ORIGINAL ARTICLE

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Author contributions: ESD participated in the conception and design of the work, drafting of the manuscript, approval of the final version, and project management. FRR participated in the conception and design of the work, data curation, formal analysis, critical review of the manuscript (revision and editing), and approval of the final version. DRP participated in the conception and design of the work, interpretation of results, and drafting of the manuscript. All authors approved the published version and assume responsibility for what has been published.

Acknowledgment of authorship: All authors declare that they have contributed to the idea, study design, data collection, data analysis and interpretation, critical review of the intellectual content, and final approval of the submitted manuscript.

Ethical responsibilities: This study was approved by the Institutional Research Ethics Committee of the University of Piura (File No. T0324-04).

Data confidentiality: Publicly available secondary data from the Demographic and Family Health Survey (ENDES) were used, which do not contain personally identifiable information.

Right to privacy and informed consent: An anonymized, publicly available database was used; it was not necessary to request individual informed consent.

Funding: This study did not receive external funding from any public or private source.

Conflict of interest: The authors declare that they have no conflicts of interest related to the research, analysis, or publication of this manuscript.

Use of artificial technology in the research or preparation of the article

No artificial intelligence was used in the preparation of this article. All scientific, methodological, and analytical decisions were made exclusively by the authors.

Original contribution and significance: This manuscript is an original work, has not been previously published, and is not being evaluated by another journal. It provides recent evidence on the factors associated with the receipt of Pap smear results in Peruvian women, which is relevant information for strengthening cervical cancer prevention strategies.

Received: 11 August 2025

Accepted: 14 November 2025

Online publication: 8 December 2025

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Cite as: Sánchez-Díaz E, Romaní-Romaní F, Ríos-Piñeyro D. Factors associated with receiving and knowing the results of the Papanicolaou test among women aged 25 to 64 years in Peru. Rev peru ginecol obstet. 2025;71(3). DOI: https://doi.org/10.31403/rpgo.v71i2801

Factors associated with receiving and knowing the results of the Pap test among women aged 25 to 64 years in Peru

Factores asociados a recibir y conocer los resultados de la prueba de Papanicolaou entre mujeres de 25 a 64 años en Perú

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DOI: https://doi.org/10.31403/rpgo.v71i2801

ABSTRACT

Introduction: The determinants of undergoing a Pap smear have been widely studied; however, few studies have analyzed the factors influencing the receipt and understanding of Pap smear results. Specifically in Peru, this issue has not been explored at the population level. Objectives: To identify the factors associated with not receiving and not knowing the results of the Pap smear test in women in Peru. Materials and methods: Cross-sectional, analytical study based on data from the Peruvian Demographic and Family Health Survey (ENDES, 2023). Women aged 25-64 years who had a Pap test in the last three years were included. Sociodemographic and household characteristics associated with receiving and knowing the results of the Pap smear test were evaluated. The association was analyzed using crude and multivariable analyses, and adjusted prevalence ratios with their respective 95% confidence intervals (95% CI) were estimated. Results: 7,342 women were included, 84.9% received or knew the results of the test. The probability of knowing the results was higher among women in the richest quintile (aPR: 1.07; 95% CI: 1.01–1.14) compared to those in the poorest quintile, and among those residing in urban areas (aPR: 1.06; 95% CI: 1.01–1.11) compared to rural areas. Conclusions: 15% of women who underwent a Pap smear in the past three years did not receive or were not informed of the results. Further studies are needed that consider other variables that may affect the receipt and awareness of Pap smear results.
Key words: "Uterine Cervical Neoplasms"; "Papanicolaou Test"; "Mass Screening"; "Peru".

RESUMEN

Introducción: Los determinantes de la realización del Papanicolau han sido ampliamente estudiados, sin embargo, son escasos los estudios que analizan los factores que influyen en recibir y conocer los resultados del PAP. Específicamente en Perú, esta problemática no ha sido explorada a nivel poblacional. Objetivos: Identificar los factores asociados a recibir y conocer los resultados de la prueba de Papanicolau en mujeres en Perú. Métodos: Estudio de corte transversal, analítico, basado en datos de la Encuesta Demográfica y de Salud Familiar del Perú (ENDES, 2023). Se incluyeron mujeres de 25 a 64 años que tuvieron una prueba de Papanicolaou en los últimos tres años. Se evaluaron las características sociodemográficas y del hogar asociadas a recibir y conocer los resultados de la prueba de Papanicolau. La asociación fue analizada mediante el análisis crudo y multivariado y se estimaron razones de proporciones ajustadas con sus respectivos intervalos de confianza al 95% (IC95%). Resultados: Fueron incluidas 7342 mujeres, el 84,9% recibió o conoció los resultados de la prueba. La probabilidad de conocer los resultados fue mayor entre las mujeres del quintil más rico (RPa: 1,07; IC95%: 1,01-1,14) respecto a las más pobres y entre aquellas que residían en áreas urbanas (RPa: 1,06; IC95%: 1,01-1,11) comparadas con el área rural. Conclusiones: El 15,1% de las mujeres que se realizaron un Papanicolaou en los últimos tres años no recibieron ni conocieron los resultados. Se requieren nuevos estudios que tengan en cuenta otras variables que podrían afectar la recepción y conocimiento de los resultados del Papanicolau.
Palabras clave: "Neoplasias del Cuello Uterino"; "Prueba de Papanicolaou"; "Tamizaje Masivo"; "Perú".

Introduction

In 2022, nearly 660,000 women worldwide were diagnosed with cervical cancer (CC). This neoplasm is the fourth leading cause of cancer death in women globally and the third in Latin America[1]. In Peru, CC represents a significant public health problem: according to the latest GLOBOCAN

update (2022), there were 2,545 deaths, equivalent to 12.3% of cancer deaths in women, with an age-standardized mortality rate of 12.1 per 100,000 women[2]; it is the cancer that causes the most deaths in Peruvian women.

Women at risk have access to vaccines (primary prevention) and screening tests (secondary prevention)[3]. Screening tests, such as the detection of human papillomavirus (HPV) by nucleic acid amplification tests (NAAT) and the Pap test (PAP) or cervicovaginal cytology, are based on knowledge of the natural history of CC, which is associated with HPV infection, especially genotypes 16, 18, 31, 33, 45, 52, and 58, with the subsequent development of CC. Initially, the virus causes cellular changes that lead to cervical intraepithelial neoplasia (CIN)—detectable by PAP—and from these lesions, if left untreated, some women develop invasive cancer[4].

In Peru, in addition to the tests mentioned above, visual inspection with acetic acid and Lugol's iodine (VIA/VILI) and liquid-based PAP tests are also used (5). In this country, between 2008 and 2017, the period in which the HPV vaccine and screening were implemented, mortality from cervical cancer has fallen from 11.62 to 9.69 per 100,000 women-years. however, some departments in the highlands and jungle still have mortality rates above 16 per 100,000 women-years. This inequality reflects difficulties in accessing preventive health services, mainly in the interior of the country[6]. A similar phenomenon was observed in Latin America and the Caribbean, where between 1997 and 2017 the mortality rate from cervical cancer CC decreased unevenly among countries[7].

Limited access to PAP test in Peru has been evident since 2022, when only 43.4% of women aged 25 to 64 had a PAP test in the last three years and 15.5% of those who did not receive their results[8].

Limited access to screening tests leads to late diagnoses, which increase morbidity and mortality from CC[9]. These delays have been associated with factors related to women and the healthcare system[10].

Among woman-related factors, lack of awareness of Pap test results may delay timely diagnosis. This step is critical, as a positive screening result initiates diagnostic confirmation and subsequent treatment[11]. According to the Universal Conceptual Framework for Access to Healthcare[12], from the user's perspective, effective engagement in screening requires not only participation in the test itself but also sustained interaction with healthcare services following receipt of results to ensure appropriate follow-up[13]. Within the Peruvian healthcare system[5], Pap test results are managed by healthcare personnel, who are responsible for communicating results and providing corresponding recommendations within timeframes determined by the nature of the findings. Failure to deliver results reflects deficiencies in patient identification and contact, as well as shortcomings in the communication of follow-up instructions.

In Latin America, the limited available evidence on this topic originates primarily from Brazil. Some studies have examined factors influencing receipt and awareness of Pap test results[14,15], whereas others have estimated the proportion of women who received the results of their most recent Pap test. A population-based study in Brazil reported that in 2019, 9.1% of women were unaware of the results of their last Pap test[16], a finding consistent with a study conducted in São Paulo in 2000, in which 13% of women did not receive their results[17]. In Peru, this issue has not been examined at the population level. Existing evidence is derived from studies conducted among women who underwent Pap testing at specific healthcare facilities[18,19], underscoring a significant gap in knowledge. In light of these considerations, the objective of the present study was to identify the social and personal determinants associated with women receiving and being aware of their Pap test results in Peru.

Methods

Study design

A cross-sectional study was conducted using data from the 2023 Peruvian Demographic and Family Health Survey (ENDES). The study population comprised women aged 25 to 64 years who had undergone a Pap test within the preceding three years.

Study context

The ENDES is conducted by the National Institute of Statistics and Informatics (INEI). The target population includes women aged 12 to 49 and their children under 5, as well as one person aged 15 or older from each household. In all cases, participants must be regular residents of the selected household, and those who are not residents must have spent the night before the interview in the household. The ENDES has a two-stage, balanced, stratified, and independent probabilistic sample design that is representative at the departmental, urban, and rural levels. In 2023, 35,657 of 38,352 eligible women were interviewed.

In the ENDES, data were collected through direct interviews conducted by trained health personnel. The fieldwork methodology is described in the procedure manual[20]. The data are freely available on the INEI website (https://proyectos.inei.gob.pe/microdatos/). These data are organized into multiple data files containing an individual identifier for each woman (CASEID) and household (HHID), variables that were used to merge the data files. The complex sample design of ENDES 2023 was taken into account. We used the sample weighting variables [stratum (HV022) and weighting factor (PESO15_AMAS)]. According to ENDES, the weighting factor must be divided by 1,000,000 to obtain the sample weight[21].

In Peru, since 2019, the current Ministry of Health (MINSA) regulation establishing the processes for early detection of CC has been in force[5]. This regulation is mandatory for MINSA and regional government facilities. It also serves as a reference for Social Security (EsSalud), Armed Forces and National Police facilities, and private facilities. In MINSA and regional government facilities, PAPs are funded by the "Cancer Prevention and Control" Budget Program and are free of charge for those insured by the Comprehensive Health Insurance (SIS) program and those who do not have insurance.

The PAP test is aimed at women aged 25 to 64, pregnant women, and women infected with the human immunodeficiency virus. After the PAP test, negative results and low-grade positive results must be delivered to the patient with the respective recommendations within a maximum of 30 days. In cases of high-grade positivity, designated personnel must locate the patient and deliver the results within three days in urban areas and seven days in rural areas, and then perform a colposcopy within 30 days of receiving the results at the facility. Follow-up is biennial for negative results and annual for the following three years for women with low-grade positive results (CIN 1).

Procedures

The author FRRR merged the CSALUD01, REC0111, RECH1, RECH0, and RECH23 data files. The woman's identifier (CASEID) was used for the merger (18). Once the data files were merged, the same author applied the selection criteria: a) being between 25 and 64 years of age, categorized based on variable QS103 (question: How old are you?); b) having answered affirmatively to the question: "Have you ever had a Pap test performed by a doctor or other health professional?" (variable QS411); and c) having had a Pap test in the last three years, constructed from variables QS412U and QS412C. Using the STATA subpop command, we made the estimates considering the subpopulation defined by meeting the three inclusion criteria.

Variables

The dependent variable was measured using question (QS413) from the ENDES Health Questionnaire: "Did you collect or find out the results of your Pap test?" According to the context provided by the national guidelines for early detection of cervical cancer CC in Peru, an affirmative answer to the question was interpreted as knowledge of the Pap test results, after receiving them from health personnel.

The explanatory variables were divided into three groups. The patient variables were age, level of education, marital status, health insurance status, number of children, and ethnicity. The women's knowledge about CC was assessed using the following questions: Have you heard of HPV? Do you believe that HPV causes uterine cancer? Can cancer be prevented? Have you heard of cervical cancer? These variables were recategorized as yes and no (when they answered no or don't know/can't remember).

The variables associated with the household and housing were the wealth index, area of residence, and natural region of residence. These explana-

tory variables were selected based on a review of the literature on factors associated with PAP screening[14,23–26]. These factors were considered as a starting point, assuming that they could be associated with the next stage in the screening pathway, corresponding to the receipt or knowledge of results after undergoing a PAP test.

Statistical analysis

The svy command in STATA® version 16 was used to specify the sample design. The information was summarized using measures of central tendency and dispersion, and proportions for categorical variables with their respective 95% confidence interval (95% CI). We present the proportion of women who collected or knew the PAP results for the overall sample and according to the independent variables.

To explore whether the independent variables were associated with receiving or knowing the PAP results performed in the last 3 years, we performed hypothesis tests to compare proportions using the Chi-square test, with second-order Rao-Scott correction. We then performed multivariate analysis, formulating a model with those variables that had a p-value less than 0.25 (two-tailed) in the bivariate analysis[27]. This cutoff point was chosen so as not to exclude variables that could be related to the dependent variable.

The first model considered the characteristics of the household/dwelling (distal factors) that met the statistical criterion; then, the second model was constructed by retaining the characteristics of the household/dwelling that achieved a p-value <0.25 in the previous model and adding the characteristics of the woman that met the statistical criterion in the bivariate analysis; Finally, the third model retained the household and woman variables that had a p-value <0.25 in the second model, and incorporated the variable on knowledge of cervical cancer that met the statistical criterion in the crude analysis. It was not possible to add the two questions on knowledge (Have you heard of HPV? and Have you heard of cervical cancer?) because the adjusted model did not generate estimates for these variables.

To estimate the crude and adjusted PRs (aPR), we used negative binomial regression with a log link function from the generalized linear model family (28). We considered a variable to be an associated factor when the 95% CI of the PR did not include the unit. The diagnosis of multicollinearity among the explanatory variables was made by checking the standard errors of the regression coefficients; values >2.0 were indicative of multicollinearity.

This analytical approach was based on the three-level hierarchical regression model described by Victora et al.[29]. The variables were classified according to the relationship between them and their influence on the timeliness of cervical lesion diagnosis[30]. Household-housing variables were considered distal factors, women's individual characteristics were considered intermediate factors, and knowledge about cervical cancer CC was considered a proximal factor (Figure 1).

Ethical considerations

This study was approved by the Institutional Research Ethics Committee of the University of Piura (File No. T0324-04). The study used data from an anonymized database that is freely and publicly accessible, so it was not necessary to obtain informed consent.

Results

After merging the data files, we identified 34,536 records of individuals over the age of 15. After applying the selection criteria, we analyzed data from 7,342 women aged 25 to 64 who had undergone a PAP test in the last 3 years (Figure 2).

Sample characteristics

The mean age of the study population was 41.28 years (standard deviation: 0.22), with 31.9% of participants aged between 25 and 34 years. Overall, 84.9% (95% CI: 83.6–86.2) responded affirmatively to the question “Did you collect or learn your results?”. Additional characteristics of the sample included a high level of educational attainment, with 43.6% having completed higher education; 67.5% were married or cohabiting; and 90.3% reported having some form of health insurance coverage.

Regarding knowledge related to cervical cancer, 91.1% of participants had heard of human papillomavirus (HPV), and 95.5% were aware of cervical cancer; however, a smaller proportion recognized that cervical cancer is preventable (88.6%). With

respect to household characteristics, 32.3% of participants were classified within the poor or poorest wealth quintiles, and 85.0% resided in urban areas (Table 1).

Bivariate analysis

The three household-related variables were associated with receiving and knowing the PAP test results. With regard to wealth quintile, we observed a progressive increase in this proportion, from the poorest (77.8%) to the richest (87.8%) (p = 0.001). There was also a notable difference in the proportion of women who received and knew the results of the PAP between urban (86.1%) and rural (78.2%) areas ($p < 0.001$). Finally, in Metropolitan Lima, the proportion of women who received and knew the results of the PAP was 88.1%, while in the highlands it was 81.4% ($p = 0.001$). In terms of women's characteristics, among those who did not belong to an ethnic group, there was a higher proportion of collecting or knowing the results (85.6% versus 80.7%, $p = 0.001$). In the questions about general knowledge of CC, only having heard of HPV was associated with learning the PAP test result (85.4% versus 81.8%, $p = 0.041$) (Table 2).

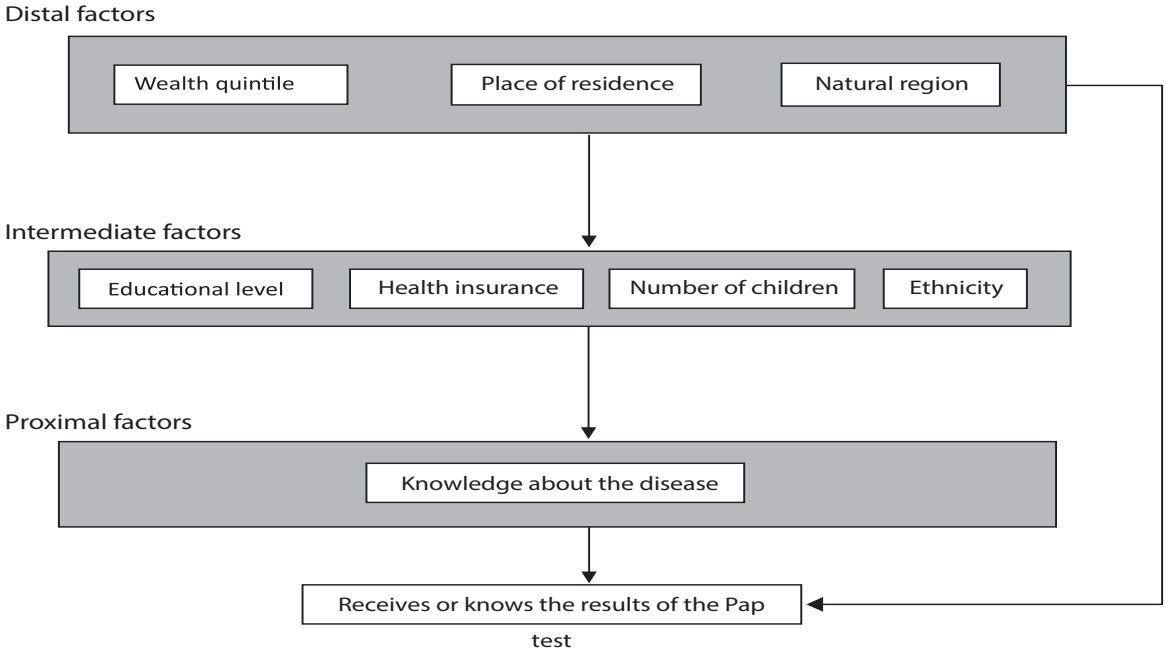
Multivariate analysis

The first adjusted model only included household-housing factors, among which wealth quintile was the only factor associated with receiving and knowing the PAP test results. Women in the richest quintile were more likely to know the result than those in the poorest quintile (aPR: 1.07; 95% CI: 1.01-1.14). In the second model, which included women's characteristics as intermediate factors, none of these variables were associated with the response; however, the richest category (aPR: 1.09; 95% CI: 1.01-1.16) was more likely to know the result, compared to those in the poorest quintile. In the third model, in addition to the previous factors, we included one of the questions on general knowledge of CC. The response to "Have you heard of HPV?" was not associated with the outcome. However, it was found that living in an urban area increased the probability of receiving and knowing the PAP result (aPR: 1.06; 95% CI: 1.01-1.11) (Table 3).

Discussion

We found that 84.9% of women who had undergone a Pap test in the past three years were aware of their results. Among these women, no significant associations were identified between individual characteristics, including knowledge of cervical cancer (CC), and the likelihood of knowing their results. The only variables found to be associated—both in crude and adjusted models—were household and housing-related factors. Specifically, women in the highest wealth quintile were more likely to know their results in the model that included only distal and interme-

Figure 1. Proposed hierarchical theoretical model of factors associated with collecting or knowing the results of the PAP test.



diate variables, while those residing in urban areas were more likely to be aware of their results when proximal variables were also considered.

The proportion of receiving and knowing the PAP test results in this study is consistent with other research. In Brazil, in a primary care facility, of 775 women who had a PAP test, 643 (83.0%) returned to receive the result[14]; another Brazilian study in a university health facility found that of 645 women who had a PAP test, 84.4% returned for their results[15]. Larger-scale Brazilian studies are also consistent. One municipal study (São Paulo) found that in 2000, 87% of women received the results of their last PAP test[17]; another population study with data representative of all of Brazil estimated that in 2019, 90.9% of women received their results[16]. In Peru, in Cusco, 86% of 617 women who had a PAP test reported receiving their results [31], while in a high Andean health center in Cajamarca, only 35% did so[19]. This latter proportion is similar to that observed in Haiti, where 48.4% of women collected their results[32].

In the hierarchical analysis, the first two models showed that the wealth quintile was associated with a higher probability of receiving and knowing the PAP test results. Given the absence of association between the intermediate variables, it is likely that the wealth index exerts its effect through causal pathways other than the variables analyzed in this study. For example, women in a better economic position tend to face fewer financial barriers that limit the prioritization of their health. In addition, they tend to live closer to health facilities, facilitating both access to care and follow-up by health personnel[33]. Likewise, women with a higher level of wealth have better living conditions that facilitate adherence to screening recommendations for CC[34]. In Brazil, it has been reported that women from more affluent classes (A or B) are more likely to receive their PAP results (92.3% versus 84.0%, $p < 0.001$)[17].

In the complete model, which included the variable on knowledge of human papillomavirus (HPV), living in an urban area increased the probability of

Figure 2. Flowchart of female participant selection. CSALUD01, RECH0, RECH23, and RECH1 correspond to the names of the data files that include the variables analyzed in this study. PAP: Papanicolaou test.

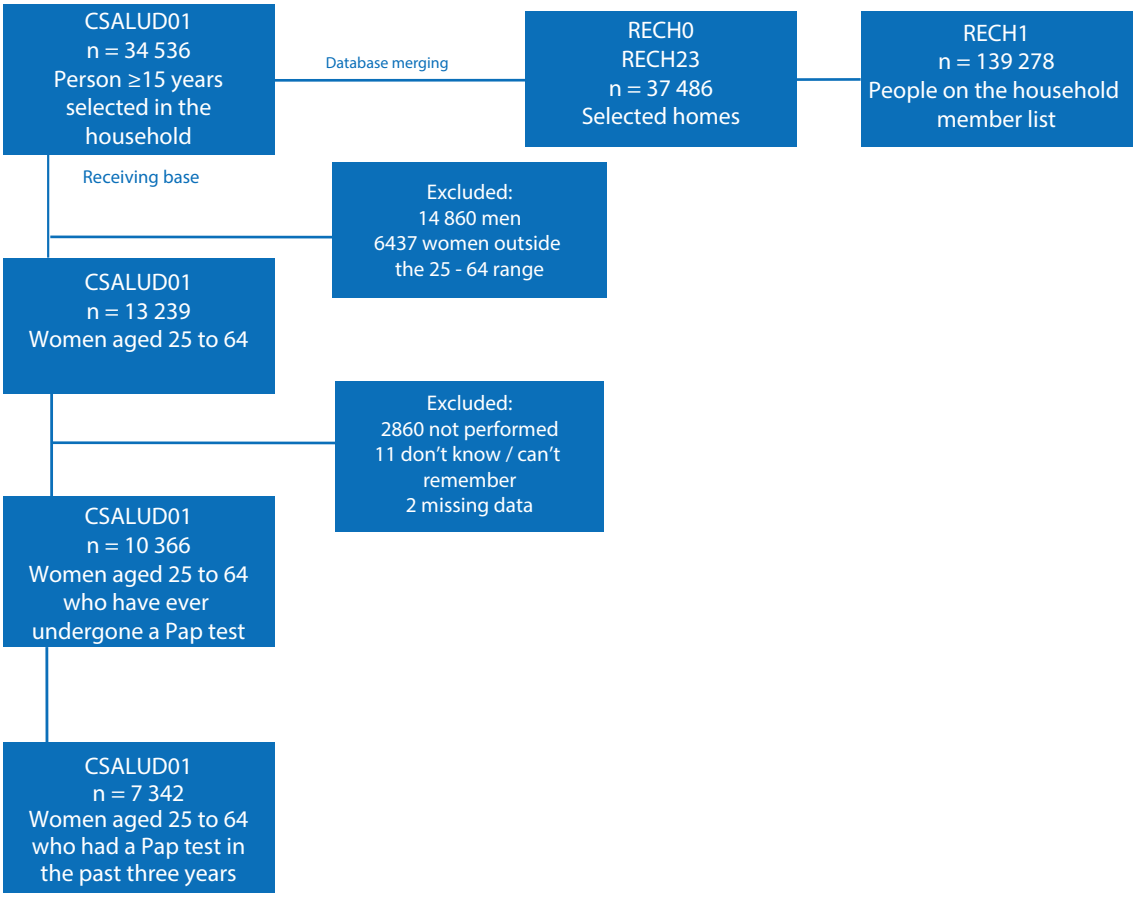


Table 1. General characteristics of women aged 25 to 64 who had a Pap test in the last 3 years.

Variables	Unweighted Absolute Frequency	Weighted proportion	95% Confidence interval	
			LL	UL
Women characteristics				
Age group (years)				
25 to 34	3190	31.9	303	33.5
35 to 44	2446	31.3	29.7	33.0
45 to 54	1003	22.7	20.7	24.8
55 to 64	703	14.1	12.7	15.7
Education level				
No education- primary	1658	19.4	18.0	20.9
Secundary	2914	37.0	35.1	38.9
Higher university	2770	43.6	41.7	45.6
Marital status				
Single	387	6.5	5.6	7.6
Currently married or cohabiting	5302	67.5	65.6	69.4
Previously/ever married or cohabited	1653	26.0	24.2	27.8
Health insurance				
Yes	6845	90.3	88.8	91.7
No	497	9.7	8.3	11.2
Number of children				
None	2223	34.5	32.6	36.5
One	4196	53.9	51.9	55.8
Two or more	923	11.6	10.5	12.8
Belongs to an ethnic group				
No	5646	86.2	85.0	87.2
Yes	1696	13.8	12.8	15.0
Knowledge about cervical cancer				
Has heard about the Human Papillomavirus (HPV)				
No	874	8.9	8.1	9.9
Yes	6049	91.1	90.1	91.9
Thinks HPV causes cervical cancer				
No	518	8.4	7.3	9.7
Yes	5531	91.6	90.3	92.7
Believes cancer can be prevented				
No	809	11.4	10.2	12.7
Yes	6533	88.6	87.3	89.8
Has heard about cervical cancer				
No	419	4.5	3.9	5.3
Yes	6923	95.5	94.7	96.1
Household characteristics				
Wealth quintile				
Poorest	1917	13.9	13.1	14.8
Poor	1801	18.4	17.1	19.7
Middle	1476	20.8	19.3	22.4
Rich	1240	22.9	21.2	24.6
Richest	908	24.1	22.2	26.0
Area of residence				
Urban	5107	85.0	84.2	85.8
Rural	2235	15.0	14.2	15.8
Natural Region				
Metropolitan Lima	912	40.7	38.8	42.6
Rest of the Coast	2205	26.1	24.8	27.5
Andean Highlands	2647	22.0	20.9	23.1
Amazon rainforest	1578	11.2	10.5	11.9

LL: Lower limit , UL: Upper limit

Table 2. Proportion of women aged 25 to 64 who collected or learned the results of a Pap test performed in the last three years.

Variables	Proportion of women who received or knew the results, % (IC95)			
	%	LL	UL	*p* value *
Women characteristics				
Age group (age)				0,67
25 to 34	84.2	82.2	85.9	
35 to 44	86.1	84.0	87.9	
45 to 54	85.9	81.8	89.2	
55 to 64	82.6	78.1	86.3	
Education level				0.121
No education- primary	82.3	79.7	84.7	
Secundary	85.1	82.9	87.0	
Higher university	85.9	83.6	88.0	
Marital status				0.992
Single	84.8	78.2	89.7	
Currently married or cohabiting	85.0	83.4	86.4	
Previously/ever married or cohabited	84.8	81.7	87.4	
Health insurance				0.073
No	89.1	84.1	92.7	
Yes	84.5	83.0	85.8	
Number of children				0.141
None	83.9	81.0	86.4	
One	86.1	84.5	87.6	
Two or more	82.6	78.4	86.1	
Belongs to an ethnic group				0.001
No	85.6	84.1	87.0	
Yes	80.7	77.9	83.3	
Knowledge about cervical cancer				
Has heard about the Human Papillomavirus (HPV)				0.041
No	81.8	78.2	84.9	
Yes	85.4	83.9	86.8	
Thinks HPV causes cervical cancer				0.535
No	83.9	77.8	88.5	
Yes	85.6	84.0	87.0	
Believes cancer can be prevented				0.829
No	85.3	81.5	88.4	
Yes	84.9	83.4	86.2	
Has heard about cervical cancer				0.131
No	81.4	76.0	85.9	
Yes	85.1	83.7	86.4	
Household characteristics				
Wealth quintile				0.001
Poorest	77.8	75.2	80.1	
Poor	84.6	82.1	86.8	
Middle	85.2	82.3	87.7	
Rich	86.2	83.0	88.9	
Richest	87.8	84.0	90.8	
Area of residence				<0.001
Urban	86.1	84.5	87.5	
Rural	78.2	75.9	80.3	
Natural Region				0.001
Metropolitan Lima	88.1	85.2	90.5	
Rest of the Coast	83.8	81.5	85.8	
Andean Highlands	81.4	79.4	83.3	
Amazon rainforest	82.9	80.4	85.1	

**Comparison of proportions using Pearson's chi-square test with second-order Rao–Scott correction.*
LL: Lower limit, UL: Upper limit

Table 3. Crude and adjusted analysis to identify factors associated with not collecting Pap test results performed in the last 3 years.

Variable	Received or became aware of the results of the Pap smear test performed in the last 3 years															
	Crude model					Adjusted model 1				Adjusted model 2				Adjusted model 3		
	RPc	LL	UL	*p* value	RPa	LL	UL	*p* value	RPa	LL	UL	*p* value	RPa	LL	UL	*p* value
Household characteristics (distal factors)																
Wealth quintile																
Poorest	1.0				1.0				1.0				1.0			
Poor	1.09	1.04	1.13	<0.001	1.05	1.00	1.11	0.033	1.05	1.00	1.11	0.034	1.04	0.99	1.10	0.109
Middle	1.10	1.05	1.15	<0.001	1.05	0.99	1.11	0.082	1.05	0.99	1.12	0.080	1.03	0.97	1.09	0.410
Rich	1.11	1.06	1.16	<0.001	1.06	1.00	1.12	0.066	1.06	1.00	1.13	0.055	1.04	0.98	1.11	0.174
Richest	1.13	1.07	1.19	<0.001	1.07	1.01	1.14	0.026	1.09	1.01	1.16	0.017	1.06	0.99	1.13	0.073
Area of residence																
Rural	1.0				1.0				1.00				1.00			
Urban	1.10	1.07	1.14	<0.001	1.04	0.99	1.09	0.107	1.05	1.00	1.10	0.052	1.06	1.01	1.11	0.016
Natural Region																
Amazonian rainforest	1.0				1.0											
Andean higlands	0.98	0.95	1.02	0.355	0.99	0.95	1.02	0.472	----	----	----	----	----	----	----	----
Rest of the coast	1.01	0.97	1.05	0.582	0.99	0.95	1.03	0.506	----	----	----	----	----	----	----	----
Metropolitan Lima	1.06	1.02	1.11	0.004	1.03	0.98	1.07	0.209	----	----	----	----	----	----	----	----
Women characteristics (Intermediate factors)																
Education level																
No education - primary	1.0				----	----	----	----	1.0				----	----	----	----
Secundary	1.03	0.99	1.08	0.095	----	----	----	----	0.99	0.95	1.03	0.768	----	----	----	----
High superior	1.04	1.00	1.09	0.036	----	----	----	----	0.98	0.94	1.03	0.427	----	----	----	----
Health insurance																
Yes	1.0				----	----	----	----	1.0				1.00			
No	1.06	1.00	1.10	0.037	----	----	----	----	1.04	0.99	1.10	0.116	1.04	0.99	1.10	0.115
Number of children																
None	1.0				----	----	----	----	1.0				----	----	----	----
One	1.03	0.99	1.07	0.152	----	----	----	----	1.02	0.98	1.06	0.252	----	----	----	----
Two or more	0.98	0.93	1.04	0.596	----	----	----	----	0.98	0.93	1.04	0.568	----	----	----	----
Belongs to an ethnic group																
Yes	1.0				----	----	----	----	1.0				1.0			
No	1.06	1.02	1.10	0.002	----	----	----	----	1.03	0.99	1.07	0.116	1.03	0.99	1.07	0.166
Knowledge about cervical cancer (proximal factors)																
Has heard about the HPV																
No	1.0				----	----	----	----	----	----	----	----	1.0			
Yes	1.04	1.00	1.09	0.057	----	----	----	----	----	----	----	----	1.00	0.96	1.05	0.964
Has heard about cervical cancer																
No	1.0				----	----	----	----								
Yes	1.05	0.98	1.11	0.168	----	----	----	----	----	----	----	----	----	----	----	----

RPc: crude prevalence ratio; RPa: adjusted prevalence ratio.
Crude model: variables related to women with a p-value <0.25 in Pearson's chi-square test with second-order Rao–Scott correction were included.
Adjusted model 1: household–housing characteristics (distal factors) with a p-value <0.25 in the bivariate analysis were included.
Adjusted model 2: distal factors with a p-value <0.25 in adjusted model 1 were retained, and intermediate factors with a p-value <0.25 in Pearson's chi-square test with second-order Rao–Scott correction were added.
Adjusted model 3: distal and intermediate factors with a p-value <0.25 in adjusted model 2 were retained, and only one variable related to knowledge about cervical cancer (proximal factor) was incorporated; the variable with the lowest p-value was selected, since including both variables in the model did not yield estimators for both.
Multicollinearity diagnostics among the explanatory variables were performed by verifying the standard errors of the regression coefficients (values >2.0 were indicative of multicollinearity).
In model 1: standard errors of coefficients were <0.031; in model 2: standard errors were <0.04; in model 3: standard errors were <0.03.

receiving PAP test results by 6%, while the wealth index ceased to be a determining factor. This finding is consistent with studies conducted on different continents, where living in urban areas is associated with a higher probability of having had a PAP test[35–38]. However, a study in Brazil reported that proximity to a health facility was not related to the collection of results[14]. Our results could be explained by the fact that urban areas have a concentration of health infrastructure and specialized human resources, as well as offering greater geographical accessibility than rural areas. In Amazonian regions of Peru, for example, some women must travel up to 12 hours by boat to reach the nearest health center, which discourages them from seeking care and participating in screening programs[39]. This prolonged and costly travel also makes follow-up difficult, as the process of returning to collect results involves a considerable investment of time and resources[12].

No individual characteristic was specifically associated with receiving and knowing the results of the PAP test results. It is known that people with higher education better understand the health risks of not undergoing screening tests, which increases their willingness to participate in them and potentially return for the results[40]. Some studies have found at a crude level that higher educational attainment is associated with a higher proportion of knowing or receiving PAP test results. This finding has been reported at a health center in Lima (Lurigancho-Chosica), where women with a secondary or higher level of education are almost three times more likely to know the results of their last PAP test[18]. Among women in Sao Paulo (Brazil), those with higher educational levels were more likely to receive their results (93.5% versus 85.4%, $p < 0.01$)[17].

On the other hand, health insurance has been shown to facilitate access to preventive screenings, such as Pap tests[41]. However, similar to our findings, a study of women attending a health center in Lima found no significant association between insurance coverage and the likelihood of receiving or being aware of the results of their most recent Pap test[18]. Marital status is another factor that can influence access to preventive care. In many countries, married women are more likely to receive support from their partners to undergo preventive screenings and tend to visit healthcare facilities more frequently for maternal and child health services. This increased engagement often leads to greater exposure to cervical cancer screening and early detection campaigns[35,42,43]. In our study, however, marital status was not associated with knowing or receiving Pap test results. The lack of significant findings regarding these factors may be attributed to the generally favorable attitudes toward cervical cancer prevention within the population studied. This likely reduced the variability in these explanatory variables, thereby limiting the detection of significant differences between subgroups.

Interpretation of these findings should take into account the regulatory context of cervical cancer screening in Peru. Guidelines issued by the Ministry of Health (MINSA)[5] and the Social Security system (EsSalud)[44] mandate that healthcare personnel actively deliver Pap test results, including locating women with high-grade positive results within a maximum period of seven days [44,45]. However, these requirements are not applicable to the private healthcare sector or to health services provided by the armed forces or police. Moreover, even within MINSA and subnational government facilities, only 42.8% of women scheduled for screening were effectively screened in 2022[45]. This low coverage suggests suboptimal adherence to result delivery and follow-up protocols, affecting both negative and, more critically, positive Pap test results.

The study has limitations inherent to its cross-sectional design, which prevents establishing the temporal relationship between variables, although this was partially mitigated by considering Pap smears performed in the last three years. Self-reporting of test performance and results could introduce memory or social desirability biases, and the use of secondary sources limits the inclusion of other relevant covariates. In addition, the ENDES does not separate the actions of "collecting" and "knowing," which are formulated in a single question, nor does it inquire about the initial contact or location that healthcare personnel must make.

Therefore, the findings should be interpreted within the context of the population studied, and the factors identified refer specifically to women who have had a PAP test in the last three years. Despite the limitations, our findings allow for a better characterization of the implementation of the actions set out in the technical standard for CC screening in Peru.

Conclusions

Approximately 15% of women who had undergone a Pap test within the preceding three years were unaware of or did not receive their results, underscoring gaps in follow-up processes, patient contact, and the communication of recommendations by healthcare personnel in Peru. Belonging to the highest wealth quintile and residing in urban areas were weakly associated with a greater likelihood of receiving and knowing test results; however, further research is required to elucidate the underlying mechanisms of these associations. Targeted interventions are needed to strengthen result delivery systems, particularly for women from lower socioeconomic strata and rural settings, and to enhance adherence to national guidelines governing the communication of Pap test results.

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