Falling short of Pap test guidelines

Judy Lee, Greg F. Parsons and Jane F. Gentleman

Abstract

Objectives

This article examines the associations between women's characteristics and getting or not getting a Pap test.

Data source

The data are from the 1994/95 National Population Health Survey (NPHS) conducted by Statistics Canada.

Analytical techniques

Multivariate logistic regressions were used to determine the odds of women not complying with Pap test guidelines, that is, of never having had a Pap test, and among women who had had one, of not having done so in the last three years.

Main results

One in four women aged 18 to 69 had either never had a Pap test or had not had one in the three years before the NPHS. Notably, older women—who are at the greatest risk for cervical cancer—are less compliant with screening guidelines than younger women. Other characteristics of women with high odds of never having had a Pap test are: being single, being a resident of Quebec, having immigrated to Canada, having less than a secondary school education, not being in the highest income group, and having had no sex partners in the previous year.

Key words

Pap smear, Pap test, cervical cancer, mass screening

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According to a 1995 national forum on cervical cancer screening, "There is no other cancer for which screening reduces the incidence of invasive disease as dramatically and predictably as cervical cancer."[1] Screening for this disease is done using a simple, low-cost procedure called the Papanicolaou smear, known commonly as the Pap test. This test detects the presence of abnormal cells in the cervix, including those that are precursors to the invasive form of cervical cancer.

At present, the most established Canadian cervical cancer screening programs are in British Columbia and Nova Scotia. These programs began in 1949 and 1991, respectively. Other provinces have implemented programs to varying degrees. There has been a series of national initiatives to establish a comprehensive population-based cervical cancer screening program,[1-4] but for a variety of reasons, a fully integrated system has yet to be established in any province or territory.[1,5,6]

Methods

Data source

The data in this article are from Statistics Canada's 1994/95 National Population Health Survey (NPHS). The NPHS is a longitudinal survey designed to collect information related to the health of the Canadian population over time. In 1994/95, it surveyed household residents in all provinces and territories, except persons living on Indian reserves, Canadian Forces bases, and in some remote areas. A more detailed description of the survey design, sample and interview procedures is found in published reports.[7]

The 1994/95 NPHS provincial, non-institutional sample consisted of 27,263 households, of which 88.7% agreed to participate in the survey. After the application of an eligibility rule, 20,725 households remained in scope.

One knowledgeable person in every participating household provided general socio-demographic and health information about each household member. In total, data pertaining to 58,439 individuals were collected.

In addition, one randomly selected person in each of the 20,725 participating households was chosen to provide in-depth information about his or her own health. In 18,342 of these households, the selected person was aged 12 or older. Their response rate to these in-depth health questions was 96.1%, or 17,626 respondents.

In the remaining 2,383 participating households, the randomly selected respondent was younger than age 12. In-depth health information was collected for these individuals as part of Statistics Canada's 1994/95 National Longitudinal Survey of Children and Youth (NLSCY).

Of the 17,626 randomly selected respondents aged 12 or older, 14,786 were eligible members of the NPHS longitudinal panel. These respondents were also eligible for the Health Canada supplement. The response rate for these Health-Canada-sponsored questions was 90.6%.

Of the 17,626 randomly selected respondents aged 12 or older, the remaining 2,840 were sponsored by provincial governments that elected to enlarge the sample sizes in their provinces. These respondents will not be followed-up and were not eligible for the Health Canada supplement.

To ascertain women's Pap test histories, female respondents aged 18 and older, who were selected to answer the in-depth health questions, were asked, "Have you ever had a Pap smear test?" Those who answered "yes" were then asked, "When was the last time?" Of this group of respondents, only those eligible for the Health Canada supplement were analysed in this article, as they were also asked about the number of sex partners they had had in the past year (a risk factor for cervical cancer).[8] The survey asked "How many sexual partners have you had within the past twelve months?"

After the exclusion of 20 women who did not respond to some of the survey questions, 6,878 respondents remained in the study population. They represented 10,718,417 non-institutionalized women aged 18 and older who were residing in the 10 provinces.

Analytical techniques

Multivariate logistic regressions were used to predict the odds of women not complying with recommendations for Pap test screening, that is, the odds of never having had a Pap test, and among women who had ever had one, the odds of not having done so in the last three years. The data were weighted to represent the Canadian population. The sample weights were adjusted so that they average to 1. This approach permits a less biased estimate of the standard errors.

The independent variables in the regressions were age, marital status, province of residence, residence/non-residence in a census metropolitan area (CMA), highest level of education, household income, main activity, country of birth, number of sex partners in the last year, and presence of cancer. CMAs are large urban centres consisting of an urbanized core with 100,000 or more inhabitants, and adjacent urban and rural areas that have a high degree of economic and social integration with the urbanized core. There are 25 CMAs in Canada.[9] Household income is a derived measure of income adequacy based on household size. Main activity refers to the principal way in which the respondent reported spending most of her time. The cancer variable was included in the model to adjust the other results for whether or not the woman had this disease. It was presumed that cancer patients would likely undergo a more intense scrutiny of their health. A respondent who had ever had cancer was not recorded as having it at the time of the survey if the diagnosis occurred at least five years earlier, and she had been told that the disease was cured. An estimated 2.4% of the women in this study had cancer (of any kind) at the time of the survey.

Limitations

Pap test data from the NPHS are subject to the problems inherent in self-reported data. Women who agreed to participate in the NPHS may be more likely than non-respondents to have engaged in health-promoting behaviour such as having a Pap test. Some respondents wishing to provide a socially desirable answer may have said that they had had a Pap test when, in fact, they had not. Also, respondents might not have remembered accurately the date of their last Pap test. Studies of self-reported Pap test histories tend to over-report screening.[10]

Ideally, Pap test rates and cervical cancer rates would be based on counts of women with intact cervixes, which depend upon rates of total hysterectomy over many previous years. Without this adjustment, rates of non-compliance with cervical cancer screening guidelines presented in this article are overestimated.[11]

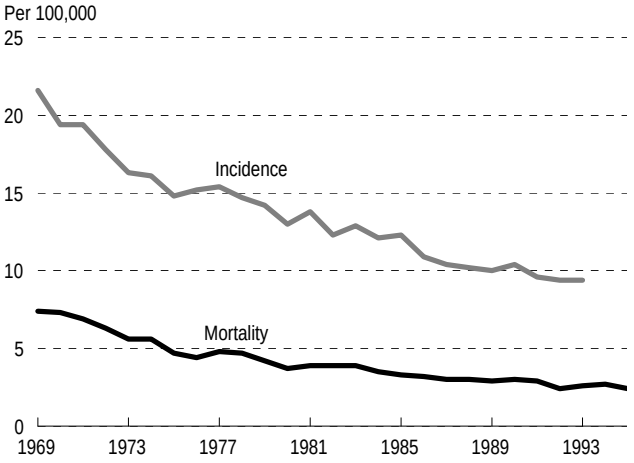
As a result of the introduction of cervical cancer screening in British Columbia in 1949 and its subsequent gradual adoption across Canada, cervical cancer incidence and mortality rates have decreased dramatically.[5] Between 1969 and 1998, the age-standardized incidence rate fell from 21.8 to an estimated 8.3 cases per 100,000 females (Chart 1).[12,13] Similarly, the mortality rate dropped during the same period from 7.4 to an estimated 2.2 deaths per 100,000, with the most pronounced decline among older women (Chart 2).[12] Despite these gains, there will be an estimated 1,400 new cases of cervical cancer in 1998. This same year, the disease is expected to cause the deaths of 400 Canadian women.[12]

Women with cervical cancer have a relatively good prognosis, with a deaths-to-cases ratio of 0.29[12] and a five-year relative survival rate of 74%.[14] Depending on the stage to which the cancer has advanced at the time of detection, cervical cancer can be readily treated, with pre-cancerous cells removed by laser, cyrosurgery (destruction of tissue by the application of extreme cold), and conization (surgical removal of a cone of tissue); invasive tumours require a simple or radical hysterectomy, or radiotherapy with chemotherapy.[8] Most cases of invasive cervical cancer occur in women not previously screened or not screened recently.[8,15]

Women who are older, immigrants, Aboriginal, smokers, and/or with a lower socioeconomic status face a higher risk of cervical cancer. Early sexual activity, number of sex partners and exposure to human papilloma virus (HPV) are also risk factors. There is a strong causal relationship between HPV (which can be spread through sexual contact) and cervical cancer (and its precursors).[8,16-18]

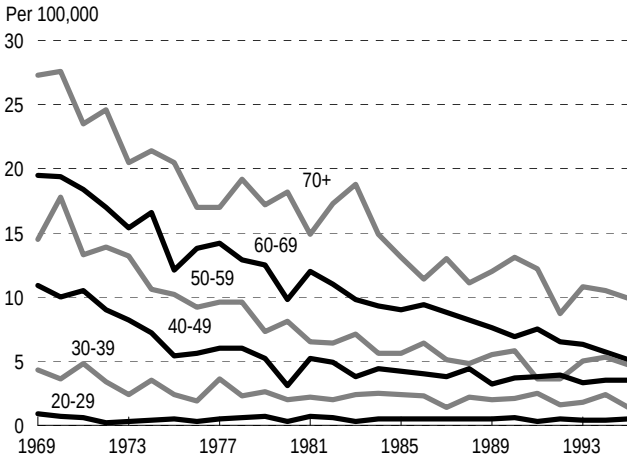
This article analyzes data from the 1994/95 National Population Health Survey (NPHS), which provided information on the self-reported Pap test histories of Canadian women aged 18 and older. The study relates women's propensity to get Pap tests to selected demographic, socioeconomic and lifestyle characteristics (see *Methods*). According to the NPHS, about one in six Canadian women aged 18 and older have never had a Pap test—a finding consistent with past research.[19-21] Previous studies have shown that factors related to Pap test use include age, marital status, education, income, work status, ethnicity, Aboriginal status, immigrant status, urban or rural residence, and lifestyle and health-related behaviour.[15,19-29]

Chart 1
Age-standardized cervical cancer incidence and mortality rates, females, all ages, Canada, 1969 to 1995



Data sources: *Cancer Incidence in Canada, 1969-1993 (Reference 13); Canadian Vital Statistics Data Base*
Note: *Rates are standardized to the age distribution of the 1991 Canadian population. Projected incidence rates (1994 to 1998) and projected mortality rates (1996 to 1998) are available, but not shown.*

Chart 2
Cervical cancer mortality rates, by age group, women aged 20 and older, Canada, 1969 to 1995



Data source: *Canadian Vital Statistics Data Base*

According to the 1994/95 NPHS, over 1.2 million women aged 18 to 69—the age group targeted for cervical cancer screening—reported having never had a Pap test. Another 1.2 million had their last test more than three years before the survey. In total, one in four women in the targeted age group had not been screened in accordance with current guidelines, hereafter referred to as Pap test non-compliance.

Non-compliance does not imply personal responsibility. Women may or may not get a Pap test for a variety of reasons, including awareness, belief in its effectiveness, promotion by health care providers, and access to programs and services.

A national workshop conducted in 1989 produced 27 recommendations for the establishment of a national screening program (see *Screening guidelines)*. The recommendations on screening frequency were that "physicians should ensure that cervical cytology smears are taken soon after age 18 or once women are sexually active. The process should be repeated after one year, and provided the smears are of appropriate quality and normal, at least every three years until the woman reaches age 70. This will ensure that as many women as possible throughout Canada are offered the protection that regular cervical cytologic screening provides."[4] In practice, it is possible for women to get a Pap test more often than the guidelines recommend, for example, as part of a regular health examination or as a prerequisite to obtaining some forms of birth control.

Senior women

Lifetime rates of non-compliance with Pap test guidelines vary with age, decreasing abruptly from 51% to 19% between the age groups of 18 to 19 and 20 to 29. The rate continues to decline to a low of 8% among 30- to 49-year-old women. Thereafter, the rate increases, reaching 34% at ages 70 and older (Chart 3 and Table 1). In the multivariate analysis, the odds of lifetime non-compliance were lowest among women aged 30 to 39 and highest among those 70 and older (Table 2).

Among women who have had at least one Pap test, whether they received it as recently as recommended is very strongly related to age. The older a woman is, the less likely she is to have had her most recent Pap test in the last three years.

Screening guidelines

In 1989, the National Workshop on Screening for Cancer of the Cervix issued recommendations for cervical screening, the highlights of which follow.[4]

- All women aged 18 and older who have had sexual intercourse should be encouraged to participate in a cervical cytology screening program.
- A second smear should, in general, be taken after one year, especially for women who begin screening after age 20.
- If the first two smears are satisfactory and show no significant epithelial abnormality, women should, in general, be advised to be rescreened every three years to age 69.
- Women over age 69 who have had at least two satisfactory smears and no significant epithelial abnormality in the last nine years and who have never had biopsy-confirmed severe dysplasia or carcinoma in situ (cervical intraepithelial neoplasia III) can be dropped from the cervical cytology screening program.
- The recommended frequency of rescreening for women aged 18 to 69 is appropriate for all risk groups.
- Women entering a screening program at age 67 or older should have two satisfactory smears at least six months apart; those over age 69 can then be dropped from the program if the smears show no epithelial abnormality.
- The recommended screening frequencies apply to women whose smears show no epithelial abnormality. If abnormalities are detected, schedules for repeat examinations should be dictated by the requirements of surveillance, diagnosis, treatment and follow-up.
- Women do not need to be screened if they have never had sexual intercourse or have had a hysterectomy for benign conditions with adequate pathological documentation that the cervical epithelium has been totally removed and previous smears have been normal.

The guidelines stress the importance of high-quality laboratory services for reading cytology smears, with adequate internal and external quality-control systems, and information systems to monitor screening frequencies and to issue reminders to attend at the recommended intervals.

Among women aged 60 to 69 who had ever had a Pap test, nearly a third had not done so in the three years before their NPHS interview (Table 1). Not surprisingly, the age group with the largest share of women not getting a Pap test in the last three years was 70 and older. The low screening rates among older women may be partially related to the higher prevalence of hysterectomies in this group.[11,25]

In the absence of tests showing problems, the guidelines recommend that senior women be dropped from screening programs. However, it is recommended that senior women who have never had a Pap test get tested. According to the guidelines, "women entering a screening program at age 67 or older should have two satisfactory smears at least six months apart; those over age 69 can then be dropped from the program if the smears show no epithelial abnormality."[4]

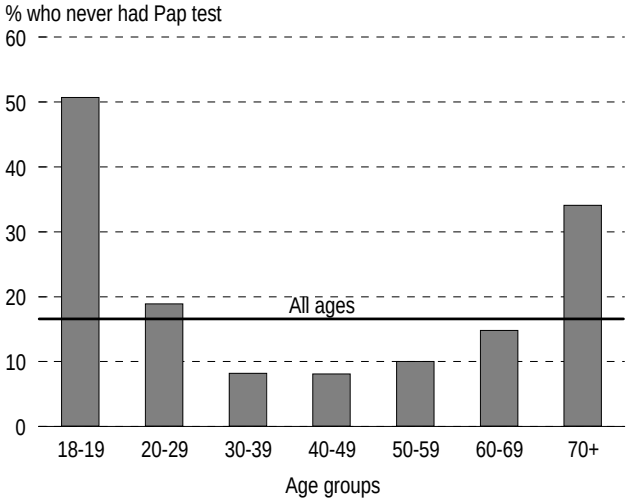
Thus, older women, who have the highest incidence and mortality rates of cervical cancer,[13] are highly non-compliant with Pap test guidelines, although they might be expected to be the most likely to have ever had a Pap test, having had the longest opportunity to do so. These findings concur with past studies that identify older women as an under-served group for Pap tests.[20,23,25,30,31]

Immigrant women

Studies of cancer screening among ethnic and immigrant groups have suggested that cultural barriers may inhibit some women from taking Pap tests.[22,31] NPHS data support these findings (Table 2). For example, women born in Asia had the highest odds of never having had a Pap test—almost nine times those of Canadian-born women. Since 20% of all Canadian women aged 18 and older are immigrants, this situation affects a sizeable proportion of the female population (Appendix).

Although Asian-born women were the least likely to have ever had a Pap test, those who had had one were very likely to have had it less than three years ago. Women born in South America, Central America, the Caribbean or Africa who had had at least one Pap test were also more compliant with guidelines for test recency than Canadian-born women.

Chart 3
Lifetime Pap test non-compliance rates, women aged 18 and older, Canada excluding territories, 1994/95



Data source: *1994/95 National Population Health Survey*
Note: *Univariate rates were weighted to represent 10,718,417 non-institutionalized women aged 18 and older in the 10 provinces.*

Socioeconomic characteristics

Some strong socioeconomic effects that support findings from previous studies were also evident.[19,20,25] The less educated a woman was, the higher were her chances of never having had a Pap test. Women with less than a secondary education had odds for lifetime non-compliance that were more than twice those for women with a college diploma or university degree. Also, women in the lowest two household income groups had significantly higher odds than women in the highest group. Similarly, women in the lowest three household income groups had odds that were significantly higher than those for women in the highest income group.

Education and income also appear to be factors related to Pap test recency. Compared to women with college or university education, those with secondary or less than secondary education and who had ever had a Pap test had significantly higher odds of having their most recent test three or more years ago.

Table 1
Pap test non-compliance rates, women aged 18 and older, Canada excluding territories, 1994/95

			Ever had Pap test		
		Never had Pap test†	Total†	Had last test 3 or more years ago‡	Had last test in last 3 years‡
				%	
All women 18 and older		**15.4**	**84.6**	**18.3**	**81.7**
Age	18-19	50.7	49.3	.8	99.2
	20-29	18.9	81.1	2.7	97.3
	30-39	8.2	91.8	10.7	89.3
	40-49	8.1	92.0	15.6	84.4
	50-59	10.0	90.0	24.1	75.9
	60-69	14.8	85.2	31.1	68.9
	70+	34.1	66.0	54.2	45.8
Marital status	Single (never married)	32.3	67.7	10.3	89.7
	Now married	10.4	89.6	17.5	82.5
	Common-law/Living with partner	9.1	90.9	8.4	91.6
	Separated or divorced	9.2	90.8	18.1	81.9
	Widowed	25.4	74.6	44.9	55.1
Province of residence	Quebec	23.7	76.3	15.8	84.2
	New Brunswick	15.7	84.3	24.3	75.7
	Newfoundland	13.1	86.9	23.6	76.4
	Ontario	14.5	85.5	18.6	81.5
	Prince Edward Island	11.6	88.5	20.9	79.1
	Nova Scotia	10.5	89.5	20.1	79.9
	Alberta	10.1	89.9	11.5	88.5
	British Columbia	11.3	88.7	22.5	77.5
	Manitoba	8.9	91.1	20.9	79.1
	Saskatchewan	7.7	92.3	22.3	77.7
Resides in census metropolitan area	No	13.5	86.5	23.2	76.8
	Yes	16.6	83.4	15.2	84.8
Education	Less than secondary	24.3	75.7	29.3	70.8
	Secondary	15.2	84.8	20.6	79.4
	Beyond high school	13.7	86.3	15.0	85.0
	College or university	9.6	90.5	12.2	87.8
Household income	Low	22.6	77.4	22.7	77.3
	Lower middle	18.3	81.7	23.4	76.6
	Upper middle	10.6	89.4	15.5	84.5
	High	8.8	91.2	10.2	89.8
Main activity	Working	13.6	86.4	10.9	89.1
	Working and caregiving	4.9	95.1	12.1	87.9
	Caregiving	14.0	86.0	19.5	80.5
	Looking for work	16.7	83.3	14.0	86.0
	Retired, at school, ill	27.0	73.0	32.3	67.7
Place of birth	Canada	13.3	86.7	18.6	81.4
	Other North America, Europe, Australia	16.3	83.7	21.4	78.6
	South Am, Central Am, Caribbean, Africa	29.5	70.5	5.9	94.2
	Asia	39.2	60.8	9.9	90.1
Number of sex partners in last 12 months§	None	47.1	52.9	15.6	84.4
	One	9.3	90.7	8.7	91.3
	Two	13.4	86.6	5.2	94.8
	Three or more	13.5	86.5	1.4	98.6
Has cancer	No	15.5	84.5	18.2	81.8
	Yes	11.6	88.5	23.1	76.9

Data source: *1994/95 National Population Health Survey*
Note: *Because of rounding, figures may not sum to 100%. "Unknown" categories are not shown.*
† Univariate rates were weighted to represent 10,718,417 non-institutionalized women aged 18 and older in the 10 provinces who responded "yes" or "no" to the Pap test question.
‡ Univariate rates were weighted to represent 9,062,010 non-institutionalized women aged 18 and older in the 10 provinces who ever had a Pap test. Excludes women who had had a Pap test, but did not indicate recency.
§ Women over age 45 were not asked about the number of sex partners.

Table 2
Odds ratios for non-compliance with Pap test guidelines, women aged 18 and older, Canada excluding territories, 1994/95

		Never had Pap test		If ever had Pap test, had last test 3 or more years ago	
Independent variable	**Category**	**Odds ratio**	**95% confidence interval**	**Odds ratio**	**95% confidence interval**
Age	18-19	5.11**	3.4, 7.6	.05**	-- .4
	20-29	2.19**	1.7, 2.9	.21**	.1, .3
	30-39†	1.00	...	1.00	...
	40-49	1.26	.9, 1.8	1.46**	1.1, 1.9
	50-59	1.63	1.0, 2.7	1.94**	1.3, 2.9
	60-69	2.18**	1.3, 3.7	2.34**	1.6, 3.5
	70+	7.31**	4.3, 12.4	5.62**	3.6, 8.8
Marital status	Single (never married)†	1.00	...	1.00	...
	Now married	.37**	.3, .5	.60**	.4, .8
	Common-law/Living with partner	.38**	.3, .6	.71	.4, 1.1
	Separated or divorced	.26**	.2, .4	.67*	.5, 1.0
	Widowed	.31**	.2, .4	.81	.6, 1.2
Province of residence	Quebec	5.22**	3.0, 9.1	.78	.5, 1.2
	New Brunswick	2.76**	1.4, 5.5	1.11	.6, 1.9
	Newfoundland	2.11	1.0, 4.6	1.18	.7, 2.1
	Ontario	1.84*	1.1, 3.2	1.00	.7, 1.5
	Prince Edward Island	1.79	.5, 6.6	.86	.3, 2.5
	Nova Scotia	1.52	.7, 3.1	.97	.6, 1.6
	Alberta	1.41	.8, 2.6	.56*	.4, .9
	British Columbia	1.27	.7, 2.3	1.20	.8, 1.8
	Manitoba	1.03	.5, 2.1	1.03	.6, 1.7
	Saskatchewan†	1.00	...	1.00	...
Resides in census metropolitan area	No†	1.00	...	1.00	...
	Yes	.97	.8, 1.2	.68**	.6, .8
Education	Less than secondary	2.12**	1.7, 2.7	1.46**	1.2, 1.8
	Secondary	1.64**	1.3, 2.1	1.67**	1.3, 2.1
	Beyond high school	1.04	.8, 1.3	1.19	1.0, 1.5
	College or university†	1.00	...	1.00	...
Household income	Low	1.57**	1.1, 2.2	1.45*	1.1, 2.0
	Lower middle	1.70**	1.3, 2.3	1.81**	1.4, 2.4
	Upper middle	1.26	.9, 1.7	1.41*	1.1, 1.8
	High†	1.00	...	1.00	...
Main activity	Working†	1.00	...	1.00	...
	Working and caregiving	.65**	.5, .9	1.11	.9, 1.4
	Caregiving	1.10	.9, 1.4	1.35*	1.1, 1.7
	Looking for work	.81	.5, 1.4	1.47	.8, 2.7
	Retired, at school, ill	1.20	.9, 1.5	1.13	.9, 1.5
Place of birth	Canada†	1.00	...	1.00	...
	Other North America, Europe, Australia	1.87**	1.5, 2.4	.89	.7, 1.1
	South Am, Central Am, Caribbean, Africa	3.55**	2.4, 5.2	.35**	.2, .7
	Asia	8.73**	6.5, 11.8	.58*	.4, .9
Number of sex partners in last 12 months‡	None	9.48**	5.1, 17.8	7.81*	1.5, 40.6
	One	2.02*	1.1, 3.7	4.73	.9, 23.9
	Two	1.55	.7, 3.3	3.58	.6, 20.9
	Three or more†	1.00	...	1.00	...
Has cancer	No	1.41	.8, 2.4	1.40	.9, 2.1
	Yes†	1.00	...	1.00	...
Number of observations		6,878		5,945	

Data source: *1994/95 National Population Health Survey*
Notes: *Odds ratios are from two multivariate logistic regressions, the first weighted to represent 10,718,417 women aged 18 and older in the 10 provinces, and the second weighted to represent the 9,062,010 of these women who had ever had a Pap test and had indicated recency. Reference categories are the same for both regressions, and the reference categories do not always have the lowest or highest odds. The odds ratio for one category relative to another is equal to the ratio of their respective odds ratios. "Unknown" categories for the following variables were included in the model but are not shown here: education, income, and number of sex partners in last 12 months.*
† Identifies reference category, for which the odds ratio is always 1.00.
‡ Women over age 45 were not asked about the number of sex partners.
-- Amount too small to be expressed
... Not applicable
** $0.01 < p \leq 0.05$*
*** $p \leq 0.01$*

Province of residence

Women living in Quebec had significantly elevated odds of never having had a Pap test, almost twice those of residents of New Brunswick, the province with the second highest odds. Women in the four westernmost provinces had the lowest non-compliance odds. For British Columbia and Nova Scotia, which have the longest-running cervical screening programs, the odds of lifetime non-compliance were not significantly different from Saskatchewan, the province with the lowest odds.

Alberta women who had had a Pap test were the most compliant with the three-year frequency guideline; their odds of non-compliance were the lowest among the ten provinces. And while residents of Quebec had the highest lifetime non-compliance odds, Quebec women who had had a Pap test were relatively compliant with the three-year frequency guideline. Conversely, British Columbia women had relatively low lifetime non-compliance odds, but those who had had a Pap test had the highest odds of having their last test more than three years ago. Hence, even in the province with the most well-established cervical cancer screening program in Canada, recommended guidelines are not being fully met.

Residents of large urban areas

Living in a large metropolitan area had no significant effect on whether women had ever had a Pap test. However, among women who had had one, it did have a significant effect on when they had their last test. Compared with women in smaller metropolitan or rural areas, women in census metropolitan areas had significantly lower odds of having had their most recent Pap test three or more years ago. This suggests that access to medical facilities is more limited in smaller metropolitan or rural areas, affecting the recency of screening.

Number of sex partners

Cervical cancer is strongly associated with having had first intercourse at an early age and with having multiple sex partners, because it is associated with the human papilloma virus (HPV), which can be sexually transmitted.[4,6,8] The results of this study show that the more sex partners a woman had in the last year, the more likely she was to have ever had a Pap test. Given the guidelines for cervical cancer screening, which recommend that screening begin at the onset of sexual activity, it is not surprising that women with three or more sex partners in the 12 months before their NPHS interview had the lowest odds of never having had a Pap test—one-ninth the odds for women with no sex partner.

Among women who have had at least one Pap test, the effect of the number of sex partners in the last 12 months on Pap test recency was similar. Women with three or more sex partners had the lowest odds of not having had a test in the previous three years, compared to women with one sex partner.

Whether this compliance is due to success in conveying information about cervical cancer to women at increased risk is a matter of speculation. It may be related to the practice by doctors of conducting a Pap test before prescribing or renewing prescriptions for birth control pills.

Marital status and main activity

Single women were the most likely to have never had a Pap test. In addition, single women who had ever had a Pap test had the highest odds of having had the last one three or more years ago. Widowed women, who were very likely to have ever had a Pap test, were relatively unlikely to have had one within the last three years.

Women whose main activity included both working and caregiving had the lowest odds of never having had a Pap test, significantly lower than for women who only worked. Women whose main activity was caregiving had the second highest odds of not having had their most recent test within the last three years, significantly higher than for women whose main activity was working.

Implications

Efforts to improve Pap test compliance in order to further reduce cervical cancer incidence and mortality may be best directed by focussing on groups of women highlighted in this article and in

past research. For example, the high rates of lifetime non-compliance among those born outside Canada might be useful for programs attempting to focus their activity. Cervical cancer is a very common cancer in developing countries—with both high incidence and mortality rates[16,32] (see *International comparisons).*

It has been found that groups at low risk for cervical cancer are over-screened, while groups at high risk are under-screened,[33] a finding consistent with those in this article to some extent. Older women are at greater risk for cervical cancer, yet NPHS data indicate that they do not receive Pap tests as frequently as recommended. On the positive side, women with multiple sex partners, who are also at elevated risk for developing cervical cancer via HPV infection, exhibit the lowest odds of non-compliance with screening guidelines.

International comparisons

The quinquennial publication *Cancer Incidence in Five Continents*[32] compiles data from cancer registries around the world and is the source of the following cervical cancer incidence rates.

Country/ Cancer registry	Age-standardized cervical cancer incidence rate per 100,000 females, 1988 to 1992
Zimbabwe: Harare, Africans†	67.2
Ecuador: Quito	31.7
Costa Rica	24.5
Philippines: Manila	21.6
India: Bombay	20.2
Czech Republic	16.4
Hong Kong	15.3
Denmark	15.2
England and Wales‡	12.5
USA: SEER,§ Black	12.0
Australian Capital Territory	10.3
Japan: Osaka	9.2
Canada	**7.8**
USA: SEER,§ White	7.5
China: Shanghai	3.3

Note: *Rates are standardized to the World Standard Population.*
† Data from Zimbabwe are for 1990-1992.
‡ Data from England and Wales are for 1988-1990.
§ The Surveillance, Epidemiology and End Results program

Half of invasive cervical cancer cases occur in women with no previous cytologic examination or whose last exam was more than five years ago.[15] The findings of this study—that a large number of Canadian women have never had a Pap test or have had one more than three years ago—suggest that more effort is needed to reach these women.

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Appendix

Percentage distributions of characteristics, women aged 18 and older, by level of Pap test guideline compliance, Canada excluding territories, 1994/95

		All women	Had Pap test in last 3 years†	Had last Pap test 3 or more years ago†	Never had Pap test
Total		**10,718,417**	**7,402,822**	**1,659,188**	**1,654,278**
				%	
		100.0	100.0	100.0	100.0
Age	18-19	3.2	2.3	.1	10.6
	20-29	17.6	20.1	2.5	21.6
	30-39	24.6	29.3	15.6	13.0
	40-49	18.4	20.7	17.1	9.6
	50-59	13.1	13.0	18.4	8.5
	60-69	11.3	9.6	19.4	10.9
	70+	11.7	5.1	27.0	25.8
Marital status	Single (never married)	17.2	15.1	7.7	35.9
	Now married	56.7	60.7	57.6	38.2
	Common-law/Living with partner	6.8	8.2	3.4	4.0
	Separated or divorced	9.5	10.2	10.1	5.7
	Widowed	9.9	5.9	21.3	16.2
Province of residence	Newfoundland	1.9	1.9	2.6	1.6
	Prince Edward Island	.5	.5	.6	.3
	Nova Scotia	3.3	3.4	3.8	2.2
	New Brunswick	2.6	2.4	3.4	2.6
	Quebec	25.3	23.6	19.7	38.9
	Ontario	37.8	38.1	38.7	35.4
	Manitoba	3.7	3.8	4.5	2.1
	Saskatchewan	3.3	3.4	4.4	1.6
	Alberta	9.0	10.3	6.0	5.9
	British Columbia	12.7	12.6	16.3	9.3
Resides in census metropolitan area	No	38.2	36.8	49.5	33.5
	Yes	61.8	63.2	50.5	66.5
Education	Less than secondary	25.5	19.8	36.5	40.3
	Secondary	17.5	17.0	19.7	17.2
	Beyond high school	26.1	27.7	21.8	23.1
	College or university	30.8	35.5	22.0	19.1
	Unknown	.1	--	--	.4
Household income	Low	20.2	17.4	22.9	29.5
	Lower middle	28.9	26.2	35.7	34.3
	Upper middle	33.4	36.6	29.8	23.1
	High	13.5	16.0	8.1	7.7
	Unknown	4.0	3.8	3.5	5.4
Main activity	Working	24.9	27.7	15.1	21.9
	Working and caregiving	20.4	24.7	15.2	6.5
	Caregiving	27.2	27.2	29.4	24.7
	Looking for work	2.0	2.1	1.5	2.2
	Retired, at school, ill	25.5	18.3	38.8	44.7
Place of birth	Canada	80.4	82.1	83.7	69.4
	Other North America, Europe, Australia	11.8	11.2	13.5	12.4
	South America, Central America, Caribbean, Africa	3.0	2.9	.8	5.7
	Asia	4.9	3.9	1.9	12.5
Number of sex partners in last 12 months‡	None	6.3	4.1	3.4	19.3
	One	45.9	55.1	23.4	27.7
	Two	2.5	3.0	.7	2.2
	Three or more	1.8	2.2	.1	1.6
	Not asked/Unknown	43.4	35.7	72.3	49.2
Has cancer	Yes	2.4	2.3	3.1	1.8
	No	97.6	97.7	96.9	98.2

Data source: *1994/95 National Population Health Survey*

Note: *Distributions were weighted to represent non-institutionalized women aged 18 and older in the 10 provinces.*

† Excludes women who had ever had a Pap test, but did not indicate recency.

‡ Women over age 45 were not asked about the number of sex partners.

-- Amount too small to be expressed