

# Causes for Late Diagnosis of Cervical Cancer in Three Colombian Border Regions and Strategies to Implement a Program for Its Control

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## Research article

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# Abstract

**Background:** Although cervical cancer is preventable through early detection and appropriate treatment, it is still one of the most common cancers in the developing world. In Colombia approximately half of the women diagnosed with cervical cancer die. The purpose of our study was to determine factors associated with delay in the diagnosis of cervical cancer (CC) and to establish strategies for its control in three border regions of Colombia with high number of indigenous and impoverished population.

**Methods:** We conducted a mixed study with convergent triangulation. The study was developed in two stages, first the quantitative component comprising a case-control study, followed by the qualitative component that included interviews and focus groups to healthcare personnel, members of women's associations, indigenous communities, and quantitative phase participants. We used the three-delay model as our theoretical framework; this has helped understanding the delay in decision-making by women regarding seeking care (delay 1: individual), arriving at the healthcare institution (delay 2: access), and receiving the appropriate treatment at the institution (delay 3: care and quality).

**Results:** Fifty-five women participated in the quantitative phase, and we conducted 64 interviews and 9 focus groups. Time between the first appointment or Pap smear and final diagnosis was more than two months in 76% of the participants. Delay one was most common among women in La Guajira (higher concentration of indigenous population), and delay two and three in Nariño. Pap smear after 25 years of age ( $p= 0.002$ ), and more than 3 years apart, once in a lifetime, or never ( $p< 0.001$ ) were associated with invasive CC. Barriers to undergo a Pap smear were negative experiences with the healthcare system, lack of symptoms, lack of an active sexual life, having only one partner or their partner not having other sexual partners, and fear of the test being painful. The main strategies proposed to prevent and control CC were education, improve actions to promote Pap smear, and human talent strengthening.

**Conclusion:** Even though individual factors played an important role in a delay diagnosis, they are closely influenced by actions of health care services, insurers, and public health actions.

## Background

In Colombia, cervical cancer (CC) is the fourth most common cause of cancer in women, with an incidence of 12,7 and mortality of 5,7 per 100.000 women.<sup>(1)</sup> This type of cancer has an unequal geographical distribution across the globe, with the disease burden being higher in countries with lesser social and economic development.<sup>(2)</sup> Unequal distribution is also present within countries. In Colombia, the disease prevalence is higher in poor areas, areas next to navigable rivers, border areas, and areas with high indigenous populations.<sup>(3)</sup> For example, between 2007 and 2011, mortality rates for the departments where the present study was conducted varied from 4,9/100.000 to 12,2/100.000.<sup>(4)</sup>

Infection by human papillomavirus (HPV) as causal agent, and presence of other cofactors are important in the development of the disease.<sup>(5-7)</sup> Moreover, several studies have reported that multiple structural

barriers in healthcare systems or services contribute to the delay in early diagnosis and prevent adequate treatment and follow-up.<sup>(7-9)</sup> Early detection programs for CC in rural populations and those with ethnic minorities are a challenge because they generally do not consider religious, sociocultural, and gender perspectives, thereby hindering disease control.<sup>(10)</sup> Another key aspect is geographical dispersion and accessibility issues related to the areas where they live.<sup>(11)</sup> Studies conducted on indigenous women have shown a lack of awareness of CC and difficulties in screening.<sup>(11-13)</sup>

Although CC is preventable through early detection and appropriate treatment, there are few studies that, from quantitative and qualitative perspectives, address socio-economic, cultural, individual, and health services factors, which could help to understand why a late diagnosis of the disease is reached. As a result, the aim of the authors was to determine factors associated with delay in the timely diagnosis of CC in three border regions in Colombia and to qualitatively assess cancer knowledge, screening practices, barriers, and strategies to prevent CC, taking into account the geographical and sociocultural contexts. Our results can be useful for decision-makers, insurance companies, and healthcare institutions.

## Methods

**Design.** To propose geographically and socioculturally pertinent strategies, a mixed design with convergent triangulation was used, where quantitative results were compared and expanded with qualitative results.<sup>(14)</sup> The study was developed in two stages, first, the collection and analysis of quantitative information was carried out, followed by the collection and analysis of qualitative information.

### Quantitative component

A case-control study matched by frequency for age and residence was used as a quantitative method. The eligibility criteria were as follows:

**Cases:** Women with a pathology result of invasive CC (Stage IIIB - IVB) were considered a late diagnosis of cervical cancer, and therefore invited to participate.<sup>(15)</sup> The woman had to be diagnosed within the last two months, living in one of the selected regions (15 in total), and aged less than 69 years (age limit for screening in Colombia).

**Controls:** Women with a colposcopy/biopsy negative for invasive CC performed within the previous 2 months, with  $\pm 5$  years of age in relation to the case, and without a medical history of cervical disease or hysterectomy. Furthermore, they must have resided in the same municipality as their corresponding case during the previous year.

Both case and control subjects had to physically and cognitively understand and answer questions.

**Participants and procedures.** The study was conducted in three departments in Colombia, namely, La Guajira, Amazonas, and Nariño. These departments are border areas and have a high presence of ethnic

minorities. Some municipalities from each department were selected by taking into account population density, accessibility, security, and information availability. In Amazonas, the two municipalities, Leticia and Puerto Nariño that represented 64% of the population of the department were selected. In La Guajira, we selected Riohacha, Manaure, Maicao, Uribia, San Juan del Cesar, Albania, El Molino, Barrancas, and Villanueva, which represent 87% of the population of the department. In Nariño, we selected Pasto, Tumaco, Ipiales, and La Unión that represent 46% of the population of the department.

The number of women with cervical cancer (cases) that occur in a calendar year is low compared to other health events. For example, in Pasto, 49 cases were reported in 2010. Data for Amazonas and La Guajira were limited, but given that they have a smaller population than Nariño, it was estimated that the number of cases would be much smaller. Therefore, it was not appropriate to use a sample. Therefore, measurements were made for all women who met the inclusion criteria for a period of 16 months. With this strategy, the absence of the random error was guaranteed and therefore, there is also no standard error. Non-random biases were minimized by homogenizing the measurements to be performed both in the controls and in the cases.

Quantitative information was collected between February 2016 and June 2017. For data collection, we contacted all pathology laboratories, clinics, hospitals, and insurance companies in the three departments. Databases of these organizations were reviewed every 15 days to detect potential cases and controls that met the eligibility criteria. Once a potential participant was identified, the subject was contacted by the insurer or health care provider to explain in detail what her participation would entail. Then, trained personnel from the project conducted the consent process, obtained their signature, and applied a questionnaire of 114 questions with an approximate duration of 45 minutes.

**Theoretical model and questionnaire.** The questionnaire was designed taking into account the objectives and the proposed theoretical model (three-delay model). This model is mostly used to assess maternal mortality and was adopted in 1998 by the World Health Organization.<sup>(16, 17)</sup> Given that CC in most instances, is also a preventable event we adopted this model. This theoretical model has significantly helped understand the delay in decision-making by women regarding seeking care (delay 1: individual), arriving at the healthcare institution (delay 2: access), and receiving the appropriate treatment at the institution (delay 3: care and quality). Thus, this model considers internal and external factors associated with the disease or event. Invasive cervical cancer and extreme maternal morbidity, share some of these factors, such as those related to the social context, the accessibility to preventive and curative health services, and conditions related to the health system.

Delay 1 (individual): Refers to the delay in the decision to seek attention, because the signs of the complication are not recognized or because, despite doing so, the decision is not made or actions are not taken to attend the consultation. This relates among others to the social, cultural, and educational context of women.

Delay 2 (access): Delay in the arrival at a health care center attributable to social, economic, environmental, cultural or administrative conditions that make access to services difficult. It is the period between the moment when the decision to consult is made until the woman has contact with the health institution.

Delay 3 (care and quality): Delay in the opportunity for care or deficiencies in the quality of care provided. It begins at the time of admission to the institution and ends when the specific treatment required in each case is administered.

The questionnaire was reviewed by all co-investigators and subsequently underwent a face and content validity process with field experts. The questionnaire was also validated in terms of language and comprehension with two women with sociodemographic characteristics similar to those of the subject population. For women in the indigenous communities of La Guajira who did not speak Spanish, the questionnaire was translated into the ancestral language Wayuunaiki and conducted by a bilingual person. A pilot test was also conducted with two women, and few adjustments were made in terms of phrasing and the order of questions.

The questionnaire included variables such as sociodemographic characteristics, CC and HPV knowledge, social support, perceived health status, CC risk factors, and delay-associated factors.

A score was calculated using the sociodemographic information by adding up some aspects from women's dwelling, public services, occupation, and salary. The highest score was 21, which represented the most favorable socioeconomic status.

Taking into account CC risk factors recognized in the literature, we calculated a score derived from the sum of the following variables: number of sexual partners, age of first sexual encounter, condom use, number of pregnancies, and tobacco use. Therefore, a woman with a score of five had all the risk factors.

A knowledge score was also calculated from the sum of knowledge scores for Pap smear, CC risk factors, and HPV, with zero being the value for incorrect or do not know/no response answers and one for correct answers. The highest score being 14 and representing high knowledge.

The following variables were used to evaluate delay 1 (individual): delay in having the first Pap smear; number of Pap smears throughout life; not screened because of lack of time, fear, laziness, not trusting health personnel; belief that the test is not needed because of age; lack of sexual relations; not feeling unwell; embarrassment to undergo test; lack of awareness of where the service is provided; not seeking results from previous Pap smear; and symptoms appearing >30 days before the first appointment. The following variables were used for delay 2 (access): expensive travel, service far away or in another municipality, time to health service >30 minutes. Lastly, the following variables were used for delay 3 (care and quality): expensive service; Pap smear paid by the patient; not receiving care; poor quality service; numerous administrative procedures; delay in scheduling appointments; delay in care and delivery of results; doctor not requesting a Pap smear; Pap smear importance not explained to the patient;

patient not receiving the Pap smear results; authorization needed for a Pap smear, colposcopy or biopsy; authorization for a colposcopy or biopsy taking more than 15 days; time between first appointment and diagnosis higher than 2 months, and in case the woman was not aware of Pap smear, lack of awareness of where the service is provided was considered delay 3. A score was calculated from the questions included in each delay. The score was between 0 and 15 for delay 1, between 0 and 5 for delay 2, and between 0 and 24 for delay 3. A higher value was equivalent to a higher delay.

**Data analysis.** Quantitative data were analyzed using R and SPSS. Bivariate analyses were performed to establish significant differences between cases and controls. A binomial logistic regression model was used to explore variables associated with the diagnosis of CC. Variables included in the model through the enter method were: delay 1 ( $p < 0.001$ , p-values correspond to bivariate analyses), delay 2 ( $p = 0.563$ ), delay 3 ( $p = 0.340$ ), ethnic group ( $p = 0.992$ ), socioeconomic index ( $p = 0.037$ ), presence of risk factors ( $p = 0.307$ ), religion ( $p = 0.826$ ), cancer knowledge ( $p = 0.282$ ), decision to undergo a Pap smear ( $p = 0.070$ ), and healthcare seeking different than screening ( $p = 0.044$ ). Control variables included in the model were age and department of residence.

## Qualitative component

**Participants and procedures.** Qualitative information was collected between October 2016 and March 2017 by trained staff mentioned in the acknowledgement section, and one of the authors (SMRJ, magister in collective health) who was also the project coordinator. The staff team had three women and one man, among them one nurse and three health promoters (two from indigenous population). In all three departments, interviews and focus groups of approximately one hour were conducted and then transcribed. Transcripts were not returned to participants for comment and/or correction. We used a guide with semi-structured questions, constructed taking into account the type of interviewee (four guides). Participants were selected through telephone or face-to-face using stratified purposeful sampling, to capture major variations rather than to identify a common core. Only one interview was conducted with each participant and participants included healthcare personnel (nurses and nursing assistants, microbiologist, physicians and specialists), members of women's associations and from indigenous communities (traditional healers, traditional midwives, public healthcare assistant, indigenous authorities, and female leaders). Additionally, all case and control subjects were invited to participate, their participation depended on women's availability or interest. It should be noted that in the department of Amazonas in the qualitative phase, we did not have participants from the case and control study due to difficulties to contact them again or because some of them died. The interviews were conducted in hospitals, the universities of Antioquia and Nariño, and the homes of the participants. In the case of Amazonas and La Guajira, the interviews were also carried out in indigenous communities. The participants did not have prior relationship with the researchers and none of the invited participants refused to participate. No one else besides the participants and interviewer was present at the time of the interviews or focus groups. At the end of the research, a meeting in the three departments was held to share the results, and a booklet with the results was sent via certified mail to all participants who could not attend the meetings.

**Topic guides.** Topic guides of the qualitative phase for healthcare professionals focused on the operation of CC prevention programs/strategies, barriers to perform Pap smears, follow-up of possible abnormalities, timely diagnosis of cancer, facilitators, and recommendations to prevent CC in the department. The guide for key informants focused on cancer knowledge, western and traditional CC prevention and care practices, presence of CC risk factors, and recommendations to prevent CC within the department. The guide for women focused on meanings assigned to experiencing a disease in their genital organs or cancer, CC knowledge, experiences with diagnostic procedures, barriers in timely diagnosis, communication between patient and health personnel, and facilitators or strategies needed to prevent CC. When conducting the first interviews, the topic guides were refined, specifically minor changes were made to the women's guide, by including more questions about experiences from cancer diagnosis. No field notes were taken.

**Analysis.** The number of interviews was determined by the saturation criterion, when the data began to be repeated and there were no new contributions. A content analysis technique was applied for the qualitative analysis.<sup>(18, 19)</sup> Two researchers coded the interviews by grouping analysis units, considering the main topics of the guides. These units were subsequently classified into categories and subcategories. To facilitate the count, frequency tables were created to display the number of times that the same code was repeated, differentiated by key informant and department.

**Data Integration.** Quantitative and qualitative data were analyzed separately and subsequently merged according to thematic relevance. The integration of the data at the level of interpretation and presentation was carried out through narrative, which facilitates to show the connection of qualitative and quantitative data.

## Results

Fifty-five women participated in the case-control study: 29 in the case group and 26 in the control group. Women in the control group were diagnosed with cervical squamous intraepithelial neoplasia 1, cervicitis, or polyps. There were 20 cases and 18 controls in Nariño; 2 cases and 2 controls in Amazonas; and 7 cases and 6 controls in La Guajira. In the qualitative phase, 64 interviews and 9 focus groups were held, and their distribution is shown in Table 1.

Table 1  
Interviews and focus groups held depending on the role and region (department)

Role/department	La Guajira	Nariño	Amazonas
<b>Healthcare professionals</b>	6 interviews and 2 focus groups	7 interviews and 2 focus groups	6 interviews
<b>Key informants</b>	5 interviews and 1 focus group	1 focus group	30 interviews
<b>Case and control women</b>	5 interviews and 1 focus group	5 interviews and 2 focus groups	None

**Sociodemographic characteristics.** The average age was 53.9 (SD 9.6) years for cases and 49.8 (SD 6.9) years for controls (Table 2). Among all participants, 10 women from the case group and 9 from the control group (35%) were indigenous or afro-descendants. Most women were married (62%), followed by single (22%) and separated or widow (16%). Furthermore, 93% of case and 92.3% of control subjects reported to be enrolled in the subsidized (public) healthcare system.

Table 2

Sociodemographic characteristics, risk factors, and knowledge about cancer in women from case and control groups

Characteristics	Cases	Controls	OR*	(95% CI)	P**
	(N = 29)	(N = 26)			
	n (%)	n (%)			
Age [Average/SD]	[53.3/9.6]	[49.8/6.9]	1.05	(0.99–1.13)	0.129
Department					
La Guajira	7 (24.1)	6 (23.1)	1.00		
Amazonas	2 (6.9)	2 (7.7)	0.86	(0.08–9.0)	0.893
Nariño	20 (69.0)	18 (69.2)	0.95	(0.26–3.4)	0.940
Belongs to an ethnic group					
No	19 (65.5)	17 (65.4)	1.00		
Yes	10 (34.5)	9 (34.6)	1.05	(0.27–4.09)	0.992
Marital status					
Married/civil union	17 (58.6)	17 (65.4)	1.33	(0.45–3.98)	0.868
Separated/widowed/single	5 (17.2)	4 (15.4)	1.00		
Socio-economic index <sup>a</sup>					
Mid and high tertiles	12 (41.4)	18 (69.2)	1.00		
Lower tertile	17 (58.6)	8 (30.8)	3.67	(0.93–17.03)	0.037
Health insurance type					
Private	2 (6.9)	2 (7.7)	1.00		
Public	27 (93.1)	24 (92.3)	0.77	(0.07–8.08)	0.910
Risk factors' index <sup>b</sup>					
Mid and high tertiles	12 (41.4)	18 (69.2)	1.75	(0.59–5.26)	0.307
Lower tertile	17 (58.6)	8 (30.8)	1.00		

\*Odds ratio adjusted by age and department of residence. \*\*Chi-square

a. Variables included in socioeconomic index: years of education, literacy, occupation, income, public services, personal property, type of dwelling and dwelling materials.

b. Variables included in risk factor index: number of sexual partners, age of first sexual encounter, condom use, number of pregnancies, and tobacco use.

Characteristics	Cases	Controls	OR*	(95% CI)	P**
	(N = 29)	(N = 26)			
	n (%)	n (%)			
Cervical cancer knowledge					
Mid and high tertiles	16 (55.2)	18 (69.2)	1.00		
Lower tertile)	13 (44.8)	8 (30.8)	1.57	(0.47–5.43)	0.282
Decision to undergo Pap smear					
Own	17 (63.0)	22 (84.6)	1.00		
Someone else's	10 (37.0)	4 (15.4)	4.08	(0.90–22.51)	0.070
*Odds ratio adjusted by age and department of residence. **Chi-square					
a. Variables included in socioeconomic index: years of education, literacy, occupation, income, public services, personal property, type of dwelling and dwelling materials.					
b. Variables included in risk factor index: number of sexual partners, age of first sexual encounter, condom use, number of pregnancies, and tobacco use.					

The socioeconomic score (highest value: 21) was different among cases (average: 8.6, SD: 3.8) and controls (average: 10.2, SD: 2.9). Furthermore, 60% of cases and 31% of controls were in the lower tertile. These differences were also observed among departments, with women from La Guajira having the lowest socioeconomic index (lower tertile), with a score of 77%, compared with the score of women from Nariño (32%).

Regarding CC risk factors, most women in the control group (69%) were in the mid and high tertiles compared with the case group (41%). During the interviews with healthcare professionals, they emphasized that early start of sexual relations was more frequent and that the number of partners had increased in the general population, which contributed to recurrent HPV infections. Similar information, including multiparity and less use of condoms, was reported in the interviews with key informants.

*“Women get married one year after getting their first period; they only wait the year when they’re locked down [ancestral practice in this indigenous community] and that’s all” (midwife, La Guajira).*

**Knowledge and practices related with screening.** Although 70% of women in the control group had sufficient knowledge of CC compared with 55% in the case group, the difference was not statistically significant ( $p = 0.282$ ). In contrast, 100% of controls were aware of the use of Pap smears compared with 76% of the cases ( $p = 0.002$ ).

The interviews showed that, even though most participants mentioned that they were somehow aware of cancer and that they had heard of it before or had witnessed a previous experience from one of their

acquaintances, there were many knowledge gaps regarding this disease. This was even more evident in women who were diagnosed with CC and who mostly were unaware of its origin, as seen below:

*"I don't really know, no idea what you have to do to get this disease" (A005-Case).*

*"What do I really know about cervix cancer? To be honest, I don't know, I don't know what its origins could be" (A002-Control).*

Similarly, participants mentioned some characteristics or attributes that differentiate cancer from other diseases, which gives it the connotation of "dreadful" because it is "silent," makes people sad, and can be fatal.

*"No, it is horrible indeed, I wouldn't wish that disease on anyone" (public health assistant, indigenous community in Amazonas).*

Regarding Pap smear knowledge and the decision to undergo the test, there was a range of opinions. Some participants, particularly some women in Nariño and in the control group, were aware of the test and also regularly underwent it, mainly because they knew it was important and beneficial to their health and to prevent CC. On the other hand, some women were unaware of this test, particularly indigenous women from La Guajira who mentioned that no information had been provided in their communities and that it was also a topic that they did not tend to think about.

*"Since my first smear test, I have been told it's used to prevent cancer, to check I am not infected, and to check I am in good health, so it's for my own health's benefit" (C011-Case).*

*"No! It's not known, people don't know that [Pap smear] test" (A004-Case).*

Furthermore, 63% of women in the case group and 84.6% in the control group decided themselves to undergo a Pap smear, whereas the remaining women in the case (37%) and control (15%) groups stated that someone else made the decision ( $p = 0.070$ ). Moreover, most women reported having symptoms before the Pap smear (controls: 65%, cases: 63%).

**Delays.** *Delay 1, individual factors.* On a bivariate level, cases showed a higher probability of experiencing type 1 delays than controls (OR: 7.70; CI: 2.28–30.35; Table 3). When this delay was analyzed, variables that were significant and proved to play an important role in invasive CC onset were age at first Pap smear > 25 years ( $p = 0.002$ ) and frequency of Pap smears which includes: more than 3 years, once in a lifetime, or never ( $p < 0.001$ ). Regarding the starting age for screening, it was determined that in La Guajira, 91% of subjects underwent their first test after the age of 25 years compared with 52% in Nariño and 50% in Amazonas. The number of Pap smears during their lifetime also showed differences ( $p = 0.05$ ); the average number of Pap smears was 7 in La Guajira, 18 in Amazonas, and 16 in Nariño.

Table 3

Frequency distribution and odds ratios of delays 1, 2, and 3 in case and control groups.

Characteristics	Cases	Controls (N = 26)	OR*	(95% CI)	p**
	(N = 29)				
	n (%)	n (%)			
Type 1 delay					
[Average/SD]	[2.7/1.8]	[0.9/1.1]	2.28	(1.46–3.98)	
Low and mid tertiles	10 (34.5)	22 (84.6)	1.00		<b>&lt;0.001</b>
High tertile	19 (65.5)	4 (15.4)	10.70	(2.88–50.40)	<b>&lt;0.001</b>
Type 2 delay					
[Average/SD]	[1.0/0.8]	[0.8/0.7]	1.42	(0.67–3.15)	
Low and mid tertiles	9 (31.0)	10 (38.5)	1.00		0.270
High tertile	20 (69.0)	16 (61.5)	1.21	(0.32–4.66)	0.563
Type 3 delay					
[Average/SD]	[3.4/2.0]	[3.9/1.6]	0.86	(0.62–1.17)	
Low and mid tertiles	16 (55.2)	11 (42.3)	1.00		0.327
High tertile	13 (44.8)	15 (57.7)	0.55	(0.17–1.69)	0.340
*Odds ratio adjusted by age and department of residence. **Chi-square					

Although the reasons for not undergoing a Pap smear did not differ between cases and controls, some differences were found depending on the place of origin. Among women from La Guajira, the main reasons were not feeling unwell (50%) and being unaware that they had to undergo the test (25%), whereas in Nariño, the reasons were poor quality service (20%) and laziness or carelessness (25%).

The interviews highlighted personal barriers that prevented women from undergoing a Pap smear. The most important barriers were negative experiences with the healthcare system, lack of symptoms, lack of an active sexual life, having only one partner or their partner not having other sexual partners, and fear of it being painful. Although these were defined as personal barriers, some were closely linked to a lack of education from health services:

*"...Maybe due to a bit of fear, anxiety. Because it's an invasive procedure, so they're scared it could be painful, so they think" (health care professional 11, La Guajira).*

*"I used to think, why would I get a Pap smear done? I thought that a Pap smear was only done on women with a private life, who spend time with a man or another" (A005-Control).*

Barriers related to health personnel were also mentioned, such as a dehumanized treatment:

*"Because when I get the Pap smear test done, sometimes nurses hurt you inside. You have to be like 15 days or one month without having any relationships, so I rather not take it. I'm pretty honest and I say I'm not taking it, why? Because I prefer traditional medicine" (female leader 07, Amazonas).*

*Delay 2, access to health services.* With regard to delay 2, there were no significant differences between cases and controls (OR: 1.21; CI 0.32–4.66). When analyzing variables included in this delay, 100% of cases and 83% of controls considered that transportation was inexpensive. Moreover, 100% of controls and 95% of cases did not perceive the health service center as being far away. However, 62% of controls spent over 30 minutes in traveling compared with 41% of cases. The analysis according to the department showed that 79% of women from Nariño presented with this delay, followed by 38% from La Guajira and 25% from Amazonas.

On the contrary, qualitative analysis exposed geographical barriers to access health services and out-of-pocket expenses related to transportation, food, and accommodation outside home. The situation was even more serious for women who lived in indigenous communities.

*"Geographical distances, as I was saying, in 21 communities that are located throughout the Amazon River and River Loretoyaco prevent women from having access to Pap smear testing. Having to travel two or three hours from the communities makes it very hard" (healthcare professional 04, Amazonas).*

*Delay 3, care and quality.* There were no differences between cases and controls in terms of delay 3 (OR: 0.55, CI: 0.17–1.69; Table 3). When analyzing variables included in the delay, 53% of cases had paid for a Pap smear at some point in their life. In contrast, none of the cases and controls considered that the service was expensive, and most women received care when needed. In terms of service quality, 16% of cases reported that it was poor, whereas none of the controls considered it to be poor. There were delays for both cases and controls in authorization times for diagnostic aids or procedures; delivery of tests such as Pap smears, colposcopies, or biopsies; and establishing a final diagnosis. Furthermore, the time between the first appointment or Pap smear and final diagnosis was more than two months in 73% of cases and 79% of controls.

Qualitative findings were consistent. According to participants, from Pap smear uptake to cancer treatment there were extensive administrative procedures and multiple bureaucratic problems.

*"He [doctor] told me that I'd get my surgery in 8 days, but my insurance company took longer and didn't issue the authorization. They told me that it couldn't be here [municipality 1], but in Pasto [capital city], because it was a high-risk procedure. So they told me it was in Pasto and they had me back and forth, I even had to get a tutela (legal action)" (Case C008).*

Delays in procedures can usually be explained by a low number of healthcare institutions, lack of human resources, contracting problems between insurance companies and healthcare providers, lack of supplies, and expenditure restraint.

The results would be delayed 3 months, 6 months or 1 year, depending on contracts with cytologists and pathologists in Bogotá. If they don't get paid, results don't arrive and people get tired of waiting for them (specialist, Amazonas).

**Factors associated with invasive CC.** Only delay 1 was found to be associated with invasive CC in the logistic regression model (OR: 8.78, CI: 1.77–57.91). Therefore, not undergoing a Pap smear at an adequate age and frequency increases the probability of developing this type of cancer by 8-fold (Table 4).

Table 4  
Multivariable model for factors associated with invasive cervical cancer

Characteristics	OR*	(95% CI)	p**
Belongs to an ethnic group			
No	1.00		
Yes	0.79	(0.11–5.31)	0.897
Socioeconomic index			
Mid and high tertiles	1.00		
Low tertile	1.51	(0.23–10.03)	0.092
Presence of risk factors			
≤ 2	1.00		
≥ 3	0.63	(0.13–2.89)	0.535
Religious belief			
Catholic	1.00		
Other	1.75	(0.14–21.32)	0.663
None	2.60	(0.21–39.72)	0.750
Cervical cancer knowledge			
Mid and high tertiles	1.00		
Low tertile	1.55	(0.30–8.36)	0.626
Decision to undergo Pap smear			
Own	1.00		
Someone else's	1.39	(0.14–13.29)	0.114
Type 1 delay			
Low and mid tertiles	1.00		
High tertile	8.78	(1.77–57.91)	0.009
Type 2 delay			
Low and mid tertiles	1.00		
High tertile	0.46	(0.06–3.02)	0.522
Type 3 delay			
*Odds ratio adjusted by age and Department of residence. **Chi-cuadrado			

Characteristics	OR*	(95% CI)	p**
Low and mid tertiles	1.00		
High tertile	0.49	(0.10–2.20)	0.260
Healthcare other than screening			
Low and mid tertiles	1.00		
High tertile	0.36	(0.08–1.53)	0.167
*Odds ratio adjusted by age and Department of residence. **Chi-cuadrado			

**Strategies to prevent CC.** The information extracted from interviews held with women, key informants, and healthcare professionals in all the three departments produced 25 strategies for Nariño and Amazonas and 24 for La Guajira. These strategies were analyzed during a workshop with researchers, which included professionals from each department, thereby facilitating a contextual reading of the problem. The strategies were subsequently graded with a score between zero and five for each of the following items: ability for the strategy to be achieved with minimal resources, acceptance from healthcare professionals and the community, and impact of the strategy to reduce CC. The three strategies with the highest score were education, improve actions to promote Pap smear, and human talent strengthening. Table 5 describes the target population proposed for each strategy and punctual actions to carry them out.

Table 5  
Strategies for cervical cancer prevention in three regions in Colombia

Strategy	Number of people that mentioned this strategy	Target	How
<b>Educational strategies to prevent cervical cancer</b>	25	Men and women, indigenous authorities, and traditional healers	<ul style="list-style-type: none"> <li>• Through radio programs and/or public health assistants, volunteer work, and community networks</li> <li>• Education in the language of communities with ethnic relevance</li> <li>• Outreach door to door education</li> <li>• Articulate traditional and western medicine</li> <li>• Patient navigator services</li> </ul>
<b>Improvement strategies to promote Pap smear</b>	13	Healthcare institutions, insurance companies	<ul style="list-style-type: none"> <li>• Outreach Pap smear campaigns</li> <li>• Promoting patient recruitment through general practitioner consultation</li> </ul>
<b>Human talent strengthening</b>	16	Health personnel	<ul style="list-style-type: none"> <li>• Review of differentiated urban/rural health care pathways, CC ethnic groups, and their dissemination</li> <li>• Periodic training and theoretical/practical evaluations related to screening and follow-up</li> <li>• Training and raising awareness among health personnel regarding humanized/respectful treatment</li> </ul>

## Discussion

For the majority of participants (76%), the time between the first appointment or Pap smear and final diagnosis was more than two months. Delay one was most common among women in La Guajira (higher concentration of indigenous population), and delay two and three in Nariño. Women in La Guajira presented the lowest knowledge about cervical cancer and its prevention. Delay one or individual factors were the group of factors statistically associated with invasive cancer, mainly never having a Pap smear, age at first Pap smear greater than 25 years, and inadequate frequency of Pap smears (more than every 3 years, once in a lifetime).

Implementing preventive programs that take into account cultural, social, and geographical particularities of women and their territories may be vital to control the disease. Even though some factors associated with a delay diagnosis could be considered of the individual level, they are closely influenced by actions

of health care services, insurers, and public health actions. Reducing the incidence of CC and its mortality rate has been possible in some countries because of the introduction of effective programs, even with the use of screening techniques, such as Pap smear.<sup>(20)</sup> Efforts have been made in Latin America to implement visual inspection with acetic acid in dispersed populations, HPV DNA testing, and HPV vaccination. However, other strategies in personal and health service barriers must be adapted to achieve a reduction.<sup>(21, 22)</sup>

The results of this study are consistent with findings around the world, that report that poorer women and with lower level of education are more prone to develop CC. A study conducted in three Colombian cities among non-vaccinated women ages 18 to 25 years old reported high prevalence of any HPV type (60.3%) and 42.2% for high-risk HPV.<sup>(23)</sup> Some studies have shown that low-income women, from indigenous communities,<sup>(24)</sup> or women in rural areas are more likely to have HPV,<sup>(25)</sup> possibly due to nutritional deficiencies<sup>(26)</sup> and differences in the construction of sexual networks, perhaps due to cultural factors.<sup>(25)</sup> Unfortunately, these women are also less likely to undergo screening than those who live in urban areas.<sup>(27)</sup>

Cancer knowledge among study participants was low, particularly in women from the case group who had a lower level of education and non-remunerated jobs. Similar findings were reported in a study in Fiji, where women with a lower level of education and without an occupation had less knowledge.<sup>(28)</sup> Other studies in Nigeria and Gabon (Africa) showed a poor knowledge of risk factors and HPV in general. They also revealed that a higher level of education was proportional to a higher number of Pap smears throughout life. Furthermore, lack of knowledge was constantly mentioned as a barrier for undergoing Pap smear, in the same manner as it was reported during the qualitative phase of the present study.<sup>(29)</sup>

Regarding lack of knowledge, individual factors such as carelessness, fear, shame, belief of being unnecessary, and not feeling unwell as well as other cultural factors such as objection from partners play an important role in undergoing screening tests properly.<sup>(22)</sup> Unfortunately, no clear actions, such as culturally pertinent education and proper communication, were implemented by health services to alleviate these barriers. This situation was worsened in women from indigenous communities whose cosmogony, individual and collective vision toward the disease, health practices, gender roles, and language need to be understood.<sup>(30)</sup>

Delays attributed to the healthcare system were also mentioned during the study as limitations for a timely diagnosis. Among these, administrative procedures, queues, delays in scheduling appointments with specialists, delays in diagnostic tests, and long waits for results were the most common. Unfortunately, the problem in Colombia and other countries with similar healthcare systems is structural. There is a higher concentration of health services in towns/urban areas and lack of available physicians in rural communities; in general, healthcare providers focus on financial interests of the system and not on prevention and follow-up.<sup>(8, 31, 32)</sup>

Developing strategies that can link screening, follow-up, and treatment with different perspectives at both individual and community levels can contribute to considerably lowering social barriers and promoting women participation in screening programs.<sup>(33)</sup> Likewise, some studies have concluded that culturally designed interventions are more effective in improving health results, even in chronic diseases, than standard care interventions.<sup>(34)</sup>

One of the limitations of this study is that the sample size of the quantitative phase is small; this was because we took incident cases of only invasive disease in a period of a year and four months, in places of the country with low number of inhabitants. However, we consider that the sample size represents the current situation of women with this disease in these areas of the country. One of the strengths of this research was the mixed methods analysis that we conducted, this triangulation of the information presented a novel perspective of the problem. Future studies could focus on adherence to treatment, innovative primary health care strategies such as, self-collected sampling for HPV testing among women with cultural barriers to access health services, and strategies to increase Pap smear uptake or HPV test uptake among indigenous women.

## Conclusions

Health personnel need to be aware of barriers presented by women to access screening and follow-up treatment, since many of them are related with inadequate health promotion and communication practices at the primary health care level. The strategies proposed in this study can be useful to promote changes in CC prevention and control, among decision-makers, insurance companies, and healthcare institutions. Including sociocultural aspects, organizing outreach home-to-home training, integrating both western and traditional medicine, incorporating a patient guide or navigator in the healthcare system, improving treatment given by health personnel, and building differentiated clinical pathways can be useful to reduce cancer incidence in certain regions with similar characteristics or in immigrant Latin women.

## Abbreviations

CC: Cervical cancer

HPV: Human papillomavirus

OR: Odds ratio

CI: Confidence interval

## Declarations

**Ethics approval and consent to participate.**

The research was conducted in accordance with the ethical standards provided by the International Ethical Guidelines for Health-related Research Involving Humans, prepared by the Council for International Organizations of Medical Sciences (CIOMS) in collaboration with the World Health Organization and the principles contained in the Declaration of Helsinki. The study was approved by the Ethics Committee of the *Facultad Nacional de Salud Pública* (School of Public Health) of University of Antioquia. Participants signed a consent form. Their voluntary participation was kept confidential by assigning them a code to prevent them from being personally identified.

### **Consent for publication.**

Not applicable.

### **Availability of data and materials.**

The datasets generated and/or analyzed during the current study are not publicly available because individual privacy could be compromised.

### **Competing interests.**

The authors declare that they have no competing interests.

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### **Authors' contributions.**

ICGP: substantial contributions to the conception and design of the study; analysis and interpretation of data; contributed to the writing of the manuscript and approved the submitted version.

SMRJ: contributions to the design of the study; collection, analysis and interpretation of data; contributed to the writing of the manuscript and approved the submitted version.

DPMB: analysis and interpretation of data; contributed to the writing of the manuscript and approved the submitted version.

ARB: substantial contributions to the conception and design of the study, analysis of data; contributed to the writing of the manuscript and approved the submitted version.

AB: analysis of data; contributed to the writing of the manuscript and approved the submitted version.

MCYC: contributions to the design of the study, analysis of data; contributed to the writing of the manuscript and approved the submitted version.

EJGP: contributions to the design of the study, analysis of data; contributed to the writing of the manuscript and approved the submitted version.

MACD: analysis of data; contributed to the writing of the manuscript and approved the submitted version.

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