Pap Test Coverage in São Paulo Municipality and Characteristics of the Women Tested[1]

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Interview data collected in March–September 1987 as part of an international multi-center study were used to assess Pap test coverage in the municipality of São Paulo and determine characteristics that made study subjects more likely or less likely to have been tested. The data analyzed came from interviews with 967 women. Information gathered during the interviews included demographic and socioeconomic data as well as information about use of health service facilities, use of oral contraceptives, breast self-examination, smoking, alcoholism, and prior Pap testing. The results showed that 666 (69%) of the women said they had received a Pap test in the past; 588 (61%) said they had one within three years of the interview; and 399 (41%) said they had one during the past year. Statistically significant relationships were found between Pap testing sometime in the past (and also Pap testing within the preceding three years) and age, education, marital status, use of oral contraceptives, breast self-examination, and consulting with a physician during the year preceding the interview. Adjustment for all the other statistically significant variables through multivariate analysis influenced but did not undo the statistical significance of each of these relationships. Overall, the results of this study point to levels of Pap test coverage exceeding those found by other São Paulo studies. One reason could have been this study's inclusion of Pap tests obtained at medical clinics that were not specifically accredited to give the test; another, which does not exclude the first, could have been a real increase in coverage resulting from increasing dissemination of messages in the 1980s stressing the importance of Pap testing. It is also noteworthy that 40% of the women interviewed said they had not had the test within the preceding three years. Characteristics associated with those not having had the test were youth (being 15–24 years old), being single, having low socioeconomic status, not having consulted a physician for a year, not having used oral contraceptives, and not having performed breast self-examination for a year. Knowing these characteristics could help implement measures to increase Pap test coverage of specific subgroups.

Cervical cancer, the second most frequent malignant neoplasia among women, accounts for 15% of all cancers (*1*). It is also noteworthy that about 80% of all cervical cancer cases diagnosed worldwide occur in developing countries (*2*). Among the latter, Brazil has one of the highest incidences of this disease (*1–3*). In the municipality of São Paulo, for example, according to data available from the cancer registry, age-adjusted invasive cervical cancer incidences per 100 000 women in 1969, 1973, and 1978 were 27.5, 37.7, and 35.1, respectively (*4*).

Programs that provide cervical cancer screening through cervical cytology (Pap) testing offer an effective strategy for reducing morbidity and mortality caused by invasive cervical cancer (*5*). The Pap test, introduced in a number of countries includ-

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ing the United States of America in the 1940s (*6*), became a widespread medical practice before controlled clinical tests were carried out. Evidence of its effectiveness is based on ecological (*7–9*), case-control (*10–12*), and cohort (*13*) studies. However, research carried out in countries without organized screening programs or individual outreach systems indicates irregular Pap test coverage (*14*). Typically, while one segment of the female population would undergo testing several times over brief intervals, in other groups a considerable percentage of women was never tested.

Systematic use of the Pap test in Brazil appears limited (*15*), even though the cost of administering it is low and the test may be included in the services provided by primary health care facilities. The few studies conducted confirm this irregularity of coverage (*16–18*). The study described here employed an interview survey in an effort to determine the percentage of women in the municipality of São Paulo who had submitted to Pap testing at least once during their lives and to describe the characteristics of those who had undergone such testing.

MATERIALS AND METHODS

The design of this study has been described previously (*19*). The research performed was part of a PAHO-sponsored multi-center study involving a number of Latin American countries (Brazil, Chile, Cuba, Mexico, and Venezuela) in which an attempt was made to estimate the prevalence of risk factors for chronic noncommunicable diseases. Data collection in the municipality of São Paulo took place between March and September of 1987.

Following the division into homogeneous areas proposed by Bussab and Dini (*20*), eight subdistricts, each pertaining to a socioeconomically distinct region, were intentionally selected. Two outlying districts not originally included in the above-mentioned division were added in order to extend the study to peripheral lower-income areas. The 10 selected districts and subdistricts were then grouped into five areas that were progressively concentric to the central region of the municipality of São Paulo. These areas, identified in this study by the numbers 1 through 5, were employed as the sample strata.

The study covered 100 census sectors in the five strata (20 sectors per stratum). The list of households was updated for the study, and in each stratum a cluster sample of households was randomly selected. The selection process took place in two stages: (a) selection of the census sectors within each district or subdistrict, and (b) selection of individual households within each designated census sector. Using the population distribution recorded by the 1980 census, 15 households were selected in each census sector (a total of 1500 households). However, this number was then corrected for population growth in each census sector, increasing the total number of households surveyed to 1914.

In each household, one individual was selected from among all household members 15–59 years old. Using this approach, 1479 interviews were conducted in 77.2% of the survey households. In 234 households (12.2%) none of the household members fell into the above-mentioned age range; and in 201 households (10.5%) those who were eligible refused to participate in the study.

To conduct the analysis described in this article, the 969 interview subjects who were women were selected. Information gathered from them during the interviews included demographic and socioeconomic data, as well as their use of health service facilities, use of oral contraceptives, breast self-examination, history of smoking, and screening for alcoholism. Those interviewed were also asked whether they had ever undergone Pap testing and, if so, when was the most recent test. The text of this latter question explained that the Pap test

is directed at early detection of gynecologic cancer and that it can contribute to preventing this type of cancer.

Except as indicated, having ever submitted to Pap test screening was the dependant variable in this analysis. To estimate its association with other variables of interest, odds ratios (OR) and 95% confidence intervals (95% CI) were calculated using unconditional logistic regression (*21*). Interactions were verified on the basis of that technique. Statistical significance was evaluated by means of the likelihood ratio test. For factors susceptible to ranking, the chi-square test for linear trend was used; the factors were then classified and the scores taken as a continuous variable. Since cluster-based sampling rather than simple random sampling was used, the multivariate analyses also provided 99% confidence intervals (99% CI).

Monthly per capita family income was defined as the total income of the family expressed as multiples of the minimum wage divided by the number of family members living in the household. This information was not available for 99 women. Since the values of the other variables (age, marital status, having seen a physician for consultation in the year preceding the survey, use of oral contraceptives, and breast self-examination) were not significantly affected when education was substituted for per capita family income in the final model, this substitution was retained. With regard to screening for alcoholism, the questionnaire included the four CAGE method questions (Cut down, Annoyance by criticism, Guilty feeling, and Eye-opener). The results were considered positive for alcoholism when two or more responses were affirmative (*22–24*). With regard to the use of oral contraceptives, women were classified in accordance with two categories: women currently using or ever having used oral contraceptives and women who had never used them. With respect to breast self-examination, women were asked whether they had performed this examination within the past 12 months.

RESULTS

Comparison of the study sample's age distribution with that of the 1980 Census (for the municipality of São Paulo) revealed that the sample contained a somewhat smaller percentage of women between the ages of 15 and 24 and a somewhat larger percentage in the other age groups. Of the 969 women interviewed, two were excluded for not providing information about whether they had ever had a Pap test; 666 (68.9%) said they had undergone Pap testing at least once during their lives; 588 (60.8%) said they had been tested in the three years preceding the survey; and 399 (41.3%) said they had been tested within the preceding year. The average age of the women who had received at least one Pap test at some time during their lives was 36.2 years (median = 34.5 years), while the average age of those who had never undergone Pap testing was 29.6 years (median = 26.0 years).

Table 1 shows the distribution of women who had received a Pap test by demographic and socioeconomic characteristics. Scarcely 36% of those 15–24 indicated they had ever been tested. With regard to education, despite the fact that the chi-square test for linear trend was statistically significant (6.81, $P = 0.009$), the percentage of women who had been tested was similar for the first four categories but increased for women with more schooling. This percentage was clearly greater (87%) among women with university education. With regard to per capita family income, the greater the income, the greater the percentage of women who had ever undergone testing (chi-square for linear trend = 21.73, $P < 0.001$). Among single women (not including those separated or widowed), only 37% said they had received a Pap test. As expected, single women were found to be

Table 1. Distribution by demographic and socioeconomic characteristics of the study women who reported having undergone Pap testing at some time in their lives. OR = odds ratio; CI = confidence interval; LR = likelihood ratio statistics. Municipality of São Paulo, 1987.

Characteristics	Total	Pap tests conducted			
		No.	%	OR	95% CI
*Age (years):**					
45–59†	202	151	74.8	1.0	
35–44	217	182	83.9	1.8	1.1–2.8
25–34	326	253	77.6	1.2	0.8–1.8
15–24	221	80	36.2	0.2	0.1–0.3
LR (3 DF) = 140.88; $P < 0.001$					
Education:					
None or incomplete primary†	198	130	65.7	1.0	
Complete primary (4 years)	349	237	67.9	1.1	0.8–1.6
Secondary (8 years)	186	122	65.6	1.0	0.7–1.5
Preuniversity (11 years)	159	112	70.4	1.3	0.8–2.0
University	75	65	86.7	3.4	1.6–7.0
LR (4 DF) = 15.109; $P = 0.004$					
Family per capita income (minimum wages):‡					
≤1†	133	82	61.7	1.0	
1–13	407	273	67.1	1.3	0.8–1.9
3–15	168	130	77.4	2.1	1.3–3.5
>5	160	132	82.5	2.9	1.7–5.0
LR (3 DF) = 23.15; $P < 0.001$					
Marital status:					
Married†	637	504	79.1	1.0	
Widowed	41	31	75.6	0.8	0.4–1.7
Separated	56	45	80.4	1.1	0.5–2.1
Single	233	86	36.9	0.2	0.1–0.2
LR (3 DF) = 138.68; $P < 0.001$					
*Color:**					
White†	715	497	69.5	1.0	
Mulatto	192	136	70.8	1.1	0.8–1.5
Black	40	22	55.0	0.5	0.3–1.0
Yellow	19	11	57.9	0.6	0.2–1.5
LR (3 DF) = 4.88; $P = 0.182$					
Area of residence:§					
Area 1†	219	155	70.8	1.0	
Area 2	246	157	63.8	0.7	0.5–1.1
Area 3	158	104	65.8	0.8	0.5–1.2
Area 4	202	152	75.3	1.3	0.8–1.9
Area 5	142	98	69.0	0.9	0.6–1.5
LR (4 DF) = 7.89; $P = 0.095$					

* Data unknown for 1 woman.
† Reference group.
‡ Data unknown for 99 women.
§ Areas taken as sample strata, progressively concentric to the central region of the municipality of São Paulo. Each area pertains to a socioeconomically distinct region.

Table 2. Distribution by certain health care or health characteristics of the study women who reported having undergone Pap testing at some time in their lives. OR = odds ratio; CI = confidence interval; LR = likelihood ratio statistics. Municipality of São Paulo, 1987.

Characteristics	Total	Pap tests conducted			
		No.	%	OR	95% CI
*Consulted a physician in the year preceding the survey:**					
No†	254	142	55.9	1.0	
Yes	706	519	73.5	2.2	1.6–3.0
LR (1 DF) = 26.07; $P < 0.001$					
Uses or has used oral contraceptives:‡					
No†	423	226	53.4	1.0	
Yes	542	440	81.2	3.8	2.8–5.0
LR (1 DF) = 86.00; $P < 0.001$					
Smoking:§					
Never smoked†	581	384	66.1	1.0	
Ex-smoker	66	50	75.8	1.6	0.9–2.9
Currently smokes	319	232	72.7	1.4	1.0–1.8
LR (2 DF) = 5.85; $P = 0.054$					
Screening for alcoholism:§¶					
Negative†	934	646	69.2	1.0	
Positive	32	20	62.5	0.7	0.4–1.5
LR (1 DF) = 0.62; $P = 0.431$					
*Performs breast self-examination:***					
No	718	441	61.4	1.0	
Yes	246	223	90.7	6.1	3.9–9.6
LR (1 DF) = 85.12; $P < 0.001$					

* Data unknown for 7 women.
† Reference group.
‡ Data unknown for 2 women.
§ Data unknown for 1 woman.
¶ By application of the CAGE questionnaire (*22*).
** Data unknown for 3 women.

younger, on the average, than those in the other marital status categories (data not shown). No statistically significant associations were found between having undergone Pap testing and skin color or residence in one of the five selected areas.

Associations between Pap testing and selected health-related characteristics are shown in Table 2. Having consulted a physician in the year preceding the survey, use at some time of oral contraceptives, and having performed breast self-examination all showed statistically significant associations with having undergone Pap testing. However, neither a history of smoking nor the results of CAGE screening for alcoholism revealed a statistically significant association with Pap testing.

The variables that showed a statistically significant association with Pap testing in the univariate analysis were included in the final model (Table 3). At least one subcategory of each variable showed an independent statistically significant association with Pap testing when subjected to multivariate analysis. It should be noted, however, that following adjustment the ORs for the 25–34 and 35–44 age groups were

Table 3. Multivariate analysis of characteristics with a statistically significant relationship in the univariate analysis to ever having undergone Pap testing. OR = odds ratio; CI = confidence interval; LR = likelihood ratio statistics.

Characteristics	OR*	95% CI	99% CI
Age (years):			
45–59†	1.0		
35–44	1.2	0.7–2.2	0.6–2.6
25–34	0.6	0.4–1.0	0.3–1.2
15–24	0.2	0.1–0.3	0.1–0.4
Education:			
None or incomplete primary†	1.0		
Complete primary (4 years)	1.5	1.0–2.4	0.8–2.7
Secondary (8 years)	2.2	1.2–3.9	1.0–4.6
Preuniversity (11 years)	2.0	1.1–3.7	0.9–4.5
University	3.2	1.3–7.7	1.0–10.1
Marital status:			
Married†	1.0		
Widowed	1.3	0.6–3.0	0.4–3.9
Separated	1.0	0.4–2.2	0.3–2.8
Single	0.3	0.2–0.4	0.2–0.5
Consulted a physician in the year preceding the survey:			
No†	1.0		
Yes	2.1	1.4–3.0	1.3–3.4
Uses or has used oral contraceptives:			
No†	1.0		
Yes	3.1	2.1–4.5	1.8–5.0
Performs breast self-examination:			
No†	1.0		
Yes	4.7	2.8–8.0	2.4–9.4

LR (13 DF) = 336.68; $P < 0.001$.
* Adjusted for all variables included in the table.
† Reference group.

smaller (relative to the 45–59 group) than in the univariate analysis. Also, other levels of education (rather than just university education) were found to have a statistically significant association with Pap testing. Finally, ORs for a history of oral contraceptive use and breast self-examination were lower than in the univariate analyses.

The multivariate analysis tested the interactions between age and the other variables of the model, as well as between education and the other variables. Two of these interactions were found to be statistically significant: those between age and breast self-examination (positive interaction, $P = 0.002$) and between age and use of oral contraceptives (negative interaction, $P = 0.01$). The positive interaction indicates that older women who performed breast self-examination were more likely to have received Pap testing. The negative interaction between age and use of oral contraceptives can be attributed to the fact that a relatively high percentage of young women who reported use of oral contraceptives had also undergone Pap testing.

Table 4. Multivariate analysis of characteristics with a statistically significant relationship in the univariate analysis to having undergone Pap testing in the three years preceding the survey. OR = odds ratio; CI = confidence interval; LR = likelihood ratio statistics.

Characteristics	OR*	95% CI	99% CI
Age (years):			
45–59†	1.0		
35–44	1.4	0.9–2.3	0.7–2.7
25–34	1.1	0.7–1.8	0.6–2.1
15–24	0.4	0.2–0.7	0.2–0.8
Education:			
None or incomplete primary†	1.0		
Complete primary (4 years)	1.5	1.0–2.3	0.9–2.6
Secondary (8 years)	2.3	1.4–4.0	1.2–4.7
Preuniversity (11 years)	2.7	1.5–4.6	1.3–5.5
University	3.7	1.7–8.1	1.4–10.3
Marital status:			
Married†	1.0		
Widowed	0.8	0.4–1.6	0.3–2.0
Separated	1.0	0.5–2.0	0.4–2.5
Single	0.3	0.2–0.5	0.2–0.6
Consulted a physician in the year preceding the survey:			
No†	1.0		
Yes	2.8	2.0–4.0	1.8–4.5
Uses or has used oral contraceptives:			
No†	1.0		
Yes	2.4	1.7–3.4	1.5–3.8
Performs breast self-examination:			
No†	1.0		
Yes	3.9	2.5–6.0	2.2–6.8

LR (13 DF) = 303.60; $P < 0.001$.
* Adjusted for all variables included in the table.
† Reference group.

Table 4 shows the results of multivariate analysis when Pap testing within the three years preceding the survey (rather than sometime in the past) was used as the dependent variable. Comparison of these results with those when the Pap test was taken sometime in the past showed a decline in the ORs (for all age groups) among women who had used oral contraceptives and women who reported performing breast self-examination. The relationship between Pap testing and education became stronger when the dependent variable was Pap testing during the previous three years (chi-square for linear trend = 20.5, $P < 0.001$) rather than Pap testing sometime in the past (chi-square for linear trend = 10.4, $P < 0.001$).

DISCUSSION

The Brazilian Ministry of Health recommends Pap testing once every three years following two negative results obtained at an interval of one year; the priority age group is 25–60 years (*15*). Brazil does not

currently have a screening program in place for detecting gynecologic cancer. Gynecologists and other physicians conduct cervical cytology testing either on an annual basis or at no set interval. The efficacy of this "spontaneous" type of triage has been questioned. Annual repetition of cervical cytology testing is not indicated for any age group (25).

The results obtained in this study suggest that the percentage of women in the municipality of São Paulo who report having undergone Pap testing at least once during their lifetimes (68.9%) is relatively high when compared to Brazilian patterns elsewhere. To date, almost all existing studies have reported very low levels of coverage (*15, 16*). A national-level assessment conducted in 1984 (*16*) indicated that health secretariats conducted Pap testing in no more than 7% of the health units pertaining to the basic health network, attaining a coverage of less than 2% of the adult female population. In 1987, the estimated coverage attained through testing performed in public health facilities was 8% of the women above age 20 (*15*).

In the state of São Paulo, according to a health secretariat source, the public, government health plan-affiliated (*conveniado*), and private sectors accredited with the Professor Walter Edgard Maffei Brazilian Center for Studies and Training in Pathological Anatomy (*Centro Brasileiro de Estudos e Treinamento em Anatomia Patológica Professor Walter Edgard Maffei*—CEBRETAP) performed approximately 1.6 million oncologic colpocytology tests in 1988, providing coverage for nearly 15% of the female population 15 years of age and older (*18*). However, this way of estimating coverage considers only the total number of tests performed; it does not distinguish between women who have undergone a number of cytology tests and those who have had only one such test. Nevertheless, coverage proved to be extremely low. It should be noted that in certain cases collection of the smear and reading of the cervical cytology test takes place in the medical clinic itself; these tests were not included in this health secretariat assessment.

In a survey conducted by the São Paulo Health Secretariat in 1988 on 2021 women between the ages of 15 and 49 who were interviewed in the metropolitan region of São Paulo, 55% indicated that they had had the Pap test performed at some time during their lives, 48% in the three years preceding the survey, and 33% in the preceding year (*17*). However, it is important to point out that in this survey the sample was not random, having been selected from potential clients of public health service facilities. In another survey, this one a case-control study conducted in the municipality of São Paulo in 1990–1991 to assess risk factors for invasive cervical cancer, 67% of the controls indicated they had had at least one Pap test performed during their lifetimes (*12*). The result presented here (69%) is quite similar.

This study constitutes the first, and possibly the only, inquiry into cervical cytology testing carried out on a random and representative sample of the population of a Brazilian city. One possible reason for the greater coverage found here, as compared to coverage estimated in previous surveys, may be its inclusion of data on tests taken and read at nonaccredited medical clinics (not included in the CEBRETAP data). A second possibility, one that does not exclude the first, is that there could have been a real increase in coverage owing to increased publicity in the 1980s about the importance of Pap testing (*26*).

The study made it possible to identify subgroups in which relatively low numbers of women submit to Pap testing. These were found to include the 15 to 24 year age group, single women, those with low levels of education, those who had not seen a physician for consultation in the year preceding the survey, those who had never used oral contraceptives, and those who

had not performed breast self-examination in the year preceding the survey. The results for the age and marital status variables are consistent with those reported in other studies (*10, 27, 28*). The low levels of coverage found among very young or single women may be attributable, at least partially, to the fact that some of these women have not yet initiated sexual activity (this study did not provide such information). The relatively high rate of cervical cytology tests conducted on women in the 35–44 year age group may be attributable to the fact that, beginning in the late 1970s, women of reproductive age started to undergo Pap testing as a routine procedure during prenatal and family planning consultations.

The relatively high Pap test coverage associated with higher levels of education and per capita family income has already been reported in previous research studies (*10, 27–31*). However, it should be pointed out that no difference was observed with regard to test coverage in the various areas of the city, despite the fact that these areas represent quite different socioeconomic regions.

Contact with health care facilities appears to have increased the likelihood of having undergone Pap testing (*32*). Performance of this test has also been associated with use of oral contraceptives (*30*) and breast self-examination (*28*). The current interpretation is that use of contraceptives or performance of breast self-examination may reflect contact with a health service (*31*). However, in our study such associations remained statistically significant following adjustment for having had a medical consultation in the past year.

It is important to note the similarity between the results obtained when the dependent variable was Pap testing in the three years preceding the survey and those obtained when the dependent variable was Pap testing sometime in the past. However, a reduction was observed (among all age groups above 15–24) in the ORs for women reporting use of oral contraceptives and performance of breast self-examinations. With regard to age group, these differences should reflect, at least partially, the greater likelihood that young women who have undergone cytology testing have done so recently.

The method used to estimate triage coverage for cervical cancer, using the responses provided by women themselves with regard to a prior history of smear-taking for cervical cytology, presents a number of limitations: (1) The questions regarding collection of samples for conducting the Pap test presuppose a prior knowledge of the test; it is possible that some women were not able to distinguish between the taking of samples for cervical cytology testing and a routine gynecologic examination (despite the fact that the question explains that the Pap test is a test for the early detection of gynecologic cancer). (2) It is not possible to affirm whether cervical cytology test samples were collected for purposes of screening or as a result of complaints of a gynecologic nature. (3) Women tend to overestimate the frequency of their testing and to underestimate the time elapsed since the most recent test (*10, 33–35*). And (4) there is a certain degree of social pressure to adopt certain health practices, and hence some women may have reported a prior history of Pap testing in order to give the impression that they were doing the "right thing" (*36*). Since the dependent variable in this study (having undergone Pap testing at least once during the study subject's lifetime) exhibits a high degree of prevalence, it is important to remember that the OR does not estimate the prevalence rate (*37*).

From this study it was possible to conclude that Pap test coverage in the municipality of São Paulo was higher than that shown by previously published studies. Possible reasons for these results have been presented. However, it is important to stress that approximately 40% of the women in-

terviewed indicated they had not submitted to Pap testing in the three years preceding the study. The characteristics associated with failure to submit to Pap testing were: being between 15 and 24 years old, being single, having a low socioeconomic status, not having seen a physician for consultation in the year preceding the survey, not having used oral contraceptives, and not having performed a breast self-examination within the past year. Identification of these characteristics may be useful for implementing measures designed to increase Pap test coverage in specific subgroups.

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