design, analysis, and interpretation. All authors reviewed, revised the article critically for important intellectual content, and endorsed the final submission.

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