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Barriers and facilitators for adherence to follow-up by HR-HPV-positive women with premalignant cervical lesions: a mixed-design study in Mexico

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Abstract

Background Mexico reports low follow-up completion rates among women with abnormal cervical cancer screenings. This study aimed to identify barriers and facilitators to follow-up adherence among women with human papillomavirus (HPV) infection and premalignant cervical lesions in Mexico.

Methods A mixed-methods study was conducted from February to April 2019. Participants included women undergoing follow-up care for high-risk human papillomavirus (HR-HPV) and premalignant lesions, along with health personnel from the Women's Healthcare Center (CAPASAM) in Mexico. Quantitative data were obtained from the Women's Cancer Information System and through a questionnaire about factors affecting follow-up adherence. Additionally, the health personnel involved completed a compliance checklist regarding care regulations. Descriptive statistics were used for analysis. Qualitative data were collected via semi-structured interviews with both groups, followed by a content analysis based on identified categories. The Hazard Analysis and Critical Control Point System confirmed care process risks. Proposals to enhance the Early Detection Program for Prevention and Control of Cervical Cancer were collected from a CAPASAM health personnel nominal group.

Results Identified barriers to follow-up included low income among CAPASAM users, family provider roles limiting time for appointments, long waits for testing and results delivery, distant facilities, insufficient service hour communication, inadequate health personnel training, and a lack of systematic counseling. Hesitation toward follow-up was also linked to shame, apprehension, uncertainty, test aversion, fear of positive results, and limited cervical cancer and screening knowledge. Patriarchal attitudes of partners and limited access to the now-discontinued PROSPERA government program further discouraged follow-up. Facilitators comprised respectful treatment by CAPASAM staff, no-cost services, health campaigns, and positive user attitudes.

Conclusions The study found more barriers than facilitators to follow-up adherence, highlighting the need for strategies to bolster the Early Detection Program. Future strategies must address the comprehensive array of factors and incorporate stakeholder perspectives.

Keywords Barriers, Facilitators, Adherence, HPV, Uterine cervical neoplasia, Secondary prevention, Mexico, Women

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Background

Cervical cancer is the second most common cancer among Mexican women despite being highly preventable. In 2022, Mexico reported 10,348 new cases and 4,909 deaths, with a 5-year prevalence of 33,441 cases [1]. Most cases occurred in women from low-resource areas [2, 3], making it a significant public health issue with substantial social costs and a problem entrenched in pre-existing inequities [2–4].

The Mexican program for early detection, prevention, and control of cervical cancer in Mexico uses traditional cervical cytology and biomolecular tests to detect high-risk human papillomavirus (HR-HPV) using PCR with liquid-based cytology [5]. However, this approach has been largely ineffective due to systemic issues [6–9], inadequate screening and diagnostic quality, and poor follow-up for women with positive results [7, 9]. Remarkably, up to 50% of Mexican women with positive results for cervical cytology or PCR for HR-HPV do not receive necessary diagnostic confirmation or follow-up [7, 8, 10].

This issue arises within a fragmented health system characterized by limited and inefficiently allocated financial resources [11], a lack of preventive health focus [12], insufficient intercultural awareness, a dearth of trained health personnel [13], poor coordination across different levels of care, and unreliable health information systems [11]. Identifying and inviting eligible women to participate in early detection and ensuring proper follow-up for those with positive results is critical [7–9].

It is crucial to identify barriers and facilitators for follow-up adherence among women with positive HR-HPV tests and premalignant cervical lesions. The World Health Organization defines adherence as the extent to which an individual's behavior aligns with health professional recommendations, highlighting the importance of active collaboration between health personnel and patients [14]. Adherence is influenced by socioeconomic conditions, health services and personnel, users, and disease and treatment dynamics [14].

The current international health policy framework provides an opportunity to address cervical cancer effectively and holistically, assuming prevention and control measures are sustainable and universally implemented. In 2020, the World Health Organization launched a global strategy to eliminate cervical cancer as a public health issue, aiming to meet several 2030 Sustainable Development Goals [15]. The strategy includes vaccinating 90% of girls by age 15, screening 70% of women by age 35 and again by age 45, and treating 90% of women with precancerous or cancerous lesions [15–17].

Given this context, our study aims to understand the barriers and facilitators affecting follow-up adherence among women diagnosed with HR-HPV and

pre-malignant cervical lesions. We analyzed the perspectives of women undergoing follow-up and health personnel involved in the Women's Healthcare Center (CAPASAM) care process of the Cervical Cancer Early Detection Program in Morelos (Mexico).

Methods

Study design and location

Our study was a cross-sectional mixed methods investigation approved by the Subdirectorate of Teaching, Research, and Training of the Morelos State Health Services, as well as by the Research Ethics Committee of the National Institute of Public Health in Mexico. Prior to participation, all participants provided informed consent through a form administered by a researcher. This study employed both qualitative and quantitative methods, with a major emphasis on qualitative aspects. The integration of these components occurred at the results stage. Data collection was conducted at the CAPASAM, which is affiliated with the Morelos State Health Services in Mexico. CAPASAM caters to women with challenging socioeconomic backgrounds, referred from health facilities due to abnormal liquid-based cytology results, from February to April 2019.

Participants and procedures

Our methodological approach targeted two participant groups (Table 1). Women aged 35 to 64, identified as follow-up cases, were invited to participate as they arrived for their consultations at the Early Detection Program for the Prevention and Control of Cervical Cancer. Eligibility for inclusion required registration of their appointments through the Women's Cancer Information System (SICAM) within the study period and their consent to participate. First-time attendees were excluded. All participants signed the informed consent form. Selection concluded upon achieving theoretical saturation. The second group consisted of health personnel involved in managing women's consultations at CAPASAM. Due to the small size of this group, it was deemed unnecessary to select samples; therefore, all individuals meeting the inclusion criteria were enrolled in the study.

Data collection

Quantitative data—CAPASAM users

To collect quantitative data for women utilizing CAPASAM services under the Early Detection Program, we extracted sociodemographic information and waiting times from SICAM and then administered a questionnaire designed to assess treatment adherence in patients with cardiovascular risk. We employed a validated

Table 1 Methodological framework employed in this study

	CAPASAM users	CAPASAM health personnel
Sample	$n = 18$	$n = 7$
Inclusion criteria	Women between 35–64 years of age; Having been referred to CAPASAM from a health facility pertaining to Morelos Health Jurisdiction I for diagnostic confirmation, treatment and follow-up after receiving a positive result from PCR for HR-HPV and an abnormal LBC; Signing an informed consent form	Having worked at CAPASAM for at least one year; Working in either the morning or evening shift; Signing an informed consent form
Quantitative data	Secondary analysis of SICAM data regarding the sociodemographic characteristics of CAPASAM users and waiting times Questionnaire based on a validated instrument adapted for this study to explore the following dimensions: socioeconomic condition, perceptions, attitudes and emotions, experiences with CAPASAM health personnel, and level of knowledge about early-detection tests regarding adherence [18]. The dimension concerning knowledge about the disease was investigated via the Battle Test [19]	Secondary analysis of sociodemographic and work-related data from CAPASAM administrative records; Checklist for compliance with the official NOM 014-SSA2-1994 (2007) standard for women's care process [20]
Qualitative data	Semi-structured interviews based on an interview guide designed to identify barriers and facilitators for adherence to follow-up on the part of HR-HPV-positive women with pre-malignant cervical lesions	Semi-structured interviews based on an interview guide designed to identify barriers and facilitators for adherence to follow-up on the part of HR-HPV-positive women with premalignant cervical lesions; Hazard analysis and critical control point system adapted for this study to identify specific risks and their effects at each stage of the care process [21]; A nominal group of five healthcare personnel selected by convenience from the CAPASAM morning shift to identify actions that can strengthen the Early Detection Program

CAPASAM Women's Healthcare Center, HR-HPV high-risk human papillomavirus, LBC liquid-based cytology, SICAM Women's Cancer Information System. Source: prepared by the authors

instrument tailored for this study (Supplementary Material 1) to examine a range of factors: users' socioeconomic conditions, perceptions, attitudes, and emotions, experiences with CAPASAM health services and personnel, and knowledge about early detection tests [18]. The aspect of user knowledge was further investigated using the Battle Test [19]. Adherence was measured overall and by category using a Likert scale, with classifications from very adherent to non-adherent based on percentage scores.

Qualitative data—CAPASAM users

The qualitative aspect was examined through semi-structured interviews with 18 users. The interview guide aimed to uncover barriers and facilitators to adherence for follow-up among HR-HPV-positive women with premalignant cervical lesions using CAPASAM services under the Early Detection Program. It covered (a) Participant profile; (b) Knowledge about cervical cancer and screening tests; (c) Socioeconomic conditions, attitudes, perceptions, emotions of users, and the influence of their partners, experiences with CAPASAM health services and personnel; and (d) Suggestions for enhancing the Early Detection Program. Interviews were conducted in Spanish by a trained study researcher in person at

CAPASAM facilities, and the average was 30 min. They were audio-recorded for textual transcription. The number of interviews was deemed sufficient for female participants to reach theoretical saturation.

Quantitative data—health personnel

To gather quantitative data on the health personnel, we accessed CAPASAM administrative records and then had clinic health personnel complete a 24-item checklist on adherence to care process guidelines. The checklist was created according to Official Mexican Standard 014-SSA2-1994 for cervical cancer prevention, diagnosis, treatment, control, and epidemiological surveillance, revised in 2007 [20].

Qualitative data—health personnel

The qualitative component was explored by conducting semi-structured interviews with seven health personnel. The interview guide aimed to identify the barriers and facilitators to adhere to the follow-up of HR-HPV-positive women with premalignant cervical lesions using the CAPASAM services under the Early Detection Program. The guide included sections on (a) Participant profile, (b) Knowledge about cervical cancer and screening tests, (c) Users' socioeconomic condition, attitudes, perceptions, and emotions, as well as the role of male partners,

experiences with CAPASAM health services and personnel, and (d) Proposals for improving the Early Detection Program. The interviews, conducted in Spanish by one of the study researchers in person at CAPASAM facilities, lasted about 30 min each and were audio-recorded for textual translation.

The results of the checklist identified phases of the follow-up process that could be improved. We adapted two of the seven principles from the Hazard Analysis and Critical Control Point System to this end [21]. Hazards were defined as factors in the healthcare process that could affect women's adherence to follow-up using CAPASAM services under the Early Detection Program. The first principle of this system involved conducting a hazard analysis to identify and examine low compliance rate factors in the healthcare process, from the checklist. The second principle established critical control points, areas where control measures could be implemented to prevent, reduce, or eliminate specific risk factors [21]; a decision tree helped determine if the identified hazards were such points.

One of the study researchers also formed a nominal group with five healthcare personnel involved in the follow-up process. Members from the CAPASAM morning shift were chosen by convenience to identify actions that could strengthen the Early Detection Program for Cervical Cancer Prevention and Control. The meeting, held at CAPASAM facilities, lasted about one hour. Based on quantitative and qualitative results and proposals from CAPASAM users and personnel, the dialogue evolved through brainstorming, followed by analysis and discussion, resulting in a consensus on actions to enhance the Early Detection Program.

Data analysis

For quantitative data analysis, descriptive statistics summarized the sociodemographic traits of CAPASAM users and characterized the center's health personnel by age, sex, professional profile, work shift, and collaboration time with CAPASAM. We defined the waiting time as the period from HR-HPV detection test sample collection to the first follow-up appointment, calculating the average days. Percentages evaluated compliance with the official care standard and adherence to follow-up results across five dimensions using the STATA/MP software (version 16.0).

For qualitative analysis, interviews were audio-recorded, transcribed verbatim and analyzed using grounded theory to define codes and to identify analytical categories with the support of Nvivo 11 software. This analysis identified barriers and facilitators to follow-up adherence among women in the study.

We triangulated information from the two study populations, integrating and contrasting results for users' socioeconomic condition, perceptions, attitudes, emotions, services and personnel experiences, general understanding of cervical cancer, and knowledge about early-detection tests. The English translation of the semi-structured interviews and nominal group discussions was performed by language professionals to ensure fidelity to the participants' testimonies.

Results

Participants included 18 CAPASAM users with an average age of 46 ± 6.47 . Most (83%) had a stable partner, 61% had completed secondary school, and only 11% had attended high school. The majority (83%) were employed, predominantly in domestic work outside the home. The study included seven CAPASAM professionals averaging 39.28 ± 9.19 years of age regarding the health personnel. Six held bachelor's or graduate degrees, and one had a technical degree.

Most findings, from the perspectives of both populations, aligned in the following dimensions of adherence: socioeconomic condition of users; their perceptions, attitudes, and emotions; general understanding of cervical cancer; knowledge about early-detection tests; and experiences with CAPASAM health services and personnel. These findings are summarized in Table 2. It is important to note that both participant groups identified more barriers than facilitators to adherence to follow-up care for HR-HPV-positive women with premalignant cervical lesions.

Socioeconomic issues were the most significant barriers to follow-up among CAPASAM users. Many lacked the financial resources for public transportation to the health facility. Additionally, numerous individuals were family providers and also engaged in unpaid domestic work, limiting their time for testing and follow-up appointments. Those who were employed outside the home faced the loss of daily wages if they missed work. Only a small number reported financial support from relatives to cover follow-up costs.

Regarding CAPASAM's health services and personnel, our study found that both groups identified lengthy waiting times for tests and result delivery as major barriers (Table 2). Based on the checklist, this is acknowledged as a phase of the care process that is often non-compliant with regulations and eligible for enhancements.

Data from SICAM allowed us to calculate waiting times across the care cascade for women. The average duration from HR-HPV PCR testing to colposcopy was 45.72 ± 13.89 days; from collecting the histological sample to providing histopathological results, it was

Table 2 The barriers and facilitators for adherence to follow-up for HR-HPV-positive women with premalignant cervical lesions: the perspectives of CAPASAM users and health personnel

Variables	Barriers and facilitators by dimensions and subdimensions	User testimonials	Testimonials from healthcare professionals
Socioeconomic factors	Low income	"Why don't people go? People don't go because of money for transportation." W38y Barrier	"Many of them tell us that sometimes they don't have [money] for bus fare because they come from different places. There are women who come from farther away so, sometimes, the main thing is money." W45y Barrier
Factors related to CAPASAM health personnel	The role of family provider	"Many times, it's the economy because, in my case, I have to work." W51y Barrier	"The life of the woman also influences, I mean, whether she's a worker or a housewife." M30y Barrier
	Long waiting times for testing	"At the health services, some of them ask you to take a card [to register for the test]. They give it to you early but don't get to you until noon." W35y Barrier	"There continue to be comments that [at the HF's] there are specific service cards or days, which should not be, given the zero-rejection policies." M30y Barrier
	Long waiting times to receive the results	"She goes to a private provider because the results take up to three months to arrive at the health services." W40y Barrier	"I consider that the waiting times are long because the health services don't send samples to the Jurisdiction daily and the Jurisdiction returns them to CAPASAM only once a week. Then it takes another week for the samples to be processed, another three or four days for them to be diagnosed by the cytotechnologist and the results corroborated by the pathologist, and it takes another week for CAPASAM to send the results to the Jurisdiction and from there to the [corresponding] health facility." W41y Barrier
Distance of CAPASAM facilities from users' homes	Distance of CAPASAM facilities from users' homes	"The distance. For example, the bus or public van sometimes takes longer than you think." W48y Barrier	"Jurisdiction 1 covers populations that, for us, are not very far away, but in reality, it (the CAPASAM health facility) is far away for them, sometimes up to two or three hours from them, so it can influence [their decision not to adhere to follow-up]." W30y Barrier
	Scarce diffusion of service hours	"Institutions are sometimes [only open] from Monday to Friday and that's it, and she [her cousin] works from Monday to Friday until six in the evening." W47y Barrier	"Not many people know that CAPASAM exists and what it does. Not many people know, and I think it's a great area of opportunity to create more publicity about what's done here, because I feel that there are a lot of people missing us." W30y Barrier
Dignified treatment (health responsiveness) by CAPASAM health personnel	Dignified treatment (health responsiveness) by CAPASAM health personnel	"I like it. They always take good care of me." W40y Facilitator	No testimonies identified

Table 2 (continued)

Variables	Barriers and facilitators by dimensions and subdimensions	User testimonials	Testimonials from healthcare professionals
Factors related to CAPASAM users	Free services	"The tests are free; if we don't have money and they cost a lot [private care], then it would be stressful. But since they're free, they don't cost us. Well, now they're giving us payment facilities." W44y Facilitator	"Regarding factors that influence [whether] women undergo tests, I believe that women go to these health services to have these tests done because they're free of charge." W41y Facilitator
	Health campaigns in remote populations	"I had the test done during a campaign, a study on Papillomavirus." W40y Facilitator	"With health fairs in the community to attract patients." W41y Facilitator
	Feelings of shame, fear, and uncertainty	"Sometimes it's fear... shame, not wanting to be looked at, but it's necessary." W55y Barrier	"Sometimes, [with respect] to a gynecological consultation, many women don't go to male doctors, only to female doctors. They say 'oh no, it's a male doctor; I don't want to go to a male doctor,' out of shyness." W55y Barrier
Fear of testing positive	"When they told me that the Pap smear results were abnormal, I thought it was cancer before coming here." W44y Barrier	"You tell them their result, that there's an abnormal finding, and they immediately think that it means a malignant condition when it's something that's very timely for treatment and doesn't mean that it's already an advanced cancer." W41y Barrier	
Factors related to user knowledge about cervical cancer screening tests and results	A positive attitude among users when making decisions	"I looked for a way to ask for permission [at work], so yes, it's possible, everything is possible." W43y Facilitator	No testimonies identified
	Unfamiliarity with tests and results	"They asked us if we wanted to do a study. I don't know what they did to me. And then they told me that it [the result] had come out abnormal and that I had to come for a colpo... I don't know what it's called." W49y Barrier	"They don't even understand what a colposcopy study is." M48y Barrier
	Doubts regarding the test results	"I had my Pap smear done last year and they told me it went well, and now that I do it again, they tell me it's abnormal. I was left with doubt: do lesions appear so quickly?" W40y Barrier	No testimonies identified

Table 2 (continued)

Variables	Barriers and facilitators by dimensions and subdimensions	User testimonials	Testimonials from healthcare professionals
General knowledge about cervical cancer	Unfamiliarity with the disease	"The truth is I don't think a lot about that [cervical cancer], I don't understand what it is and I don't know why [it develops] either."W47y Barrier	"A large number of women don't know what the injury's about. They're not very aware of the topic; sometimes they hear about it but don't assimilate it or don't analyze what's happening."W30y Barrier
	Limited knowledge about the relationship between cervical cancer and HPV	"I don't know what it is and I don't know what causes it; either [...] hmmm, from sexual relations."W48y Barrier	"I think that in 90% of the cases that come here, women and their partners don't know what HPV is, what it's about."W30y Barrier
	Misinformation about the form of transmission	"Because of having several partners, because of sexually transmitted infections, right? When you go to the bathroom... a public bathroom."W45y Barrier	"Some users believe that they acquired the infection by sitting in a public bathroom."W30y Barrier
Factors related to culture and gender	Patriarchal attitudes	"Sometimes the husband has a lot of influence, because there are people who don't let them [the women] go to the doctor if it's a man, alas! Well, I think it counts a lot. Instead of siding with him, I tell him, well, that's my case. And instead of supporting me, he says -nooo! What do you think you're doing, why? From then on, it seems that it goes down instead of raising [my] morale."W47y	"There are still many taboos. In very remote communities, some women still report that their husbands don't want them to go for sample collection because they [those who collect the samples] are going to see their wives. That part: -no, don't go-, that type of thought still exists."W41y
	The tendency of partners to blame the women for contracting the disease	"We must protect ourselves because men, we don't know if they protect themselves. I could be there [have sex] only with him, but him, I don't know. They go out, they work outside, but they blame us."W41y Barrier	"Unfortunately, they're driven by the taboo that if some type of problem is detected, then other family problems will surface, such as infidelities and other types of circumstances."M30y Barrier
Access to conditional-transfer programs	PROSPERA program	"There are women who don't go [to the doctor] anymore because they no longer get support from PROSPERA [government program]. The government educated us wrong because it's for our own health. But people don't go [to the doctor], if they don't receive anything. With PROSPERA, the nurses had a notebook and they'd tell us it's time for your Pap smear; it was mandatory because, if you didn't go, they'd deduct money from you."W40y Barrier	"Previously, there was also the PROSPERA program: they called the ladies to talks, to appointments and, yes, they gave them financial help."W51y Barrier

W Women, M men, y years old, HR-HPV high-risk human papillomavirus, CAPASAM Women's Healthcare Center, PROSPERA social inclusion/conditional-transfer program, HF-s = health facilities. Source: semi-structured interviews

20.33 ± 9.02 days. The mean time from the start of therapy to the follow-up appointment was 23.92 ± 11.75 days, though this varied based on the specialist's evaluation and required treatment type. Barriers also included the long distance from homes to CAPASAM and inadequate promotion of service schedules (Table 2).

By utilizing the checklist, our analysis showed that areas needing improvement included refresher courses for health personnel and coordination at the first level of care. Only 29% of the CAPASAM personnel in this study had recent training in the Early Detection Program, yet 43% reported their facility had feedback on the program's operational performance. Additionally, 57% noted frequent and close staff communication at the primary care level. However, counseling was systematically provided only to women diagnosed with cervical cancer, excluding those who tested positive for HR-HPV with premalignant lesions.

Conversely, dignified treatment, free services—particularly screenings, which can be expensive—and the execution of health campaigns and fairs to reach remote populations were identified as positive aspects of CAPASAM health personnel (Table 2).

Regarding users, barriers included perceptions and emotions that might impede utilizing the screening test, such as sadness, anxiety, uncertainty, and apathy. Confusion, fear, and overestimation of disease severity were common upon receiving test results, leading many to prematurely assume a cancer diagnosis. Despite these challenges, including socioeconomic conditions and obstacles within the health services, most users maintained a positive attitude and attended their appointments.

Our study found that participating women had limited awareness of tests for the early detection of cervical cancer. All were familiar with cervical cytology, known as the Pap smear, but not with the test for HR-HPV or colposcopy. This lack of awareness made it less likely for them to opt for testing or adhere to follow-up care if a premalignant lesion was detected. Several women expressed doubts about the efficacy of cervical cytology after receiving negative results, and subsequently be informed of a premalignant lesion or cervical cancer.

Most participants had limited knowledge about cervical cancer, coupled with misinformation and doubts. While many understood that the disease was sexually transmitted, some believed it could be contracted through other means. Only half recognized HPV as a causal factor for cervical cancer.

Interestingly, two factors influenced women's experiences: cultural and gender dynamics and access to a conditional transfer program such as PROSPERA. Partners' patriarchal attitudes negatively impacted women's adherence to follow-up care, often due to moral judgments

about women's sexuality. Moreover, partners tended to blame women for developing an HPV infection, associating it with promiscuity and infidelity. The users highlighted the importance of educating men about the Early Detection Program, disease transmission and prevention.

Limited access to conditional transfer programs (e.g., PROSPERA) also posed a barrier. The discontinuation of PROSPERA in 2019, due to federal administrative changes, led to women no longer receiving direct cash transfers, thus halting their visits to healthcare facilities for sampling or monitoring.

Based on our nominal group analysis, proposals are clearly needed to strengthen the Early Detection Program for the Prevention and Control of Cervical Cancer. Over 90% of the stakeholders involved had never participated in identifying improvement areas within the care process nor in developing proposals to enhance adherence to follow-up procedures in women's health care. Among the staff proposals were systematic sensitization and training of operational personnel, alongside an organizational approach that includes teamwork and periodic feedback on processes, within the framework of effective coordination at the first level of care.

Discussion

Our study revealed low adherence rates among HR-HPV-positive women with premalignant cervical lesions, identifying more barriers than facilitators. Figure 1 summarizes the interrelated barriers and facilitators to adherence identified in women who received positive early screening results. These findings on barriers and facilitators are consistent with previous studies [22–29].

The main obstacle to follow-up is the lack of economic resources, consistent with findings from previous studies [26, 30]. Research conducted along the Texas-Mexico border showed that many women rely on family and friends for transportation due to a limited bus system. Thus, securing transportation to a clinic site can pose a challenge [31]. Studies in Cameroon identified poverty and transportation costs as significant barriers preventing women from attending follow-up sessions [22]. Another study highlighted that low-income women prioritize their families' needs over prevention, making it a secondary concern [32]. Transportation, food costs, and loss of income were significant barriers to screening in other studies [23, 33–35], even when tests were free [23, 33, 34].

Lack of time to attend appointments emerged as another key barrier, a finding echoed by research in both high- and low-income countries [27, 36]. For instance, 56% of women in a German study reported lacking time to attend colposcopy sessions following

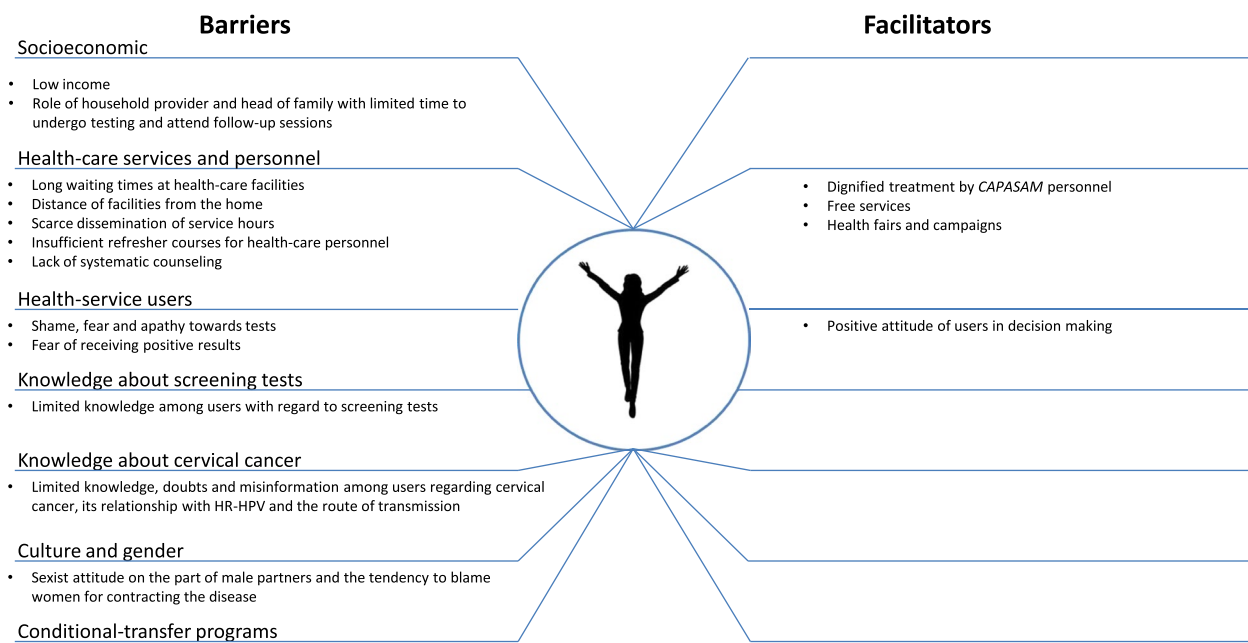


Fig. 1 Barriers and facilitators for adherence to follow-up by HR-HPV-positive women with premalignant cervical lesions. Source: prepared by the authors

abnormal cytology results [27]. Other studies found that family and work responsibilities further limited women’s ability to be tested and receive follow-up care [25, 35, 37]. It was also noted that work leave is usually only granted for ‘real’ illness, leading to income loss when missing work [37].

Long waiting times in the cascade of care significantly hinder access for women [29]. Globally, long wait times for testing and service refusals due to high patient volumes [23, 26] and insufficient staffing [26] are barriers, persisting even for those arriving early at health facilities [33].

Our study found CAPASAM facilities to be inconveniently located from the homes of many women, with transportation costs exacerbating their challenges. Literature suggests that distance from healthcare facilities is a primary barrier to access [24, 35, 38]. In Germany, 48% of respondents cited travel distance and costs as major reasons for missing colposcopy appointments [27]. In Kenya and Cameroon, the substantial distance from care providers was a significant obstacle [22, 38]. Rural dwellers face the compounded barrier of cost and difficulty accessing health care [34].

Additionally, our study pointed to inadequate dissemination of information about health services as a significant barrier to follow-up. The critical need to inform the target population about available tests and hours of operation necessitates inclusion in strategies to reduce

follow-up barriers. Previous findings indicate that many women are unaware of where to go or which facility to use for preventive or treatment services [38].

Another area requiring improvement is the provision of refresher courses for health personnel. This issue is particularly important as it significantly impacts the quality of care. A qualitative study conducted with women and health care providers in communities with a high percentage of Indigenous populations in Morelos, Mexico, revealed that providers are poorly informed about current regulations and specific clinical indications for cervical cancer detection [13]. A study on Peruvian women highlighted the need for monitoring and/or quality control training for staff collecting samples [32]. Additionally, a lack of adequately trained personnel in facilities providing oncology services, including at the primary level of care, was reported in another study [30].

Our study identified counseling as another area of opportunity, given that these services were not systematically provided to the analyzed women. This gap had not been thoroughly defined in previous studies. Counseling can encompass advice, guidance, and health education, all sharing the common goals of providing accurate, clear, and easily understood information to guide health decision-making according to the user’s needs [39]. One study underscored that women did not receive adequate advice, leading to a knowledge gap about when to return for follow-up [22]. Another investigation found that

while Peruvian women were aware of the tests, they did not receive friendly and comprehensible information about what they were involved in, hindering their implementation [32].

Issues concerning sexuality are integral to belief systems that influence attitudes toward morality, relationships, love, and fidelity. Opinions on these subjects can generate feelings about intimacy involving deeply rooted values. Thus, fear, shame, and uncertainty about performing screening tests and apprehension about a cervical cancer diagnosis were identified as barriers for participants in our study, with similar instances widely documented [26, 27, 29, 35, 40–44]. Along with these emotions, a reluctance to undergo screening was noted, with individuals avoiding these tests to evade the associated feelings and anxiety. One study discovered that reluctance to undergo a gynecological examination prevented several HPV-positive women from returning for follow-up, fearing a cancer diagnosis [23]. Other studies indicated that the embarrassment of exposing one's private areas during tests was a significant barrier [33, 35, 37], especially if the examiner was male [35, 37]. For instance, researchers have reported anxiety and fear of results deterring Nepalese and Cameroonian women from undergoing tests [34, 36], affecting their adherence to follow-up routines [45]. However, fear did not always serve as a barrier: in some cases, the fear of having cervical cancer and understanding the importance of care motivated women to seek follow-up [25, 46].

Due to unfamiliarity with the tests and their processes, the limited knowledge of PCR tests for HR-HPV and colposcopy among study participants was a crucial factor in their decision-making. This is a common situation for women globally. Evidence suggests that a limited understanding of these tests negatively impacts their acceptance [47], undermining adherence to follow-up. A study on Mexican women found that those most likely to receive a Pap smear were the most knowledgeable about the test and cervical cancer risk factors [28]. Another study revealed that women were generally unaware of cervical cancer screening but familiar with the Pap test, implying that some underwent the test without understanding its purpose [32]. Additional research identified limited knowledge of the screening process and purpose, along with little recognition of its importance [37]. A study in a predominantly low-income African-American community in the United States found that the main barrier to follow-up for women with abnormal cytology was a limited understanding of the meaning of an abnormal test result and what a colposcopy entails [7, 45].

Consistent with previous studies, our findings indicate that a limited understanding of cervical cancer, its

association with HPV, and the route of transmission, alongside misinformation and doubts, are significant barriers to follow-up. These barriers influence the decision to undergo testing [33–37, 40, 41, 43], leading many women to believe they should seek medical check-ups only when showing specific symptoms [36]. A study in Yucatan (Mexico) found that over 50% of participants were aware of HPV, while 38.9% knew about the Pap test and 25% were informed about cervical cancer [48]. In a mixed study in Peru among sex workers with abnormal Pap tests, non-adherence was linked to lesser knowledge about the connection between HPV infection and pre-malignant lesions in the cervix [46].

Similar to other studies [22, 24, 29, 33, 35, 36, 38, 43], a key finding of our research is that male partners often obstruct follow-up, either by objecting to their partners attending screenings, requiring their permission, or by not providing financial support for the services. This is often tied to patriarchal views on control over their partners' bodies and sexuality. In severe cases, this control has led to violence against women by their partners, triggered by jealousy related to gynecological examinations for screening [49]. A critical discovery was that male partners frequently accused women of infidelity upon learning of their sexually transmitted HPV infection, associating it with promiscuity [35, 38]. Additionally, our study underscores the need for education and counseling for couples about HPV transmission and prevention, as well as the cervical cancer screening program, echoing a study that emphasized increasing couple involvement in cervical cancer's secondary prevention [24].

Evaluations of conditional-transfer programs, like the defunct PROSPERA Program, show improved access to health services and enhanced human capabilities. However, their impact on health status is varied and often diminishes once the programs end, as seen when PROSPERA concluded and participants significantly reduced their use of health services [50–52]. Our study confirms that free testing and treatment are major facilitators and strengths of the Cervical-Cancer Detection Program in Mexico. The cost of testing and treatment remains a deterrent for women globally from accessing health services, as extensively documented in prior research [36, 41, 53]. In fact, one study in El Paso (Texas) found that many Hispanic women opted for Pap tests in Ciudad Juarez due to lower cost or free services, highlighting cost as a critical factor [54].

Respectful treatment by CAPASAM personnel was another facilitator for women accessing services, aligning with reports of women valuing the personnel's kindness, patience, and professionalism [22]. Conversely, poor health communication and disrespectful treatment by health professionals were identified as significant barriers

to the Early Detection Program and counseling activities [34, 39]. Our research identified health campaigns and fairs in remote areas without health facilities as facilitators for screening, consistent with findings that mobile services in communities increase testing uptake despite follow-ups occurring in established health facilities elsewhere [26, 33, 36]. In Mexico, diagnostic confirmation and treatment occur in colposcopy clinics, and follow-up continues to be challenged due to other factors. A positive attitude from users emerged as a primary facilitator for follow-up adherence in our study, potentially influencing decision-making positively, even amidst prevailing barriers. A prior study reported that a majority of women viewed cervical cytology as very important (70%) and had discussed their test results and experiences with others (58%) [42].

This study had both strengths and limitations. Notably, its strengths included a mixed-methodology approach, enabling a comprehensive exploration of factors influencing whether women in this group seek follow-up care. This analysis encompassed elements common across various national and international contexts, while some facets of multidimensional adherence were unique to the CAPASAM study population. The use of diverse qualitative instruments facilitated the identification of a broad spectrum of perspectives. Another significant strength was the involvement of two key stakeholders—patients and staff—in operationalizing the Early Detection Program for the Prevention and Control of Cervical Cancer, yielding several convergent findings. Our results underscore the need to dismantle the barriers identified and reinforce facilitating factors, turning them into strengths of the Early Detection Program.

Regarding limitations, the study focused on women who attended health services for follow-up, omitting those who did not seek care due to being HR-HPV-positive with premalignant cervical lesions. Therefore, further investigation into this subgroup's issues is warranted, necessitating a deeper examination of the barriers and facilitators uncovered in our analysis.

Conclusions

This mixed-methods study provides insights into the factors influencing adherence to follow-up among women in Mexico participating in an early detection program for cervical cancer who tested positive for HR-HPV infection and had premalignant cervical lesions. Our approach, emphasizing adherence, enabled the integration of various elements at different levels and involving multiple stakeholders. Socioeconomic conditions, CAPASAM health services and personnel, emotional responses and perceptions of CAPASAM users, lack of awareness about cervical cancer and early detection tests, as well as

patriarchal attitudes from partners and restricted access to conditional-transfer programs, emerged as barriers to follow-up adherence. Conversely, facilitators included respectful treatment by health personnel, complimentary services, health campaigns, and a positive user attitude. These findings could be considered for the development of interventions to enhance the effectiveness of Early Detection Programs for preventing and controlling cervical cancer.

Abbreviations

CAPASAM	Centro de Atención para la Salud de la Mujer [Women's Healthcare Center]
PCR for HR-HPV	Biomolecular test for high-risk human papillomavirus
PROSPERA	Social inclusion/conditional transfer program
SICAM	Sistema de información de cáncer de la mujer [Women's Cancer Information System]

Supplementary Information

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Supplementary Material 1.

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Authors' contributions

KTP, GAL, MMS: Conceptualization; GAL: data curation; KTP: resources and project administration; GAL, KTP, MMS, SMN, BPV, LECC, JAEG, TOVG, MBR: writing—original draft; and VMM: writing—revision and editing. All authors revised the manuscript. All authors contributed to the article and approved the submitted version.

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Availability of data and materials

Data generated and analyzed during the present research are not publicly available because of the need to protect personal information, but are available from the corresponding author upon reasonable written request.

Declarations

Ethics approval and consent to participate

This research received approval from the Research Ethics Committee of the National Institute of Public Health in Mexico (Protocol Resolution CI: 505) and the Subdirector of Teaching, Research and Training of Health Services of the State of Morelos, through an official letter of authorization (DAM/SFIC/DIC/1905/2019). All participants provided written informed consent before joining the study. The research was conducted according to the guidelines laid out in the Regulations of the General Health Law on Health Research, the General Health Law of the State of Morelos, and international research agreements, aligning with the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

- International Agency for Research on Cancer. Cancer Today [Internet]. Cancer incidence and mortality statistics in Mexico (Lyon, France: WHO) (2022). Available from: <https://gco.iarc.who.int/media/globocan/factsheets/populations/484-mexico-fact-sheet.pdf>. Accessed Jul 2024
- Terán-Hernández M, Ramis-Prieto R, Calderón-Hernández J, Garrocho-Rangel CF, Campos-Alanís J, Ávalos-Lozano JA, Aguilar-Robledo M. Geographic variations in cervical cancer risk in San Luis Potosí state, Mexico: a spatial statistical approach. *Int J Equity in Health*. 2016;15:161. <https://doi.org/10.1186/s12939-0160448-z>.
- Cetina Pérez L, Luviani Morales J, Delgadillo González M, Galicia Carmona T, Rely K, Castro Eguiluz D, Vaca González R, Lugo Martínez G, García Barrientos N, Nateras A. Sociodemographic characteristics and their association with survival in women with cervical cancer. *BMC Cancer*. 2024;24:161. <https://doi.org/10.1186/s12885024-119093>.
- Muñoz-Bello JO, Carrillo-García A, Lizano M. Epidemiology and molecular biology of HPV variants in cervical cancer: the state of the art in Mexico. *Int J Mol Sci*. 2022;23:8566. <https://doi.org/10.3390/ijms23158566>.
- Secretaría de Salud. Programa de acción específico de prevención y control del cáncer 2021–2024. 2021. Available online at: https://www.gob.mx/cms/uploads/attachment/file/706943/PAE_CAN_cf.pdf.
- Barquet-Muñoz SA, Arteaga-Gómez C, Díaz López E, Rodríguez-Trejo A, Marquez-Acosta J, Aranda-Flores C. Current status and challenges in timely detection of cervical cancer in Mexico: expert consensus. *Front Oncol*. 2024;14:1383105. <https://doi.org/10.3389/fonc.2024.1383105>.
- Centro Nacional de Equidad de Género y Salud Reproductiva. Evaluación del programa de Prevención y Control del Cáncer Cervical en México, 2008–2011. Problemas y Recomendaciones INSP 2011. Available from: https://www.insp.mx/images/stories/Centros/cisp/Docs/120412_cneg.pdf.
- Instituto Nacional de Salud Pública de México. Síntesis de políticas de salud. CISP - Prevención y control del cáncer cervical en México 2021. Available from: https://insp.mx/assets/documents/webinars/2021/CISP_Cancer_Cervical.pdf.
- Mandal R, Basu P. Cancer screening and early diagnosis in low- and middle-income countries. Current situation and future perspectives. *Bundesgesundheitsblatt*. 2018;61:1505–12. Available from: <https://doi.org/10.1007/s00103-018-2833-9>.
- Dirección General de Epidemiología. Boletines Caminando a la Excelencia 2019. Boletín 2do. Trimestre 2019. Available from: <https://www.gob.mx/salud/acciones-y-programas/boletines-caminando-a-la-excelencia-2019>. Accessed Nov 2023.
- Arango-Bravo EA, Cetina-Pérez LdC, Galicia-Carmona T, Castro-Eguiluz D, Gallardo-Rincón D, Cruz-Bautista I, Duenas-Gonzalez A. The health system and access to treatment in patients with cervical cancer in Mexico. *Front Oncol*. 2022;12:1028291. <https://doi.org/10.3389/fonc.2022.1028291>
- González Block MA, Reyes Morales H, Cahuana Hurtado L, Balandrán A, Méndez E, Allin S. Mexico: Health system review. *Health Systems in Transition*, 2020; 22(2):i–222. Available at: <https://apps.who.int/iris/handle/10665/334334>.
- Campero L, Atienzo EE, Marín E, De la Vara-Salazar E, Pelcastre-Villa-fuerte B, González G. Detección temprana de cáncer de mama y cervicouterino en localidades con concentración de población indígena en Morelos. *Salud Publica Mex*. 2014;56:511–8.
- World Health Organization. Adherence for long – term therapies: evidence for action. Ginebra: World Health Organization; 2004. Available from: <https://iris.paho.org/handle/10665.2/41182>.
- Organización Mundial de la Salud. Estrategia mundial para acelerar la eliminación del cáncer del cuello uterino como problema de salud pública [Global strategy to accelerate the elimination of cervical cancer as a public health problem]. Ginebra: Organización Mundial de la Salud; 2022. Available from: <http://apps.who.int/iris>.
- Bogani G, Sopracordevole F, Ciavattini A, Ghelardi A, Vizza E, Vercellini P, Casarin J, Pinelli C, Ghezzi F, De Vincenzo R, Di Donato V, Golia D'augè T, Giannini A, Sorbi F, Petrillo M, Capobianco G, Vizzielli G, Restaino S, Cianci S, Scambia G, Raspagliesi F. HPV-related lesions after hysterectomy for high-grade cervical intraepithelial neoplasia and early-stage cervical cancer: A focus on the potential role of vaccination. *Tumori*. 2024;110(2):139–45. <https://doi.org/10.1177/03008916231208344>. Epub 2023 Nov 17 PMID: 37978580.
- Golia D'Augè T, Cuccu I, Etrusco A, D'Amato A, Laganà AS, D'Oria O, Bogani G, Di Donato V, Muzii L, Giannini A. State of the art on HPV-related cervical lesions. *Ital J Gynaecol Obstet* <https://doi.org/10.36129/jog.2024.161>
- Ortiz Suarez C. Instrument to assess treatment adherence in patients with cardiovascular risk factors. *Av enferm*. 2010;28(2):73–87.
- Rodríguez Chamorro MA, García-Jiménez E, Amariles P, Rodríguez Chamorro A, Faus MJ. Revisión de test de medición del cumplimiento terapéutico utilizados en la práctica clínica. *Aten Primaria*. 2008;40(8):413–7.
- Norma Oficial Mexicana NOM 014-SSA2–1994 para la prevención, detección, diagnóstico, tratamiento, control y vigilancia epidemiológica del cáncer Cérvico uterino cérvico uterino, actualizada en 2007 y publicada en el DOF 31 de mayo de 2007. Available from: <http://www.salud.gob.mx/unidades/cdi/nom/m014ssa294.pdf>.
- Sistema de Análisis de Peligros y de Puntos Críticos de Control (APPCC) y Directrices para su Aplicación [Anexo al CAC/RCP-1 (1969), Rev. 3 (1997)]. Available from: <https://www.fao.org/3/y1579s/y1579s03.htm>.
- Manga S, Kiyang E, DeMarco RF. Barriers and facilitators of follow-up among women with precancerous lesions of the cervix in Cameroon: a qualitative pilot study. *International Journal of Women's Health*. 2019;11:229–39.
- Linde DS, Rasch V, Mwaiselage JD, Gammeltoft TM. Competing needs: a qualitative study of cervical cancer screening attendance among HPV-positive women in Tanzania. *BMJ Open*. 2019;9:e024011.
- Chapola J, Lee F, Bula A, Mapanje C, Phiri BR, Kamtuwange N, et al. Barriers to follow up after an abnormal cervical cancer screening result and the role of male partners: a qualitative study. *BMJ Open*. 2021;11:e049901.
- Schoenberg N, Baltisberger J, Bardach S, Dignan M. Perspectives on pap test follow-up care among rural appalachian women. *Women Health*. 2010;50:580–97.
- Paul P, Winkler JL, Bartolini RM, Penny ME, Huong TT, le Nga T, et al. Screen-and-treat approach to cervical cancer prevention using visual inspection with acetic acid and cryotherapy: experiences, perceptions, and beliefs from demonstration projects in Peru, Uganda, and Vietnam. *Oncologist*. 2013;18(Suppl):6–12.
- Liang LA, Zeissig SR, Schaubberger G, Merzweiler S, Radde K, Fischbeck S, et al. Colposcopy non-attendance following an abnormal cervical cancer screening result: a prospective population-based cohort study. *BMC Womens Health*. 2022;22(1):285.
- Marván ML, Ehrenzweig Y, Catillo-López RL. Knowledge about cervical cancer prevention and psychosocial barriers to screening among Mexican women. *J Psychosom Obstet Gynaecol*. 2013;34(4):163–9.
- Saldaña-Téllez M, Montero M, López L. Barreras percibidas por el personal de salud para la toma de la citología cervical en mujeres zapotecas de Juchitán. *Oaxaca Psicooncología*. 2017;14(2–3):343–64.
- Marlow L, McBride E, Varnes L, Waller J. Barriers to cervical screening among older women from hard-to-reach groups: a qualitative study in England. *BMC Women's Health*. 2019;19(1):38.
- Boom K, Lopez M, Daher M, et al. Perspectives on cervical cancer screening and prevention: challenges faced by providers and patients along the Texas-Mexico border. *Perspect Public Health*. 2019;139(4):199–205. <https://doi.org/10.1177/1757913918793443>.

32. Paz-Soldán VA, Bayer AM, Nussbaum L, Cabrera L. Structural barriers to screening for and treatment of cervical cancer in Peru. *Reprod Health Matters*. 2012;20(40):49–58.
33. Bevilacqua KG, Gottschlich A, Murchland AR, Alvarez CS, Rivera-Andrade A, Meza R. Cervical cancer knowledge and barriers and facilitators to screening among women in two rural communities in Guatemala: a qualitative study. *BMC Womens Health*. 2022;22(1):197.
34. Datchoua Moukam AM, Embolo Owono MS, Kenfack B, Vassilakos P, Petignat P, Sormani J, et al. "Cervical cancer screening: awareness is not enough". Understanding barriers to screening among women in West Cameroon—a qualitative study using focus groups. *Reprod Health*. 2021;18(1):147.
35. Buchanan Lunsford N, Ragan K, Lee Smith J, Saraiya M, Aketch M. Environmental and Psychosocial Barriers to and Benefits of Cervical Cancer Screening in Kenya. *Oncologist*. 2017;22(2):173–81.
36. Darj E, Chalise P, Shakya S. Barriers and facilitators to cervical cancer screening in Nepal: A qualitative study. *Sex Reprod Healthc*. 2019;20:20–6.
37. Yang H, Li S-P, Chen Q, Morgan C. Barriers to cervical cancer screening among rural women in eastern China: a qualitative study. *BMJ Open*. 2019;9:e026413.
38. Ragan KR, Buchanan Lunsford N, Lee Smith J, Saraiya M, Aketch M. Perspectives of Screening-Eligible Women and Male Partners on Benefits of and Barriers to Treatment for Precancerous Lesions and Cervical Cancer in Kenya. *Oncologist*. 2018;23(1):35–43.
39. Sardi A, Orozco-Urdaneta M, Velez-Mejia C, Perez-Bustos AH, Munoz-Zuluaga C, El-Sharkawy F, et al. Overcoming barriers in the implementation of programs for breast and cervical cancers in Cali, Colombia: a pilot model. *J Glob Oncol*. 2019;5:1–9.
40. Meneses Navarro S, De la Rosa Cruz SA, León Maldonado L, Allen Leigh B. Retos de la consejería sobre la detección del virus del papiloma humano y el cáncer cervical en mujeres del medio rural e indígena. En: Meneses Navarro S y Freyermuth Enciso G, editores. *Contribuciones desde la antropología médica y la salud pública para personal de salud en regiones indígenas y rurales*. Instituto Nacional de Salud Pública: Centro de Investigaciones y Estudios Superiores en Antropología Social, México; 2020. p. 225–234. Available from: https://spmediciones.mx/libro/contribuciones-desde-la-antropologia-medica-y-la-salud-publica-para-personal-de-salud-en-regiones-indigenas-y-rurales_133924/.
41. Khan S, Woolhead G. Perspectives on cervical cancer screening among educated Muslim women in Dubai (the UAE): a qualitative study. *BMC Womens Health*. 2015;15:90.
42. Miles TT, Riley-Powell AR, Lee GO, Gotlieb EE, Barth GC, Tran EQ, et al. Knowledge, attitudes, and practices of cervical cancer prevention and pap smears in two low-income communities in Lima, Peru. *BMC Womens Health*. 2021;21(1):168.
43. Isa Modibbo F, Dareng E, Bamisaye P, Jedy-Agba E, Adewole A, Oyenyin L, et al. Qualitative study of barriers to cervical cancer screening among Nigerian women. *BMJ Open*. 2016;6(1):e008533.
44. Bermúdez PC, Arrivillaga M, Torres Poveda K, Castrillón Libreros DM, Castillo Castillo LE, Neira AD. Barriers to adherence to cytology exam: a case study in low-income Colombian women. *BMC Health Serv Res*. 2023;23(1):796.
45. Hui SK, Miller SM, Wen KY, Fang Z, Li T, Buzaglo J, et al. Psychosocial barriers to follow-up adherence after an abnormal cervical cytology test result among low-income, inner-city women. *J Prim Care Community Health*. 2014;5(4):234–41.
46. Aharon D, Calderon M, Solari V, Alarcon P, Zunt J. Barriers to follow-up for abnormal papanicolaou smears among female sex workers in Lima, Peru. *PLoS ONE*. 2017;12(1):e0169327.
47. Tatar O, Thompson E, Naz A, Perez S, Shapiro GK, Wade K, et al. Factors associated with human papillomavirus (HPV) test acceptability in primary screening for cervical cancer: A mixed methods research synthesis. *Prev Med*. 2018;116:40–50.
48. Conde-Ferraez L, Suarez Allen RE, Carrillo Martinez JR, Ayora-Talavera G, Gonzalez-Losa MR. Factors associated with cervical cancer screening amongst women of reproductive age from Yucatan. Mexico Asian Pac J Cancer Prev. 2012;13(9):4719–24. <https://doi.org/10.7314/apjcp.2012.13.9.4719>. PMID: 23167409.
49. Allen-Leigh B, Uribe-Zúñiga P, León-Maldonado L, Brown BJ, Lörincz A, Salmeron J, et al. Barriers to HPV self-sampling and cytology among low-income indigenous women in rural areas of a middle-income setting: a qualitative study. *BMC Cancer*. 2017;17(1):734.
50. NU, CEPAL-Swedish International Development Cooperation Agency. Programas de transferencias condicionadas. Balance de la experiencia reciente en América Latina y el Caribe. CEPAL; 2011 Available from: <https://www.cepal.org/es/publicaciones/27854-programas-transferencias-condicionadas-balance-la-experiencia-reciente-america>.
51. Segobia Lagos P. New methodological perspective for the evaluation of conditional transfer programs. *Perfiles Latinoamericanos*. 2020;28(56):379–403. Flacso México. Available from: <https://doi.org/10.18504/pl12856-015-2020>.
52. Meneses-Navarro S, Serván-Mori E, Heredia-Pi I, et al. Ethnic disparities in sexual and reproductive health in Mexico after 25 years of social policies. *Sex Res Soc Policy*. 2022;19:975–90.
53. Collins T, Stradtman LR, Vanderpool RC, et al. A community-academic partnership to increase pap testing in Appalachian Kentucky. *Am J Prev Med*. 2015;49(2):324–30.
54. Byrd TL, Chavez R, Wilson KM. Barriers and facilitators of cervical cancer screening among Hispanic women. *Ethn Dis*. 2007 Winter;17(1):129–34 PMID: 17274222. PMID: 17274222.

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