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Who is getting Pap smears in urban Peru?

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Background Cervical cancer, although usually preventable by Pap smear screening, remains the leading cause of cancer-related deaths among women in Peru. The percentages and characteristics of women in Peru who have or have not had a Pap smear have not been defined.

Methods In an urban community randomized trial of sexually transmitted infection (STI)/HIV prevention in Peru, 6712 randomly selected women between the ages of 18 and 29 from 20 cities were interviewed regarding having had cervical Pap smears.

Results Among women sampled, only 30.9% had had a Pap smear. By multivariate analysis, the main predictors of having a Pap smear were having had sex, having had children, completion of secondary education and increasing age. Regional variations were also found: women from the highlands and rainforest were less likely to have had Pap smears than women from the coast.

Conclusion A norm of seeking and receiving Pap smears has not been established among sexually active young Peruvian women. To improve Pap smear coverage in Peru, promotion efforts should target underserved women and regions with less coverage.

Keywords Vaginal smear, Peru

Background

Cervical cancer is one of the most preventable cancers. We can screen for pre-cancerous and early cervical neoplasia, which progresses slowly if at all to invasive cancer; and cervical neoplasia can be effectively treated if caught in time.[1] Despite this, cervical cancer is a leading cause of cancer-related deaths among women in many developing countries, including Peru.[1,2] In Peru, the annual cervical cancer incidence is one of the highest in the Americans at 40/100 000 women, resulting in a cause-specific mortality rate of 22/100 000 women per year.[3]

To date, cervical cancer prevention efforts worldwide have relied on using cervical Pap smears to screen at-risk women for cellular abnormalities, and then treating any pre-cancerous lesions identified.[2–4] This secondary prevention has successfully decreased cervical cancer in high- and middle-income countries,[2] and reduced cervical cancer mortality in these countries, including some in Latin America.[5–7] In Peru, reducing cervical cancer has been a national priority for several decades; in 1998, a National Plan for the Prevention of Gynecological Cancer outlined strategies for cervical cancer prevention.[8] In 2000, the Ministry of Health

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published its 'Manual of Standards and Procedures for the Prevention of Cervical Cancer', recommending Pap smear screening for women between the ages of 30 and 49 every 3 years, starting at age 25 if possible, as recommended by the World Health Organization and U.S. Preventive Services Task Force.[9–11] However, for various reasons, many women in developing countries never get tested.[12] In Latin America, many programmes have not been effectively or adequately implemented,[12–15] and screening is infrequent.[16] Various estimates indicate Pap smear coverage rates of 7–42.9% in Peru or certain Peruvian cities,[13,17–19] but data on nationwide coverage are scarce.

Low coverage results from several factors, including limited facilities and few personnel for screening and follow up, unaffordable treatment options and women's inadequate preventive health seeking behaviours.[8] Many Peruvian women do not seek reproductive health services even when experiencing abnormal symptoms.[20–23]

Information about women in Peru who do not get screened is limited. In developed countries, such women tend to be older and single, have less education, fewer children and lower income levels than those who do get screening.[7,24] Additionally, they tend to have had less previous contact and experience with the health care system, lack regular health providers and have little knowledge about screening, but feel anxious or fearful about it.[23–25]

This study seeks to: (i) determine Pap smear coverage among young women (18–29 years) in 20 of the largest cities of Peru and (ii) examine the socioeconomic and demographic determinants associated with having received Pap smears in those 20 cities.

Study design

Data for this analysis comes from the PREVEN study, an urban community randomized trial aimed at controlling gonorrhoea, chlamydial infection, trichomoniasis and syphilis through improved syndromic management of STIs, and through screening of sex workers for these curable infections. Outcomes were assessed through three household-based surveys of young men and women 18 to 29 years of age, with a baseline survey in 2002 and subsequent surveys in 2005 and 2006. The 2006 survey provided the data for this current analysis. The study was carried out in 20 of the largest cities in Peru (which has a total population of 29 million[26])—each city with a population of more than 50 000.

Sampling

Within these 20 cities, sampling sets of approximately 80 houses were defined by the National Statistics Office for other unrelated work. Since these predefined sets were larger than needed for this study, they were split into clusters of 40 contiguous houses, randomly selected to provide approximately 10 eligible households per cluster. Thus, a total of 108 neighbourhood clusters were randomly selected per city and surveyed until a target sample size of 600 people per city was achieved. All eligible households within the cluster were identified based on residents' age (18–29 years) and residence status (lived in that city for at least the past 6 months). Eligible households were selected to participate, for up to a maximum of 10 households per cluster. If more than 10 households had eligible participants in that cluster, then 10 households were randomly selected using a random number table. If more than one household member was eligible, the member with the most recent birthday was selected. The participation rate for this study was 92.8%. For the remaining 7.2%, either the household, or eligible household member, refused to participate. Without more information on more participants, we can not determine how they differed from those who did participate.

The total sample size for the PREVEN 2006 survey was 13 602 men and women. Of the 7106 women who participated in the study, 6712 had complete data for all relevant questions and are included in this analysis. Remaining participants skipped some questions, especially in the self-administered portion of the survey. Those dropped for missing data were mostly similar for demographic and behavioural variables with those that remained, except that those who dropped were less likely to have had sex (23.1% vs. 18.5%, $P < 0.001$).

Consent process and survey instruments

All consent processes and subsequent interviews were conducted in Spanish, although research assistants who spoke other languages (based on location) were hired where needed to assist. After giving written consent, participants provided demographic information in face-to-face interviews, then used a palm pilot for a self-administered questionnaire, focusing on reproductive health and sexual behaviours. In the self-administered survey, women responded to questions regarding age of sexual debut, lifetime number of sexual partners, symptoms of different STIs, having ever had a Pap smear, having ever had an abnormal Pap smear and the advice given by their doctor if the smear had been abnormal.

Ethical approval

The PREVEN study obtained IRB approval for the first round from the Universidad Peruana Cayetano Heredia, the University of Washington in Seattle and the United States Navy Medical Research Center Detachment in Lima (NMRCD). This IRB approval has been renewed every year since. IRB approval was also obtained from Tulane University School of Public Health and Tropical Medicine and Vanderbilt University for use of these data.

Data analysis

Using STATA 8.0 software, means and frequencies for variables of interest were estimated, and Chi-square and *t*-tests were used to compare the distribution of variables between those who had had Paps and those who had not. Odds ratios were estimated to examine unadjusted associations between independent variables and the dependent variable of interest (having had a Pap smear) and the *P*-value for the Chi-square test for trend was estimated using StatCalc for some variables. The adjusted associations between the various social, economic and demographic variables, and having had a Pap smear, were estimated using logistic regression. It was also hypothesized that certain community level factors were associated with women's Pap smear seeking behaviours. Hence, the 20 cities were grouped into the three main geographic regions of Peru (coast, highlands, rainforest) and the coastal cities were used as a reference group. Odds ratios and 95% CIs were reported for unadjusted and adjusted associations estimated through these models. Finally, multicollinearity in the models were assessed by analysing correlations of the parameters and coefficients with one another, as well as by computing the variance inflation factor.

Results

Pap smear coverage for this sample of women was 30.9%. Of women who reported having had a Pap smear, 2.2% reported being told they had had an abnormal Pap, 3% did not remember or know what they were told and the rest reported being told their Pap smears were normal.

Mean age for women in the sample was 23.2 years (Table 1). About half had completed high school; over 40% had gone on to some type of post-secondary schooling; 53.7% were single; 43.8% were married or cohabiting; a very small percentage were separated, divorced or widowed (2.5%); 16% also spoke an indigenous language (predominantly Quechua or Aymara). About half had had at least one child. Most (66%) had lived their whole lives in the city where the interview took place. Economically, 42.2% were unemployed, 32.9% were students and a quarter worked. About two-thirds obtained most income from themselves or their parents, while about one-third depended on their partners. Overall, 81.6% reported having experienced sex, with a mean age of first sex of 18.2 years and a median age of 18 years.

By unadjusted analyses, women who did and did not report having had Pap smears differed for all of the demographic characteristics, as well as for selected sexual behaviours and risks (Tables 1 and 2). Women who had had a Pap smear were much more likely than those who had not been married or cohabiting (76.5 vs 29%), and to have had children (88 vs 32.8%). Among women over age 25, 53.5% had had a Pap smear, compared with 16.8% of those ages 18–24. Among sexually experienced women, 37.8% had had a Pap smear, including 22.7% of those 18 to 24 years of age vs. 56.8% of those 25 to 29 years of age; only 0.5% of those who denied sexual experience reported having had a Pap smear. Moreover, women who had lived in the same city all their lives were less likely than others to have had a Pap smear. Of those who have had sex, 37.8% have had a Pap smear (compared with 0.5% who have had a Pap but not had sex). Those who had had Pap smears had a slightly younger age at first sex (17.7- vs 18.5-years-old), and reported more STI symptoms than women who had never had a Pap smear. Surprisingly, in the unadjusted analyses, those with higher education were less likely to have had Pap smears than those with less education, and those who were studying or working (vs the unemployed) were also less likely to have had a Pap smear. However, after adjusting for other variables, including employment status, the direction of the association for education was reversed.

In multivariate analyses, the most significant determinant (other than sexual experience) of having had a Pap for women ages 18 to 29 in these cities was parity (see Table 2). Compared with women with no children, women with one child were 3.7 times more likely to have had a Pap smear ($P < 0.001$) and women with two or more children were 4.7 times more likely to have had a Pap ($P < 0.001$). Age and education remained important determinants of coverage: women in the oldest age group (25–29 years), as well as women in the middle age group (21–24 years), were more likely to have had a Pap than the youngest women (18–20 years) (25- to 29-year-olds: OR = 5.5, $P < 0.001$; 21- to 24-year-olds: OR = 2.3, $P < 0.001$); Chi-square test for trend, $P < 0.001$, and those with at least some secondary education were more likely to have had a Pap smear than women with only primary education (OR = 1.4, $P = 0.001$). Women's employment status or monthly family income did not remain significantly associated with having had a Pap smear after adjusting for other variables.

Those sexually active at a younger age (17 years or less, and 18- to 20-year-olds) were more likely to have had a Pap smear than women whose first sexual intercourse occurred when older than 21 (17 years or less: OR = 2.2, $P < 0.001$; 18–20: OR = 1.9, $P < 0.001$). Women who had experienced an abnormal vaginal discharge in the past year were also more likely to have had Pap smears than women who had not (OR = 1.2, $P = 0.002$). However, no significant associations of having had a Pap smear were found with having experienced genital ulcers in the past year or having ever had genital warts.

Regional variations were also observed. Women interviewed in the highlands (OR = 0.8, $P = 0.001$) and rainforest (OR = 0.8, $P = 0.037$) were less likely to have had Pap smears than women from the coast.

Table 1 Description of study sample ($n = 6712$)

	Have had Pap smears (%) ($n = 2083$)	Have not had Pap smears (%) ($n = 4629$)	*P*-value
Age (mean)	25.5	22.2	<0.001
18 to 24-years-old	16.8	83.2	<0.001
25 to 29-years-old	53.3	46.7	<0.001
Married/co-habiting	76.5	29.0	<0.001
Number of children			
None	12.1	67.2	<0.001
One	44.6	22.0	
Two or more	43.4	10.8	
Education			
Some/completed primary	12.8	6.4	<0.001
Some/completed secondary	53.5	47.6	
Post-secondary	33.8	46.0	
Speaks indigenous language	18.1	15.0	0.002
Always lived in same city	58.9	69.2	<0.001
Employment status			
Unemployed	60.5	34.1	<0.001
Studying	11.3	43.1	
Working	28.2	22.8	
Income source			
Self/parents/other	37.2	77.6	<0.001
Partner	62.8	22.4	
Family monthly income			
Less than S/.500 (~US$150)	50.6	43.4	<0.001
Greater than S/.500	49.4	56.6	
Has experienced sex	99.7	73.5	<0.001
Age of first sex (mean)	17.7	18.5	<0.001
Lifetime number of sex partners			
Zero	0.3	26.6	<0.001
One	50.5	41.6	
Two or more	49.2	31.8	
Would vaccinate against HPV	95.6	91.4	<0.001
STI symptoms (current or ever)			
Abnormal vaginal discharge	49.2	39.9	<0.001
Genital ulcers	8.6	5.8	<0.001
Genital warts	5.4	3.7	0.002
Region			
Coast	33.5	66.5	<0.001
Highlands	26.8	73.2	<0.001
Rainforest	33.4	66.6	0.055

Table 2 Socio-demographic determinants of having had a Pap smear, reporting unadjusted and adjusted odds ratio and 95% CI ($n = 6712$)

	Have had a Pap smear					
	Unadjusted association			Adjusted association		
Demographic	OR	*P*-value	95% CI	aOR	*P*-value	95% CI
Characteristics						
Aged 18–20[i]	1.00			1.00		
Aged 21–24	4.13	<0.001	3.42–4.99	2.29	<0.001	1.84–2.84
Aged 25–29	13.89	<0.001	11.61–16.62	5.46	<0.001	4.35–6.86
Single	1.00			1.00		
Married/co-habiting	7.85	<0.001	6.99–8.82	1.78	<0.001	1.51–2.10
No children[ii]	1.00			1.00		
One child	11.10	<0.001	9.53–12.93	3.71	<0.001	3.06–4.50
Two or more children	21.89	<0.001	18.57–25.80	4.72	<0.001	3.74–5.96
Partial/completed primary[iii]	1.00			1.00		
Partial/completed secondary	0.57	<0.001	0.48–0.67	1.42	0.001	1.15–1.77
Post-secondary	0.37	<0.001	0.31–0.45	1.56	<0.001	1.22–2.00
Speaks indigenous language[a]	1.18	0.015	1.03–1.35	1.04	0.678	0.86–1.26
Has always lived in this city[b]	0.64	<0.001	0.58–0.71	0.73	<0.001	0.64–84
Employment and income						
Unemployed and not studying	1.00			1.00		
Studying	0.15	<0.001	0.13–0.18	0.84	0.099	0.67–1.03
Working	0.69	<0.001	0.61–0.78	1.08	0.357	0.92–1.26
Family monthly income						
Less than S/.500	1.00			1.00		
Greater than S/.500	0.76	<0.001	0.68–0.84	0.91	0.170	0.79–1.04
Sexual behavior						
Has experienced sex[c]	131.83	<0.001	59.01–294.50	9.74	<0.001	4.22–22.45
Age of first sex						
17 or less[iv]	7.34	<0.001	6.20–8.68	2.16	<0.001	1.70–2.76
18–20	5.54	<0.001	4.70–6.53	1.89	<0.001	1.53–2.35
21 or more	1.00			1.00		
Number of lifetime sex partners						
1[v]	1.00			1.00		
2	1.94	<0.001	1.69–2.23	1.11	0.231	0.93–1.32
3 or more	2.08	<0.001	1.84–2.36	1.26	0.008	1.06–1.48
STI symptoms (current or ever)						
Abnormal vaginal discharge	1.42	<0.001	1.28–1.57	1.24	0.001	1.08–1.41
Genital ulcers	1.49	<0.001	1.23–1.81	1.06	0.643	0.82–1.37
Genital warts	1.40	0.006	1.10–1.77	1.02	0.923	0.75–1.38
Region of interview						
Coast	1.00			1.00		
Sierra	0.73	<0.001	0.65–0.81	0.77	0.001	0.66–0.90
Rainforest	f1.00	0.951	0.86–1.15	0.82	0.037	0.68–0.99
Prob > χ^2	–	–		<0.001		
Adjusted R^2	–	–		0.3209		

Adjusted for all variables associated with having had a Pap at $P < 0.01$, including sexual experience. Reference groups: [a]Does not speak an indigenous language.
[b]Has lived outside the city where they currently reside.
[c]Has not had sex.
[i–v]*P*-value for Chi-square test for linear trend in age, number of children, education, age at first sex and number of sexual partners are all <0.001.

Discussion

Pap smear coverage in this study, 30.9%, was higher than expected based on other available numbers for Peru's general population.[13,17–19] However, this study took place in 20 of the largest cities of Peru, where coverage would be expected to be higher than smaller cities or rural areas due to accessibility. Additionally, urban people tend to be more educated and affluent than rural dwellers, and these factors have been associated with seeking Pap smears in other settings.[7,13,24] Despite higher coverage than expected, the coverage also indicates that most women in these age groups are in fact not getting screened.

The most significant predictors of having received a Pap smear were demographic: number of children, education and age. Because many providers do Pap smears during antenatal pelvic exams, more children equals more opportunities to have been offered a Pap smear, and perhaps more opportunities to learn about them. The association between more education and having had a Pap has also previously been reported.[7,24]

Though Pap smear costs have been identified as a barrier for women in Latin America,[3,27] and a separate study in Peru found an association between higher income and health service utilization,[28] we found no association between family income, nor a woman's current employment status and having had a Pap smear. Data on family income may not represent the best measure of readily available resources to pay for a test, and it may be that the low cost of the Pap smear at public facilities in Peru was within budgetary limits to most women despite income.

Though we did not specifically ask women about their perceived risk for cervical cancer or exposure to human papilloma virus (HPV), the general lack of association we found between Pap seeking behaviour and STI risk or symptoms is consistent with some reports from low-resource settings that describe a lack of understanding about prevention in some populations: one goes to a health centre when one feels ill.[24,29] In addition, some have found that many women from Latin America or other resource settings undergoing Pap smear do not know what the exam was for, nor have much knowledge about cervical cancer and what causes it.[3,29] To what extent the relatively low coverage of Pap smears—especially for those ages 25 to 29—reflects health care seeking, or low provision of Pap smears by clinicians for those who do obtain health care, remains undetermined.

Interestingly, regional effects on Pap smear utilization were observed. Though the observed difference may be due to less geographic barriers (lack of mountains, road quality during rainy seasons) along the coast than in the mountains or rainforest, this study took place in urban areas, where accessibility would be somewhat similar from region to region. Centralization both of population (one-third of the population lives in the capital city of Lima on the coast) and of resources are one possible explanation. Despite the Peruvian government's development and implementation of strategies to prevent cervical cancer, outside Lima, resources for treating abnormal lesions are limited: few hospitals outside of Lima can perform cone biopsies or colposcopies. The large reference hospital in Lima, the Instituto Nacional de Enfermedades Neoplásicas, is well equipped and has well-trained doctors, so many women with abnormal Paps are referred there for treatment. However, costs associated with travel to and treatment in Lima, and the associated loss of income from work, are too high for most women.[27] A survey conducted in the rainforest region of San Martín found that only 23% of women with abnormal Pap smears actually received any follow up treatment.[30] Thus, motivation to seek screening to detect pre-cancerous lesions may be outweighed by the knowledge or belief that treatment of a pre-cancerous lesion would not be available or affordable; this may be determined by where one lives, and access to a facility that can offer appropriate follow up or treatment if necessary. A successful cervical cancer screening programme must link screening, follow up procedures, and services to manage women with abnormal Pap smears.[1,13,14,31,32]

Further research can determine to what extent lower Pap smear coverage in highlands and rainforest cities, where indigenous people are more concentrated, reflect cultural differences (i.e. modesty about one's body, anxiety towards male providers; less exposure to Western models of care) and/or structural barriers (i.e. types and quality of services within the cities, availability of appropriate labs or trained personnel). However, we did find a negative association between speaking an indigenous language and having had Pap smears. Perhaps, because women in our sample were surveyed in Peru's largest cities, they had become relatively acculturated to city life and the type of medical care available, and the regional differences observed have explanations other than cultural factors. Regardless, in this resource limited country, efforts to improve coverage of Pap smear screening should focus on the Andean region, where coverage is currently lowest, as well as on rainforest.

The main limitation of this analysis is that, due to the design and objectives of the study from which data were used, the women sampled were 29 years of age or younger and many might get Pap smears in the future, so Pap smear coverage should rise as women age, have children, learn more about Pap smears and/or have providers who recommend a Pap smear. Although Peru and WHO recommend Pap smears at age 25 if resources are available, only 53% of those 25- to 29-years old had received a Pap smear and this percentage decreased among those in the highlands and rainforest, those with only elementary education and especially among women without children

(both when examining these numbers for all women and for all sexually experienced women), indicating the need for outreach to such women.

Recall bias is possible: some women may have forgotten about their screening if it was part of a routine obstetrics/gynaecological examination. Conversely, some women screened for STIs or who have had vaginal examinations might think they have had a Pap when they have not.

Newly available HPV vaccines could greatly decrease incidence of cervical cancer over time and raises new issues in a country like Peru regarding efforts to increase cervical cancer screening. Cervical cancer screening through Pap smears would remain essential to comprehensive cervical cancer approaches because it allows for early detection and treatment of cases in women who have not received the vaccine, in those already infected with oncogenic HPV types before receiving an HPV vaccine, and in those infected with oncogenic HPV types not included in existing HPV vaccines. Although the cost-effectiveness of Pap smears will decrease as cervical cancer incidence decreases due to HPV vaccine program implementation, this decrease is not expected for at least a decade after HPV vaccine introduction, and possibly not for 30 years.[34] Additionally, though the vaccine is available and there are indications of interest among women in Peru,[33] it is for now unaffordable for most Peruvians. Finally, as the vaccine becomes accessible to more women, it will be essential to monitor its impact on cervical cancer incidence and mortality through screening. This monitoring will also provide the data needed to apply new models to determine the most cost-effective guidelines for Pap smear frequency in the coming era of HPV vaccines. In sum, HPV vaccine availability does not diminish the importance of improving Pap smear coverage in Peru: HPV vaccines and cervical cancer screening are both key to preventing cervical cancer.[34]

In Peru, cervical cancer incidence is one of the highest in the Americas.[3] Increased cervical screening has tremendously impacted morbidity and mortality of women in other regions, and would be expected to influence morbidity and mortality of women in Peru as well. Our study of women 18–29 years of age reveals that the main predictors of getting screened are having had children and age, likely indicating that women are receiving Pap smears as part of their antenatal care. Efforts to increase Pap smear coverage among other Peruvian women should include its promotion during other types of health visits, such as those for family planning, and encouraging preventive health seeking behaviours among women in general. Finally, more research to determine causes of significant regional variations in coverage will help us determine ways to improve Pap smear coverage in undercovered regions, such as the Andes highlands and rainforest.

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Conflict of interest: None declared

KEY MESSAGES

- Pap smear coverage among 18- to 29-year-olds in urban Peru is only 30.9%, and is associated with having had sex, having children, higher education, increasing age and being from the coast as opposed to the highlands or rainforest.
- Increased Pap smear coverage in Peru requires promotion during different types of women's health visits, and targeted at young women with no children and low education levels.
- Regional variations in coverage suggest the need to examine differences in infrastructure and resources for follow up and treatment that influence whether or not women go for and receive screening.

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