



Barriers to the uptake of cervical cancer services and attitudes towards adopting new interventions in Peru

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ABSTRACT

Cervical cancer mortality is high among Peruvian women of reproductive age. Understanding barriers and facilitators of cervical cancer screening and treatment could facilitate development of contextually-relevant interventions to reduce cervical cancer incidence and mortality. From April to October 2019, we conducted a cross-sectional survey with 22 medical personnel and administrative staff from *Liga Contra el Cancer*, in Lima, Peru. The survey included structured and open-ended questions about participants' roles in cervical cancer prevention and treatment, perceptions of women's barriers and facilitators for getting screened and/or treated for cervical cancer, as well as attitudes towards adopting new cervical cancer interventions. For structured questions, the frequency of responses for each question was calculated. For responses to open-ended questions, content analysis was used to summarize common themes. Our data suggest that the relative importance and nature of barriers that Peruvian women face are different for cervical cancer screening compared to treatment. In particular, participants mentioned financial concerns as the primary barrier to treatment and a lack of knowledge or awareness of human papillomavirus and/or cervical cancer as the primary barrier to screening uptake among women. Participants reported high willingness to adopt new interventions or strategies related to cervical cancer. Building greater awareness about benefits of cervical cancer screening among women, and reducing financial and geographic barriers to treatment may help improve screening rates, decrease late-stage diagnosis and reduce mortality in women who have a pre-cancer diagnosis, respectively. Further studies are needed to generalize study findings to settings other than Lima, Peru.

1. Introduction

In Peru, the highest cancer-related mortality in women of reproductive age is due to cervical cancer (Bruni et al., 2019). In addition, the age-standardized incidence of cervical cancer is 23.3 per 100,000 women, which is higher than the global incidence of 13.1 per 100,000 women (Bruni et al., 2019). Current global guidelines for cervical cancer prevention recommend early identification and treatment of

precancerous lesions (World Health Organization, 2013). In Peru, reduction of cervical cancer incidence is an ongoing national priority for the Peruvian Ministry of Health (MINSA) (Paz-Soldán et al., 2012). In 2012, the National Comprehensive Cancer Care Plan (Plan Esperanza) was launched to strengthen promotion, prevention, and early treatment through the decentralization of cancer services (Vidaurre et al., 2017). Current national screening guidelines, targeted at women between 30 and 49 years, include conventional cytology, visual inspection with

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acetic acid (VIA), or the Human Papillomavirus (HPV) DNA test. Ablation, defined as the destruction of cervical cells using cold or heat sources, is the recommended treatment method for precancerous lesions. Despite these screening recommendations and treatment protocols, the estimated cervical screening coverage among Peruvian women is 53.9%, and treatment rates may be even lower (Bruni et al., 2019; Paz-Soldán et al., 2012; Luque et al., 2016). Understanding barriers that women face in getting screened and treated is critical for designing strategies to reduce the burden of cervical cancer in Peru.

There are well-documented geographic and socioeconomic variations in the uptake of cervical cancer services in Peru (Luque et al., 2016). For instance, poor availability and accessibility of cervical cancer services is well documented for rural populations in the Amazonian and Andean regions (Nevin et al., 2019). Even in Lima, which is traditionally considered a setting with high access, lower screening uptake and higher cervical cancer incidence are reported in low income neighborhoods (Nevin et al., 2019; Aguilar et al., 2016). Most current literature on barriers to uptake of cervical cancer services focuses on disparities in central (Andean/Amazonian) vs coastal (Lima) Peru, whereas few studies have evaluated the barriers to service utilization within low-income neighborhoods in Lima. There is also a paucity of literature on any variations in the barriers that women face at different points in the cervical cancer cascade, for instance, in getting screened versus getting treated.

In recent years, strategies that leverage digital technologies, especially mobile phones, are used to bridge gaps in the utilization and delivery of health services and information. Examples of mobile phone-based strategies for cervical cancer include the use of mobile phone cameras to aid in the visualization of the cervix, using smartphone apps and remote mentorship for health worker training and task shifting, and text messages to encourage patient education and behavior change (Momany et al., 2017; Asgary et al., 2019; Erwin et al., 2019). In project HOPE in Peru, for instance, text messages were used to notify women of the results of their HPV DNA test (Garcia, 2019). The WHO recently released guidelines on the use of digital health technologies for health system strengthening, with recommendations to use these technologies for promoting accessibility to health services, providers, and information (World Health Organization, 2019). No data exists, to our knowledge, on the willingness of health providers to use new interventions, including digital health, in cervical cancer prevention.

In an ongoing study in Peru, we aim to develop and evaluate a digital health intervention to promote cervical cancer screening in community-based settings. In the formative phase of this study, we used a cross-sectional survey to examine perceptions of medical personnel and administrative staff from a private health system in Lima on barriers and facilitators that impact uptake of cervical cancer services by women. In addition, the survey assessed participants' attitudes towards adopting new cervical cancer interventions. This manuscript presents the findings of the survey in an effort to guide current and future efforts to develop and implement interventions to reduce barriers for women and increase uptake of cervical cancer services.

2. Methods

2.1. Objective

The objective of the cross-sectional survey was to describe the participants' perceptions of barriers and facilitators that impact uptake of cervical cancer screening and/or treatment services by women. In addition, the survey aimed to capture participants' attitudes towards adopting new cervical cancer interventions.

2.2. Study setting and duration

The survey was conducted from April – October 2019 in Lima, Peru. The survey was part of a larger effort to improve access to cervical

cancer screening technologies in community settings in Peru. The survey was conducted in collaboration with a private health system, *Liga Contra el Cancer – Peru* (League Against Cancer, henceforth referred to as La Liga), which offers community-based cancer screening, including for cervical cancer, in Lima. La Liga comprises five mobile community outreach screening units and three brick-and-mortar clinics where cancer-related screening, diagnosis and treatment services are offered. La Liga follows national guidelines for cervical cancer control with the exception of initiating screening services at 18 years of age. Hence, services offered at La Liga are largely consistent with other public health entities in Peru. Women with access to public insurance plans (e.g., EsSALUD – Seguro Integral de Salud) can receive free cervical cancer treatment at public health entities in Peru, while this is not the case at La Liga. Some women seeking care at La Liga differ from those attending public health entities with respect to socio-economic status (e.g., have access to private insurance).

2.3. Participants, eligibility, and recruitment

Survey participants were medical personnel and administrative staff working at La Liga. Administrative staff were included due to their interactions with patients during scheduling of appointments and responsibilities related to patient follow up. To be included in the survey, participants had to meet the following inclusion criteria:

- Work as medical personnel (e.g., Midwives, nurse technicians, expert colposcopists, social workers etc.) or administrative staff (e.g., administrators) at La Liga's cancer detection centers, administrative offices and/or the mobile community outreach units
- Be a La Liga employee for at least 6 months
- Be of age 18 years or older
- Agree to be audio recorded during study participation for open-ended components of the survey

Only those participants giving written informed consent were administered the survey.

2.4. Sample size justification

Using a purposive sampling approach, 23 participants who met eligibility criteria were identified and approached for participation. A sample size between 6 and 12 was recommended from a large qualitative methods study on reproductive health to achieve saturation of themes (Guest et al., 2006). Our sample size exceeds this estimate for achieving data saturation.

2.5. Compensation

Participants received S/10 (Peruvian Sol, approximately \$3 USD) as compensation for the time spent in responding to the survey.

2.6. Data collection and measures

Participants completed an interviewer-administered cross-sectional survey. The survey was administered in Spanish and took approximately 15–30 min to complete. The survey included closed- and open-ended questions organized into sections on participants' training, role in cervical cancer prevention and/or treatment at La Liga, and their perceptions on women's barriers and facilitators for getting cervical cancer screening and/or treatment. In each section, closed-ended questions were asked first, followed by the open-ended questions. Skip logic was built in throughout the survey so that participants were only asked questions that were relevant to the roles and responsibilities they indicated at the beginning of the survey.

Participants' attitudes towards adopting new cervical cancer interventions were measured using an adapted 15-item evidence-based

practice attitude scale (Aarons, 2004). The original scale refers to 'evidence-based practice', but for the purpose of this study, this term was modified to reference treatments/interventions/systems related to cervical cancer. We did not ask about a specific treatment or intervention. Rather, the questions assessed broad acceptability of any new treatments/interventions/systems for cervical cancer. We intended the term treatments/interventions/systems to cover not only cervical cancer screening and treatment procedures but also other behavioral or educational interventions such as appointment reminders, job aids, educational tools etc. The scale comprises four sub-scales that measure the likelihood that an evidence-based practice will be adopted given requirements to do so (e.g., if the evidence-based practice is required by a supervisor), the appeal of the evidence-based practice to individuals considering adoption, openness towards new evidence-based practices in general, and perceived divergence of the evidence-based practice from current practices (Aarons, 2004). Item response options are 0 (not at all), 1 (to a slight extent), 2 (to a moderate extent), 3 (to a great extent), and 4 (to a very great extent). A low divergence score indicates that participants view adoption and use of new interventions to improve cervical cancer screening and treatment as a current job responsibility. In contrast, a high divergence score would indicate resistance to new interventions since they would be viewed as different from current responsibilities.

Survey data were collected electronically on tablet devices using the QualtricsSM survey platform. Additionally, answers to open-ended questions were audio-recorded, transcribed, and then translated to English. All data collection activities were conducted in a private setting. Secure devices were used data storage and accessed only by authorized study personnel.

2.7. Data analysis

Survey responses were exported from the QualtricsSM survey platform into a Microsoft Excel data file (csv format) and then converted to a SAS file for analysis. SAS Version 9.4 (SAS Institute Inc., Cary, NC, USA) was used to tabulate participants' responses. Descriptive tables were created corresponding to survey categories: participant characteristics and roles and responsibilities, perceptions of women's motivators for getting screened and treated for cervical cancer, barriers to getting screened and treated, and factors that would increase chances of women getting screened and treated for cervical cancer. The frequency and percentage of responses for each question were reported. In addition, the Evidence-based Practice Attitude Scale (EBPAS) Likert-type responses were used to create the subscales of Requirements, Appeal, Openness, and Divergence by computing the mean of the subscale's items. To create a total score, all items from the Divergence subscale were reverse-scored and then the mean of all 15 items was computed.

Open-ended responses were translated and analyzed by two research assistants who were part of the study team but not involved in data collection. These research assistants were native Spanish speakers and had backgrounds in medicine and global health. The translated responses to the open-ended questions were imported into QSR NVivo for summative content analysis (Hsieh and Shannon, 2005; Duff et al., 2015). The research assistants read through all the responses and separately coded the transcripts to identify themes. The lead author reviewed the thematic memos and summarized the findings for the manuscript.

2.8. Ethics approval

The study was approved by the Institutional Review Boards at the Duke University Health System (Pro00102194) in the United States and the University of San Martin De Porres (092-2019) in Peru. All study participants provided written informed consent and were notified of the intention to publish study findings in the consent form.

3. Results

In total, 23 participants were approached for the survey. One participant declined due to lack of time. Twenty-two participants completed the survey. Table 1 describes the characteristics of the participants; they were predominantly female (n = 18) and a majority (n = 18) were between the ages of 31–50 years. Most participants were medical personnel (n = 15), while the remaining (n = 7) were administrative staff supporting the delivery of cervical cancer screening and treatment services. Participants had, on average, over a decade of experience working in healthcare, in women's health, and at La Liga.

Table 1
Characteristics of study participants (n = 22; Apr – Oct 2019).

Variable	Statistic	
Gender	N	
Male		4
Female		18
Age (years)	N	
18–30		2
31–40		7
≥41		13
Highest level of school completed ^a	N	
Finished technical school		7
Finished university		12
Post-graduate		3
Role at La Liga ^b	N	
Midwife		6
Nurse technician		5
Colposcopist (Gyn/Oncologist)		4
Social worker		2
Administrator/receptionist		1
Data manager		1
Other		3
Years working at La Liga	N	20
Mean (SD)		11.7 (8.2)
Min, Median, Max		0.8, 9, 35
Years of experience in health care	N	21
Mean (SD)		14.4 (7.7)
Min, Median, Max		3.5, 14, 35
Years of experience in women's health	N	21
Mean (SD)		12 (8.2)
Min, Median, Max		0, 11, 35
Time spent on cervical cancer-related activities	N	
Some of your time		2
A lot of your time		2
Most of your time		11
All of your time		7
Role and responsibilities at La Liga ^c	N	
Conducting screening procedures		9
Providing treatment and/or managing lesions		4
Counseling about options for screening, treatment		18
Building community awareness about cervical cancer		11
Maintaining supplies		5
Providing Administrative/Scheduling/Financial support		6
Other ^d		5

^a No participants selected the following response categories for schooling: None, Did not complete primary school, Finished primary school, Did not complete secondary school, Finished secondary school, Did not complete technical school, Did not complete university, Refused.

^b No participants selected the following response categories on their roles and responsibilities at La Liga: None, Clinical officer, Community Health Volunteer, Refused.

^c Participants could select more than one role hence the overall sum exceeds the total number of participants (n=22).

^d Other roles and responsibilities included statistics and patient care, physician and referral programming, programming and coordination with doctors, patient follow-up, and treatment of vaginal infections.

Table 2

Participants' (n = 22) perceptions of factors that motivate women to seek screening or treatment for cervical cancer in Lima, Peru (Apr – Oct 2019).

Factor	Screening	Treatment
	N	N
Concern about cancer	17	21
Concern about cancer in family/friends	17	9
Free or affordable services	14	6
Read or heard information about screening/treatment	11	7
Having had a good experience with screening/care in past	8	9
Building community awareness about cervical cancer	7	– ^a
Individual counseling by health provider	– ^a	9
Encouragement from family/friends	7	4
Encouragement from a health provider	3	8
Convenience	2	0
Have access to private versus government clinic	0	5
Other	11 ^b	4 ^c

No participants chose the following response categories: Do not know, and Refused.

^a Response option not included in survey.

^b Other reported reasons for why women choose to get screening include prestige of La Liga, accessibility of screening site (La Liga), presence of symptoms or vaginal infections, dissemination of information via social media, and presence of health problems.

^c Other reported reasons for why women choose treatment include prestige of La Liga, trust in health system, and fear of dying of cancer.

Most participants (n = 18) reported spending all or most of their work time on cervical cancer-related activities. Within La Liga, specific roles and responsibilities of the participants were: conducting screening procedures, providing treatment and/or managing lesions, counseling about screening or treatment, conducting outreach, maintaining supplies, and providing administrative, scheduling or financial support.

4. Findings from closed-ended questions

Responses to closed-ended survey items of perceived factors that motivate women to seek screening or treatment for cervical cancer are summarized in Table 2. With respect to screening motivations, concern about cancer (n = 17) and concern about cancer in family/friends (n = 17) were the most common reasons, followed by availability of free or affordable screening services (n = 14), and exposure to information about cervical cancer screening (n = 11). Concern about getting cancer (n = 21) was the top motivator for treatment, followed by concern about cancer in family/friends (n = 9), having had a good experience with

Table 3

Participants' (n = 22) perceptions of barriers that women face when trying to get screening or treatment for cervical cancer in Lima, Peru (Apr – Oct 2019).

Barrier	Screening N	Treatment N
Lack of knowledge of HPV and/or cervical cancer	20	7
Fear of immodesty or embarrassment	16	8
Fear of discomfort	15	9
Financial barriers	14	20
Work/childcare barriers	12	15
Not enough time	10	5
Partner not supportive	9	4
Do not think that screening/treatment is needed	7	3
Distrust of the medical system	5	3
Distance to screening/treatment site	4	6
Lack of transportation	2	1
Family not supportive	1	5
Lack of confidence/belief in their HPV result	1	1
Other	4 ^a	3 ^b

^a Other reported barriers to screening include machismo, fear of cancer, fear of stereotypes/stigma, and fear of positive result.

^b Other reported barriers to treatment include fear of being stigmatized, fear of cancer, and lack of gynecologists/oncologists.

Table 4

Participants' (n = 22) perceptions of factors that will improve the chances of women getting screening or treatment for cervical cancer in Lima, Peru (Apr – Oct 2019).

Improvement	Screening N	Treatment N
Counseling by community health volunteers	19	16
Accessibility of (screening/treatment) sites	11	10
Friendliness/professional nature of providers	9	4
No cost	9	10
Understanding of screening/treatment techniques	8	8
Screening/Treatment is completed in a single visit	8	2
Efficiency of screening/treatment visits	6	7
Hearing peers' experiences	6	1
Understanding of where/how to get screening/treatment	5	12
Assistance with transportation to sites	0	1
Screening results are available immediately	4	0
Family support	1	3
Other	11 ^a	6 ^b

^a Other factors for improving chances of women getting screened included counseling by health professionals, community education, dissemination of information via media, training of obstetras and social workers, availability of screening services after hours or on weekends.

^b Other factors for improving chances of women getting treatment included understanding the severity of diagnosis, discounts/reduction in costs, availability of health providers, and patient follow-up.

health care in the past (n = 9), and individual counseling by health provider (n = 9).

Table 3 summarizes participants' close-ended responses about barriers that women face in getting screened and treated for cervical cancer. Barriers to getting screened were lack of knowledge of HPV and/or cervical cancer (n = 20), fear of immodesty or embarrassment during screening (n = 16), fear of discomfort (n = 15), financial barriers (n = 14), and work or childcare-related barriers (n = 12). In contrast, financial constraints (n = 20) were a top barrier for getting treatment, followed by work or childcare barriers (n = 15), fear of discomfort (n = 9), fear of immodesty or embarrassment (n = 8), and lack of knowledge of HPV and/or cervical cancer (n = 7).

Table 4 summarizes participants' perceptions of facilitators that can increase the chances of women getting screened and treated for cervical cancer. The top facilitators for improving screening uptake included counseling by community health volunteers (n = 19), accessibility of locations where screening services are provided (n = 11), friendliness and professional nature of health providers (n = 9), and free screening services (n = 9). Counseling by community health volunteers (n = 16)

Table 5

Participants' responses to the Evidence-based Practice Attitude Scale (EBPAS)* in Lima, Peru (Apr – Oct 2019).

Subscale	Statistic	
Requirements	N	22
	Mean (SD)	3.14 (0.60)
	Min, Median, Max	2, 3, 4
Appeal	N	22
	Mean (SD)	3.10 (0.53)
	Min, Median, Max	2, 3, 4
Openness	N	22
	Mean (SD)	3.24 (0.51)
	Min, Median, Max	2.25, 3.25, 4
Divergence	N	22
	Mean (SD)	1.03 (0.50)
	Min, Median, Max	0, 1, 2
Total EBPAS Score	N	22
	Mean (SD)	3.11 (0.36)
	Min, Median, Max	2.33, 3.07, 3.93

* Based on Aarons GA, Mental Health Provider Attitudes Toward Adoption of Evidence- Based Practice: The Evidence-Based Practice Attitude Scale (EBPAS), Ment Health Serv Res. 2004 June; 6(2): 61–74.

Table 6

Themes related to barriers women face in getting screening and treatment for cervical cancer, based on open-ended responses from health providers (n = 22).

Theme	Description	Quotes
Cost of procedures	<ul style="list-style-type: none"> • Women prefer to go low-cost establishments when they need procedures. • Sometimes the cost of these procedures or screening can deter women from getting examined. • Some women may delay getting treatment because they don't have the money for it. 	<p>"Basically there are financial barriers..., there are patients who make the diagnosis and come two months and three months later because they do not have enough money to have the procedure. In my experience..., because all the patients are well aware, they know they have to have surgery and proof of that is that they come back, but they come back later and I say to them: "Why didn't you come back? and they answer: because I was counting the money for the treatment"</p>
Fear of a positive result/cancer	<ul style="list-style-type: none"> • Women are fearful of the results they might get from the screening and would rather not know. • Some women are afraid of the exam because they do not know what to expect. 	<p>"They are afraid of the screening, they think that is going to hurt and that we are going to take a biopsy of the uterus. That is wrong. I say that because that is how they say that to me."</p> <p>"Other fears that are already of a psychological nature in the person, the terror of cancer, the fear that they are going to tell me that I have something"</p>
Lack of knowledge about prevention, or procedures	<ul style="list-style-type: none"> • Women don't know what the cervical cancer services are for, don't understand the importance, or don't understand the results. 	<p>"Also, they don't know what is going to be done in them and don't have any information about cervical cancer. Sometimes they see the mobile unit and some recognize La Liga others not. Then, some come to the mobile unit asking what we do and we tell them, the time (it takes)... sometimes they come alone because they feel some discomfort, and in terms of barriers, lack of information and importance of doing promotion checkups"</p>
Low access to detection centers/services	<ul style="list-style-type: none"> • The screening services might also be far away from a woman's home which makes it an extra barrier if she has limited time. • The range of services provided by screening services might not be comprehensive enough to meet the needs of the women accessing them. 	<p>"The second is to implement detection centers that are physically close to people so that they can access and that during the consultation it generates a link between the professional the patient so that if need to make a subsequent examination, the colposcopy, they understand that it has to be done..."</p>
Male gender of examiner	<ul style="list-style-type: none"> • Women prefer to get screened and treated by a female health professional. • Husbands are usually less skeptical when a woman is being examined by another woman than by a man. 	<p>"Women feel shame when they ask if the examiners are women or men. If they are women, they are encouraged, but if they are men, they say 'no, if my husband finds out...he is going to get upset, so I prefer to avoid that kind of check-ups.'"</p>
"Machismo"	<ul style="list-style-type: none"> • Woman has to ask for permission from husband to get screened. She depends on his decisions and his money (if needed) to get screened. • Some women avoid getting screened in fear of getting into a fight with their husbands. • If a woman is diagnosed with some type of lesion, husband might think it is because she had other sexual partners. • More common barrier among older women and rural areas. 	<p>"In the provinces they follow the "machismo" and sometimes they still want to handle women as if they were objects, and unfortunately because of their culture and because of their upbringing. So they think that men have the right over them (women), and sometimes they control everything, sometimes even their ...who has to examine her. They don't want to be seen by a man, they want to be seen by a woman...because the husband controls everything. Unfortunately sometimes in those cases there have been cases that have cancer."</p>
Prior negative experience with screening	<ul style="list-style-type: none"> • Prior negative experience with screening may reduce women's willingness to be screened again. 	<p>"...due to past experiences that they may have had with other health professionals they say, 'no, they make me hurt... they have no patience, they are very rough.'"</p>
Low self-prioritization	<ul style="list-style-type: none"> • Women who are busy taking care of their families and/or have jobs don't prioritize themselves and often put their family first. 	<p>"Yes, of course in the experience in mobile units the majority of women who have been diagnosed with pre-cancer lesions... are mostly poor women, women with family responsibilities, women who are single mothers, women who have suffered violence as well. So, they prioritize more the little money they earn in education, in clothing, in the health of their children than in themselves. So, the health in them is the last thing and they are not going to give it importance if some diagnosis is presented to them. They are always going to prioritize the issue of attention with their children"</p>
Time/Availability	<ul style="list-style-type: none"> • One of the main barriers to screening is that women don't have time. This can vary from having conflicting priorities, like taking care of children, keeping up the household and working. • The clinic hours may not be convenient for working women. • Some women also complain that receiving the pap smear results takes too long or that the waiting times at the clinics are too long. 	<p>"In terms of time, they want the exam to be done fast because they have to cook and to take care of their children. It can't be like that"</p> <p>"Based on my experiences is the time of services, the time of services because if it is very early they have to go to leave their children at school, we always have to manage the hours. If it is at noon, they have to do something at lunch, if they have their children to take them to another place...the third point would be their...their work ...and...the time we stay ...then there is, they want a schedule in the afternoons others want the schedule in the morning, then."</p>
Not meeting requirements for screening	<ul style="list-style-type: none"> • Women may have been sexually active or on their period and not be eligible for screening. 	<p>"Before the examination they are sexually active every day, so if the couple knows that there is a campaign...they will not meet the basic requirement that is not to have had sex, for example."</p>
Poor follow up	<ul style="list-style-type: none"> • Sometimes, there is poor communication of results and the need for follow up. • Older patients don't remember or don't have telephone numbers or don't know any if their family member's number which can make follow-up complicated. It can also complicate how the results of screening are communicate back. 	<p>"...another barrier that exists in the... in our country is that when people make the screening in places that are only dedicated to screening but do not care about having a follow-up with patients, the screening loses all its value. That is to say, they go do the screening, but they never know the result. Nobody tells them..."</p> <p>"Some patients...when they are older they give, when one ask them if they have telephone or an direction they don't or I don't know if they are going to give their number or will give me one erroneously. They say yes miss I have, I have , I remember I think is like this and some are no...in some cases we call them but someone answers and says it is not the correct number or they say I don't have one. Some say miss I (will) come</p>

(continued on next page)

Table 6 (continued)

Theme	Description	Quotes
		tomorrow and they do not come or they forget...miss tomorrow bring your telephone number and they do not bring it and the only thing we have from them is the address...we ask the telephone number of a family member but they do not remember."

was also reported as a top facilitator for treatment, followed by knowing where/how to access treatment (n = 12), accessibility of treatment locations (n = 10), and no cost for treatment (n = 10).

Table 5 summarizes subscale and total scores on the Evidence-based Practice Attitude Scale. On a scale of 0–4, with 4 being the highest score, participants showed high openness (mean score: 3.24) towards new cervical cancer treatments/interventions/systems. Relatedly, they perceived low divergence (mean score: 1.03) of their current practices from new cervical cancer treatments/interventions/systems. They reported positive attitudes towards adopting new cervical cancer treatments/interventions/systems that are appealing (mean score: 3.10) and separately, when provided with requirements (mean score: 3.14) to adopt such treatments/interventions/systems. The total mean score was 3.11 out of 4, suggesting high likelihood of adoption of new cervical cancer treatments/interventions/systems.

5. Findings from open-ended questions

Participants' open-ended responses related to barriers that women face in getting screening and treatment for cervical cancer fit into 11 major themes as shown in Table 6. Many themes (e.g., cost of procedures, low knowledge, fear, and accessibility) reinforced the quantitative findings of the survey. New themes were related to the role of husbands ("machismo"), participant gender and empathy, time/availability, low self-prioritization, and not meeting the requirements for screening. One theme around incorrect phone numbers was mentioned as a barrier to follow up with women post-screening.

6. Discussion

This study examines participants' perspectives on facilitators and barriers experienced by women in accessing cervical cancer services in Peru, a country with high incidence and mortality due to cervical cancer. Our findings, although limited to participants from one organization, suggest that concern for cancer and knowledge about cervical cancer screening are key motivators of screening uptake, whereas reduced or free services are key for treatment. Relatedly, the relative importance and nature of barriers that women face are different for cervical cancer screening compared to treatment. In particular, for treatment, study participants mentioned financial concerns as the primary barrier and for screening uptake, a lack of knowledge or awareness related to human papillomavirus and cervical cancer as the primary barrier. The emphasis on financial barriers for treatment is not surprising, since community-based screening services at La Liga are available free of cost, whereas women are responsible for treatment related costs. Although high uptake of screening services is essential to identifying cervical cancer at the early stages when it can be treated, prevention programs are unlikely to be effective if women who screen positive are unable to access the necessary treatment due to financial constraints. The Pan American Health Organization estimates that the mortality rate due to cervical cancer in the Latin American and the Caribbean (LAC) region is three times higher than in North America (Cervical Cancer in the Americas, 2015). We posit that this disparity may be partly driven by greater financial constraints faced by women in LAC (Fast et al., 2013). Hence, reducing financial barriers to treatment may be a vital prerequisite in reducing the high mortality rate due to cervical cancer in Peru and other LAC countries.

Our study findings also highlight the continued need for community education and awareness to facilitate cervical cancer and promotion of cancer screening in community settings. While counseling in general was considered to be important, several participants emphasized a role for health workers as trusted resources in providing counseling to women. A recent review in the literature suggest that culturally and linguistically sensitive educational interventions delivered by providers were associated with improvements in cervical screening rates (Musa et al., 2017). Promotional activities, such as providers offering short awareness-raising sessions immediately before the scheduling screening, were found to be particularly important to the success of mobile outreach efforts in remote settings (Winkler et al., 2007). This role for providers needs further assessment in the context of cervical cancer control in Peru.

Our findings agree with previously published reports from Low and Middle-Income Countries (LMICs) on barriers that women face in accessing cervical cancer services. These include structural barriers such as availability of quality and affordable services, distance to health care facilities, long wait times, and inconvenient/irregular clinic hours (Paz-Soldán et al., 2012; Luque et al., 2016; Aguilar et al., 2016; Agurto et al., 2004; Paul et al., 2013), individual barriers such as lack of knowledge about cervical cancer, a lack of familiarity with the concept of preventative health care, perceptions of being at low-risk, lack of partner support, and fear of cancer (Winkler et al., 2007), as well as socio-cultural barriers such as embarrassment or shame related to the pelvic exam, particularly when conducted by a male provider (Paz-Soldán et al., 2012; Luque et al., 2016; Paul et al., 2013). In this study, we sought to update and identify the contextual relevance of these barriers in Lima, Peru, and prioritize strategies for achieving maximal impact on cervical cancer reduction. Our findings suggest that mitigation of financial barriers, opportunities to build knowledge and awareness related to cervical cancer, and improving the convenience of services (e.g., distance, hours) may be areas to prioritize in Peru. However, given the diversity of barriers, a multipronged intervention strategy may be needed in the longer term to achieve large reductions in cervical cancer incidence and mortality in the region.

This study was the first to measure willingness to adopt new cervical cancer treatments/systems/technologies in Peru. Under the National Plan for Telehealth and the National Telemedicine Framework in Peru, the use of digital health is seen as a key mechanism to improve access to health services (Congress of the Republic of Peru, 2016). Despite resource constraints in the region, significant efforts are ongoing in Latin America to build capacity and training for using digital health technologies (Curioso, 2019). Our survey was done in the context of a larger study to develop and evaluate a digital health intervention to promote cervical cancer screening in community-based settings. Among participants, the self-reported willingness to adopt new cervical cancer treatments/systems/interventions is high (mean: 3.1 out of a maximum possible score of 4). The low divergence subscale score suggests that participants perceive new cervical cancer treatments/systems/interventions as being consistent with existing practices. For comparison purposes, mean scores on the same measure reported in other non-cervical cancer studies are 2.41 (mean; SD: 0.49) among healthcare providers in Bahrain (Al Saif et al., 2019), and 3.1 (median) among Icelandic physical therapists (Arnadottir and Gudjonsdottir, 2016). Given high willingness among providers, we posit that new interventions/systems/technologies, such as those using digital health,

could be used to empower a variety of participants, such as midwives, to provide more comprehensive screening services and support the Ministry of Health's (MINSA's) goal to make "screen-and-treat" a more feasible and successful strategy in Peru.

Study limitations include small sample size and limited generalizability of study findings. We only surveyed participants from one health system (La Liga) in Peru, and hence, responses may be biased by the nature of services offered by that health system. We attempted to reduce the sampling bias by including a diverse group of participants from the private health system, including medical personnel and administrative staff involved in facilitating cervical cancer services, in our study. It is also notable that La Liga providers communicate with other cervical cancer providers throughout Peru. Hence, their perceptions are shaped by experiences at and outside La Liga. However, a larger study incorporating views of participants from other health systems, including a mix of public and private entities may yield more generalizable information. It is possible that perceptions of barriers and facilitators vary between medical personnel and administrative staff, although significant variations were not observed in our data due to the small sample size. Our findings on financial constraints may not be generalizable to the public health care system where services are offered free of cost (e.g., under Plan Esperanza). Despite the availability of free services in the public health care system, incidental costs such as transportation and accommodation remain a challenge, especially for women residing in remote settings in Peru (Nevin et al., 2019). Our study is also limited by its reporting of women's experiences by participants; additional studies of patient and community members' perspectives are needed. In addition, it is possible that the close-ended survey questions influenced participants' responses to the open-ended questions.

In conclusion, study findings highlight differences in the nature of barriers experienced by women for treatment and screening uptake in Peru. Our data reveal that focusing on expanding screening services and linkage to follow up may help ensure that women avoid late and advanced diagnoses, which are associated with higher costs of treatment and travel (Nevin et al., 2019). The findings of this study may help inform local and national strategies for cervical cancer prevention. In addition, our findings may help motivate the development and evaluation of new interventions, such as those using digital health, to promote cervical cancer prevention in Peru, and other LMICs. Further studies are needed to generalize study findings to settings other than Lima, Peru.

Disclaimers

JJ is a consultant for Merck, which is a manufacturer of HPV vaccines. All other authors have no conflict of interest to declare.

CRediT authorship contribution statement

Lavanya Vasudevan: Conceptualization, Methodology, Investigation, Validation, Formal analysis, Writing - original draft, Writing - review & editing, Visualization, Supervision, Funding acquisition. **Sandra Stinnett:** Validation, Formal analysis, Writing - original draft, Writing - review & editing, Visualization. **Cecelia Mizelle:** Writing - original draft, Writing - review & editing. **Katherine Melgar:** Investigation, Writing - review & editing, Project administration. **Christina Makarushka:** Methodology, Investigation, Writing - review & editing, Project administration. **Michelle Pieters:** Formal analysis, Writing - original draft, Writing - review & editing, Visualization. **Luis Enrique Roman Sanchez:** Formal analysis, Writing - original draft, Writing - review & editing. **Jose Jeronimo:** Methodology, Formal analysis, Writing - original draft, Supervision. **Megan J. Huchko:** Conceptualization, Methodology, Writing - original draft, Writing - review & editing, Funding acquisition. **Rae Jean Proeschold-Bell:** Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing, Visualization, Funding acquisition.

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Appendix A. Supplementary data

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