ABSTRACT

Although routine Pap screening represents an effective tool in the early detection of cervical cancer, it remains underused by some Canadian women. This study examines selected sociodemographic, health, lifestyle, and system barriers to Pap test participation among 33,817 women aged 18+ years in the cross-sectional 1996-97 National Population Health Survey (NPHS).

Among women 18 years and over, 87% reported ever having had a Pap test while 72% reported a recent (<3 years) test. A report of ever and recent use was most common among women 25-34 (92% and 86.9%, respectively). Only 0.6% of recently screened women reported access problems. Among those without a recent test, most (53%) reported that they did not think it was necessary. Pap test use varied little across provinces and was less common among older and single women, those with lower education, a spoken language other than English, a birth place outside Canada and negative health and lifestyle characteristics.

ABRÉGÉ

Bien que le test de Papanicolaou soit un moyen efficace de dépistage précoce du cancer du col utérin, certaines Canadiennes ne l'utilisent pas assez. Notre étude portait sur certains obstacles sociodémographiques, systémiques ou liés à la santé ou au mode de vie pouvant freiner le recours au test de Papanicolaou chez 33 817 femmes de 18 ans ou plus ayant participé à l'Enquête nationale sur la santé de la population (ENSP) de 1996-1997, menée de façon transversale.

Parmi les femmes de 18 ans ou plus, 87 % déclaraient avoir déjà passé un test de Papanicolaou, tandis que 72 % disaient en avoir passé un récemment (depuis moins de trois ans). Ce sont les femmes de 25 à 34 ans qui déclaraient le plus souvent avoir déjà passé ce test (92 %) ou l'avoir passé récemment (86,9 %). Seulement 0,6 % des femmes à avoir passé le test récemment ont déclaré avoir eu de la difficulté à l'obtenir. Parmi celles qui n'avaient pas passé le test récemment, la majorité (53 %) déclaraient qu'elles ne le trouvaient pas nécessaire. Nous avons constaté peu de différences entre les provinces quant au recours à ce test, qui était moins utilisé par les femmes âgées ou seules et par celles dont le niveau de scolarité était plus faible, qui parlaient une langue autre que l'anglais, qui étaient nées hors du Canada ou dont la santé ou le mode de vie présentaient des caractéristiques négatives.

Factors Important in Promoting Cervical Cancer Screening among Canadian Women: Findings from the 1996-97 National Population Health Survey (NPHS)

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Approximately 1,450 new cases and 430 deaths from cervical cancer were estimated to occur among Canadian women during 2000, resulting in an estimated incidence rate of 8.4 per 100,000 women.[1] Observed declines in cervical cancer incidence and mortality rates in previous years are largely attributed to the widespread adoption of Pap screening.[1] Current Canadian guidelines recommend women receive annual Pap tests once sexually active or at age 18 with a reduction in screening frequency to every three years after two normal smears to the age of 69, in the presence of an organized screening program.[2,3] Currently, there are no comprehensive screening programs in Canada, although several provinces have programs with several of the required elements.[4-6]

Although cervical cancer is almost completely preventable through regular screening, Pap tests remain underused by some women. Studies consistently show that among new cases, a relatively high proportion of women report no or poor participation in a Pap screening program.[7,8] As the early stages of cervical cancer (non-invasive) are asymptomatic, routine screening can result in better prognosis for the patient.[9,10] If cervical cancer is detected when symptoms are apparent, the five-year survival rate is only 10%, but with early detection exceeds 90%.[2]

Research has illustrated the relative importance of several sociodemographic, health and lifestyle factors to Pap screening among North American women.[11-16] Significant predictors of under-utilization include older age, lower education, non-English language, ethnic background, single marital status and poor preventive health behaviours.

This study examines the consistency of findings regarding sociodemographic, health and lifestyle factors that promote appropriate cervical cancer screening among different age groups of Canadian women in the 1996-97 National Population Health Survey (NPHS). Questions regarding reasons for not obtaining a Pap test were added to this survey cycle; thus, a secondary objective was to examine the relative importance of personal and system barriers to Pap test participation among this sample.

METHODS

The NPHS is an ongoing survey conducted by Statistics Canada involving the collection of cross-sectional and longitudinal data on the health of Canadians. Data from the second cycle (1996-97) of the household component, obtained primarily through telephone interviews, were used to examine the relation of sociodemographic, health and lifestyle factors to Pap test participation in a representative sample of the non-institutionalized population.

Of the 36,667 female respondents aged 18+ years, 34,832 consented to share their

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TABLE I
Pap Test Utilization Characteristics Among Canadian Women Aged 18+ Years by Age Group (NPHS Share File, 1996-97)

Characteristic	Percent (95% CI)				
	All Ages (N=33,817)	18-24 (n=3,515)	25-34 (n=7,127)	35-64 (n=16,160)	65+ (n=7,015)
Pap Test History					
Never	13.0 (12.0-14.1)	32.9 (29.4-36.3)	7.8 (6.2-9.4)	7.3 (6.3-8.4)	22.6 (20.0-25.3)
Prior (3+ years ago)*	15.0 (14.3-15.7)	1.3 (0.5-2.0)	5.3 (4.2-6.5)	15.3 (14.2-16.4)	36.4 (33.8-38.9)
Reason not had recent Pap test†					
Didn't think necessary	53.0 (51.0-55.0)	67.8 (62.0-73.6)	46.9 (40.2-53.6)	46.3 (43.2-49.5)	56.2 (52.5-59.9)
Not gotten around to it	20.0 (18.4-21.7)	19.1 (14.2-24.1)	32.0 (25.3-38.7)	25.2 (22.2-28.2)	10.9 (9.0-12.8)
Doctor didn't think necessary	12.8 (11.4-14.2)	10.3 (6.3-14.4)	5.8 (3.3-8.8)	9.7 (7.7-11.7)	19.5 (16.6-22.4)
Hysterectomy	8.0 (7.0-9.1)	0.0 (0.0-0.0)	0.4 (0.1-0.6)	11.3 (9.5-13.1)	9.7 (7.7-11.6)
Fear	2.4 (1.7-3.0)	2.2 (0.9-3.6)	3.0 (1.6-4.3)	3.4 (2.0-4.7)	1.1 (0.4-1.7)
Other	7.4 (6.3-8.5)	5.2 (2.0-8.3)	12.8 (7.7-17.9)	8.6 (6.8-10.5)	5.3 (3.9-6.8)
Recent (<3 years ago)	72.0 (70.8-73.1)	65.9 (62.4-69.4)	86.9 (85.1-88.6)	77.4 (75.9-78.9)	41.0 (37.9-44.0)
Reason for Pap test					
Screening‡	95.7 (95.2-96.2)	95.0 (93.3-96.7)	95.1 (94.0-96.3)	95.9 (95.2-96.6)	96.7 (95.6-97.8)
Other¶	4.3 (3.7-4.8)	4.9 (3.2-6.6)	4.8 (3.7-6.0)	4.0 (3.3-4.7)	3.3 (2.2-4.4)
Had problems getting one§	0.6 (0.5-0.8)	1.0 (0.5-1.4)	0.7 (0.3-0.8)	0.6 (0.4-0.8)	0.2 (0.0-0.4)

* women reporting ever having had a Pap test who did not report a date were coded as prior users (n=199)
† asked only of women who never had or did not have a Pap test in past 3 years, responses were not mutually exclusive; women not stating a reason (n=366) were coded as responding 'No' for various reasons; other reasons included: dislike having them, unavailable at time of appointment, unavailable in the area, wait was too long, transportation problems, language difficulty, cost, didn't know where to go/uninformed and other (not specified)
‡ screening purpose included: part of regular check-up, sexually active, on birth control pill, pregnant/after delivery, high risk group, on hormone replacement therapy and other, women who did not state reason for Pap test were coded as having one for screening purpose(s)
¶ other purpose included: follow-up of previous problem, abnormal bleeding/other symptoms
§ women not reporting any problems (n=8) were coded as not having any

data with provincial and federal governments. A further 1,015 did not respond to the question on ever having had a Pap test, leaving 33,817 women for evaluation. Further details of the 1996-97 NPHS design and methodology appear elsewhere.[17-19]

Measures

Responses to two survey questions ("Have you ever had a Pap smear test? and if yes, when was the last time you had a Pap smear test…?") were used to derive two binary outcome variables:

- Ever / Never had a Pap test
- Time Appropriate (< 3 years ago) / Inappropriate (3+ years ago) Pap test

Only women reporting that their last Pap test was *less* than 3 years ago were asked the reason for their test and whether they had encountered problems obtaining it. Consequently, our analyses were based on the total sample with no exclusions for potential diagnostic tests. Women reporting that they had never had a Pap test *or* that their most recent test was 3+ years ago were asked why they had not obtained a recent test. Women reporting hysterectomy as the reason for not having had a recent test were excluded from the analyses of time-inappropriate testing.

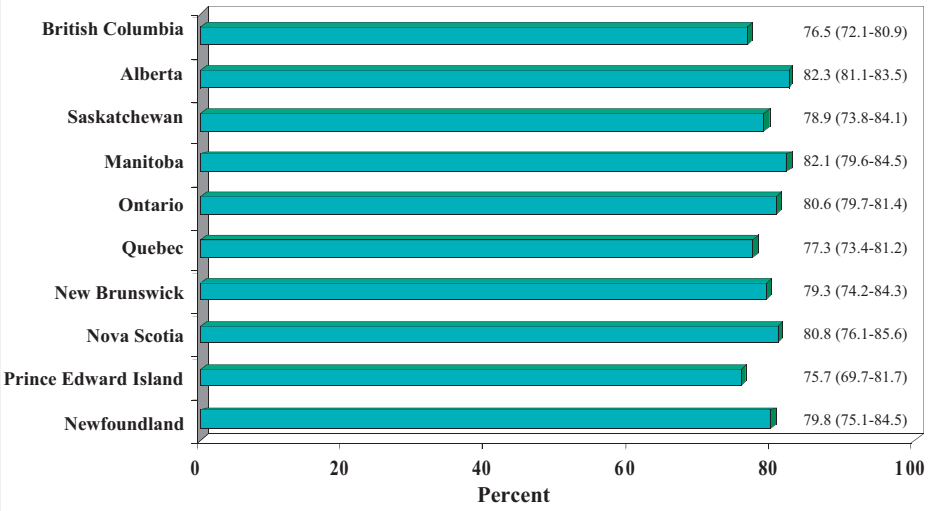

Figure 1. Percentage (95% CI) of Women 18-65* with a Pap Test in the Past 3 Years by Province, 1996-97 NPHS

The covariates examined included selected sociodemographic, health and service use, and lifestyle/behavioural variables identified from the literature (see Appendix). For derived variables (e.g., birth place), our analyses were limited to broad categories given data restrictions by Statistics Canada and concerns about small sample sizes.[19]

Analyses

Descriptive analyses of Pap test use were performed for the total sample and by

TABLE II
Estimated Odds Ratios and 95% Confidence Intervals of Reporting Never had a Pap Test among Women Aged 25-64 Years,† by Sociodemographic, Health and Lifestyle Characteristics, NPHS 1996-97

Characteristic‡	Age-Adjusted OR (95%CI)	Adjusted OR¶ (95%CI)
Sociodemographic		
Age Group		
25-29	1.47 (1.10, 1.96)**	1.28 (0.92, 1.80)
30-54 (ref)	1.00	1.00
55-59	1.32 (0.85, 2.04)	1.45 (0.91, 2.31)
60-64	1.92 (1.32, 2.86)***	1.88 (1.26, 2.80)**
Residence		
Urban (ref)	1.00	——
Rural	0.60 (0.40, 0.89)**	
Household Income		
Not stated	1.05 (0.80, 1.37)	——
Low	2.08 (1.45, 3.03)****	
Moderate (ref)	1.00	
High	0.68 (0.46, 1.01)	
Education		
Elementary/some secondary (ref)	1.00	1.00
Secondary graduate/some post secondary	0.41 (0.30, 0.57)****	0.45 (0.32, 0.65)****
Post secondary degree	0.39 (0.29, 0.53)****	0.37 (0.26, 0.51)****
Languages Spoken		
English only (ref)	1.00	1.00
French only	2.78 (1.90, 4.17)****	2.83 (1.81, 4.43)****
Bilingual	1.59 (1.06, 2.38)*	1.90 (1.26, 2.86)**
Other	5.00 (3.85, 6.70)****	1.69 (1.20, 2.39)**
Birth Place		
Canada (ref)	1.00	1.00
US/Europe/Australia	2.33 (1.64, 3.23)****	2.96 (1.96, 4.47)****
Asia	11.14 (7.70, 16.70)****	10.83 (6.33, 18.52)****
Other	3.03 (1.67, 5.00)****	3.29 (1.94, 5.57)****
Marital Status		
Married/common-law/partner (ref)	1.00	1.00
Widowed/separated/divorced	1.18 (0.86, 1.61)	1.22 (0.84, 1.78)
Single	2.70 (1.92, 3.85)****	3.00 (2.04, 4.42)****
Health and Lifestyle		
Have a Regular Medical Doctor		
Yes (ref)	1.00	1.00
No	2.86 (2.13, 4.00)****	1.90 (1.31, 2.75)***
Number of Consultations with a Medical Doctor in Past Year		
None	1.67 (1.20, 2.33)**	1.57 (1.07, 2.31)*
1-3 visits (ref)	1.00	1.00
4+ visits	0.99 (0.54, 1.82)	1.07 (0.52, 2.18)
Last Blood Pressure Check		
<2 years (ref)	1.00	1.00
Never / 2+ years	3.57 (2.56, 5.00)****	2.74 (1.91, 3.93)****
Frequency of Physical Activity		
Regular / occasional (ref)	1.00	1.00
Infrequent	2.00 (1.56, 2.56)****	1.37 (1.03, 1.81)*
Emotional Well-Being		
Happy/interested in life (ref)	1.00	——
Somewhat happy	1.18 (0.79, 1.75)	
Somewhat/very unhappy	2.22 (1.23, 4.00)**	

† includes all women (screening and diagnostic Pap tests)
‡ note: being a member of a voluntary group, perceived social support, smoking status and mobility problems were non-significant in the age-adjusted model and therefore ineligible for final model; rural residence, income and emotional well-being did not remain significant in the final model
¶ obtained from multivariate logistic regression model, adjusted for all other variables listed in table
*p<0.05; **p<0.01; ***p<0.001; ****p≤0.0001

selected age groups. Bivariate associations were examined using cross-tabulations and chi-square tests of significance (data not shown) and with simple (adjusted for age only) logistic regression models. These analyses were restricted to women 25+ because of concerns about the relevance and stability of certain predictors (e.g., education, income) among women 18-24. Separate models were examined for women 25-64 and 65+; however, analyses of time-inappropriate Pap use were restricted to women 25-64 given current guidelines. Variables significant at $p \leq 0.05$ were eligible for entry into multivariate logistic regression models.[20] Variables no longer independently associated with Pap use after controlling for other eligible factors were removed using backward elimination.

To ensure valid population estimates without inflating the sample size, NPHS records were down-weighted by multiplying the sample weight by the ratio of the unweighted to the weighted sample size. To further account for stratification and clustering in estimating variance, bootstrap re-sampling methods were incorporated with weights provided by Statistics Canada (allowing 95% confidence intervals to be calculated for the parameters). All analyses were performed using SAS (version 6.12).[21]

RESULTS

An estimated 87% of women 18+ reported ever having had a Pap test (Table I). Ever use was highest (about 92%) among women 25-34 and 35-64. A recent (<3 years) Pap test was reported by 72% of women 18+ and was most common among women 25-34 (86.9%). Estimates of recent use varied little across provinces (most confidence intervals overlap), from 75.7% in PEI to 82.3% in Alberta (Figure 1). About 0.6% of women *with* a recent test reported problems of access, primarily lengthy waiting times or unavailability of Pap test when required. Of the 28% of women 18+ without a recent Pap test, 53% reported that they did not think it was necessary (a more common response among those in the younger and older age groups). Only 2.4% reported fear as a deterrent.

Among women 25-64 (Table II), a significantly higher risk of never use was observed for the following factors (in descending order of magnitude): birth place outside Canada (especially Asia), single marital status, a spoken language other than English, lower education, not having a recent blood pressure check or regular physician, older age and infrequent physical activity.

A few associations observed for women 65+ (Table III) differed from those reported for those 25-64; most notably, lower education and not having a regular physician did not remain significant predictors of never use for older women after adjusting for other factors.

Similar to the findings for never use (Table II), a time-inappropriate Pap test

(Table IV) was significantly more likely among women (25-64) who were older, had lower education and reported negative health and lifestyle characteristics. Unlike never use, time-inappropriate use was not significantly associated with languages spoken, birth place or marital status after adjusting for other relevant variables. However, women in rural settings, with mobility problems and reporting relative unhappiness were at significantly greater risk of reporting a time-inappropriate Pap test.

TABLE III
Estimated Odds Ratios and 95% Confidence Intervals of Reporting Never had a Pap Test Among Women Aged 65+ Years,† by Sociodemographic, Health and Lifestyle Characteristics, NPHS 1996-97

Characteristic‡	Age-Adjusted OR (95%CI)	Adjusted OR¶ (95%CI)
Sociodemographic		
Age Group		
65-69 (ref)	1.00	1.00
70-74	0.97 (0.62, 1.52)	1.05 (0.65, 1.68)
75-79	1.82 (1.15, 2.90)**	2.03 (1.22, 3.35)**
80+	2.94 (1.89, 4.55)****	3.44 (2.14, 5.54)****
Household Income		
Not stated	1.04 (0.71, 1.52)	——
Low	1.49 (1.05, 2.13)*	
Moderate (ref)	1.00	
High	1.27 (0.43, 3.70)	
Education		
Elementary/some secondary (ref)	1.00	——
Secondary graduate/some post secondary	0.69 (0.50, 0.97)*	
Post secondary degree	0.66 (0.41, 1.04)	
Languages Spoken		
English only (ref)	1.00	1.00
French only	3.70 (2.27, 5.88)****	4.21 (2.55, 6.95)****
Bilingual	2.38 (1.28, 4.35)**	2.57 (1.37, 4.83)**
Other	1.82 (1.22, 2.70)**	1.28 (0.85, 1.94)
Birth Place		
Canada (ref)	1.00	1.00
US/Europe/Australia	1.01 (0.71, 1.39)	1.45 (1.03, 2.03)*
Asia	4.17 (1.61, 11.11)**	5.89 (2.17, 16.03)***
Other	1.67 (0.65, 4.35)	2.84 (1.06, 7.60)*
Marital Status		
Married/common-law/partner (ref)	1.00	1.00
Widowed/separated/divorced	0.98 (0.70, 1.37)	0.92 (0.65, 1.31)
Single	2.38 (1.35, 4.17)**	2.61 (1.54, 4.46)***
Health and Lifestyle		
Have a Regular Medical Doctor		
Yes (ref)	1.00	——
No	2.08 (1.15, 3.70)*	
Last Blood Pressure Check		
<2 years (ref)	1.00	1.00
Never / 2+ years	2.04 (1.14, 3.70)*	2.29 (1.27, 4.15)**
Frequency of Physical Activity		
Regular / occasional (ref)	1.00	1.00
Infrequent	1.41 (1.05, 1.85)*	1.38 (1.01, 1.89)*

† includes all women (screening and diagnostic Pap tests)
‡ note: being a member of a voluntary group, perceived social support, # consults with a medical doctor, smoking status, mobility problems, emotional well-being and rural residence were non-significant in the age-adjusted model and therefore ineligible for final model; income, education and having a regular medical doctor did not remain significant in the final model
¶ obtained from multivariate logistic regression model, adjusted for all other variables listed in table
*p<0.05; **p<0.01; ***p<0.001; ****p≤0.0001

DISCUSSION

Among women 25-64 in the 1996-97 NPHS, most reported having received at least one Pap test in their lifetime. A relatively high proportion of women in this age group (especially those 25-34) also reported a time-appropriate test. Conversely, women aged 18-24 and 65+ were more likely to have never had a Pap test and less likely to have received one in the past three years. These findings are consistent with others[11,14-16,22-26] and, for younger women, illustrate the need for further education emphasizing the role of sexual activity (and human papilloma virus infection) in cervical cancer risk.[27]

Among recent users, few reported problems obtaining their Pap test. Further, among women without a recent test, few reported health care access or personal barriers as reasons for not obtaining one. Older respondents were more likely to report that their doctor did not think a Pap test was necessary. This, along with the increased likelihood of a time-inappropriate Pap test among older women may reflect current recommendations suggesting older women with a history of normal Pap tests are at low risk for cervical cancer.[5] However, these guidelines may be applied without adequate information on the older patient's screening history.[28,29] Although data are lacking, certain characteristics of older patients (e.g., cognitive and physical impairment) may also affect a physician's recommendation for screening. Many older women may also find the procedure itself a deterrent.[24,30]

Birth place other than Canada (especially Asia) exhibited a particularly strong association with never use, but was not related to time-inappropriate Pap use. After adjusting for other confounders, women 25-64 born in Asia were almost 11 times more likely to report never having had a Pap test compared with Canadian-born women. Although lower in magnitude (adjusted OR=5.89), a birth place of Asia was also an important barrier among women 65+. Related cultural factors may present as barriers to cervical cancer screening.[31-34] Studies reveal that minority women may have more fatalistic attitudes and less knowledge about the disease and screening and may be less comfortable with the screening process.[32-38] Efforts to increase awareness and understanding of cervical cancer and screening along with the provision of screening by trained nurses may promote more positive attitudes and greater participation among select ethnic groups.[39]

As found previously,[11] single women were more likely to be never users. Being single may indicate a relative lack of support for instrumental activities, a potentially important barrier for women dealing with family and/or work responsibilities and restricted physician schedules.[30] However, single women were not at greater

TABLE IV
Estimated Odds Ratios and 95% Confidence Intervals of Reporting Time-Inappropriate Pap Test (3+ Years Ago) Among Ever Users Aged 25-64 years,† by Sociodemographic, Health and Lifestyle Characteristics, NPHS 1996-97

Characteristic‡	Age-Adjusted OR (95%CI)	Adjusted OR¶ (95%CI)
Sociodemographic		
Age Group		
25-29	0.45 (0.28, 0.74)***	0.47 (0.28, 0.79)**
30-54 (ref)	1.00	1.00
55-59	2.13 (1.64, 2.78)****	2.50 (1.93, 3.25)****
60-64	2.94 (2.28, 3.79)****	3.27 (2.42, 4.43)****
Residence		
Urban (ref)	1.00	1.00
Rural	1.32 (1.08, 1.59)**	1.29 (1.05, 1.58)*
Household Income		
Not stated	0.85 (0.68, 1.07)	——
Low	1.43 (1.14, 1.78)**	
Moderate (ref)	1.00	
High	0.80 (0.61, 1.04)	
Education		
Elementary/some secondary (ref)	1.00	1.00
Secondary graduate/some post secondary	0.68 (0.54, 0.86)***	0.74 (0.58, 0.95)*
Post secondary degree	0.59 (0.47, 0.76)****	0.68 (0.52, 0.88)**
Languages Spoken		
English only (ref)	1.00	——
French only	1.02 (0.77, 1.34)	
Bilingual	0.82 (0.56, 1.19)	
Other	0.77 (0.61, 0.97)*	
Birth Place		
Canada (ref)	1.00	——
US/Europe/Australia	0.80 (0.63, 1.01)	
Asia	1.02 (0.56, 1.85)	
Other	0.66 (0.44, 0.99)*	
Health and Lifestyle		
Have a Regular Medical Doctor		
Yes (ref)	1.00	1.00
No	3.09 (2.35, 4.07)****	1.93 (1.44, 2.61)****
Number of Consultations with a Medical Doctor in Past Year		
None	2.23 (1.72, 2.90)****	2.04 (1.56, 2.66)****
1-3 visits (ref)	1.00	1.00
4+ visits	1.18 (0.77, 1.82)	1.14 (0.73, 1.78)
Last Blood Pressure Check		
<2 years (ref)	1.00	1.00
Never / 2+ years	7.75 (6.05, 9.92)****	6.30 (4.84, 8.20)****
Frequency of Physical Activity		
Regular / occasional (ref)	1.00	1.00
Infrequent	1.44 (1.19, 1.75)***	1.27 (1.03, 1.57)*
Current Smoking Status		
Never / former (ref)	1.00	——
Daily / occasional	1.48 (1.24, 1.76)****	
Mobility Problems		
No (ref)	1.00	1.00
Yes	2.23 (1.27, 3.94)**	2.77 (1.60, 4.82)***
Emotional Well-Being		
Happy/interested in life (ref)	1.00	1.00
Somewhat happy	1.45 (1.14, 1.85)**	1.34 (1.02, 1.77)*
Somewhat/very unhappy	1.63 (1.03, 2.57)*	1.63 (1.06, 2.51)*

† includes screening and diagnostic Pap tests; excludes women (n=571) reporting hysterectomy as reason for not having had a Pap test in past 3 years
‡ note: being a member of a voluntary group, perceived social support, and marital status were non-significant in the age-adjusted model and therefore ineligible for final model; income, language, birth place and smoking status did not remain significant in the final model
¶ obtained from multivariate logistic regression model, adjusted for all other variables listed in table
*p<0.05; **p<0.01; ***p<0.001; ****p≤0.0001

risk of reporting a time-inappropriate Pap. Other social support indicators examined (e.g., perceived social support, membership in voluntary groups) were not associated with Pap test use. Unlike previous reports,[16,22] we did not find a lower likelihood of screening among widowed women.

Women speaking languages other than English only were at greater risk for never having had a Pap test, but not for having a time-inappropriate test. The relatively lower risk estimates found for women speaking 'other' languages in the adjusted models suggest that this risk may be explained, in part, by other factors (e.g., education, birth place). Women with poor English language proficiency may be less knowledgeable about cervical cancer and preventive measures, and thus at greater risk for inadequate screening.[38] Conversely, there is some suggestion[11] that the increased risk among bilingual women and those speaking French only may reflect provincial differences in screening rates (e.g., provincial variation in physician's attitudes or training).

Although not significant among older women, higher education was associated with a lower risk for never use and for a time-inappropriate test among women 25-64 years. Several studies[11,12,16,40] have identified low education as a barrier to appropriate cervical cancer screening. Among other factors, research suggests that higher educated women may be more likely to receive comprehensive preventive health information from their health care providers.[37]

Women 25-64 reporting health care barriers (e.g., not having a regular physician or any medical consultations over the past year) were less likely to have ever had a Pap test and, especially, to have had a time-appropriate test. Regular physician contact has consistently been shown to be an important facilitator of timely cervical cancer screening.[11,16,33,41] The increased risk of time-inappropriate testing among women in rural settings, even after adjusting for other factors, also supports the relative importance of access to appropriate screening.

Consistent with previous reports,[11,42] Canadian women who engage in positive preventive health behaviours (e.g., blood pressure checks and regular exercise) were more likely to report ever having had a Pap test and a time-appropriate test. However, smoking was not an important barrier to appropriate Pap test use in our multivariate analyses. Other risks for time-inappropriate Pap testing included reports of mobility problems and poor emotional well-being. Women with functional limitations (primarily those 65+ years) have been shown to be less likely to receive a recent Pap test.[43,44] Our data showed that compared

Appendix
Selected NPHS Variables Examined as Covariates of Pap Test Use

Selected Variables	1996-97 NPHS Variable Values
Age groups:	
18-24 / 25-34 / 35-64 / 65+	• 5-year age groups
Residence	
	Derived NPHS variable
Urban/Rural	• Urban/Rural
Household Income (all sources/past year)	
Not Stated	• Not stated
Low	• $0-14,999
Moderate	• $15,000-59,999
High	• $60,000 +
Education (highest level obtained)	
	Derived NPHS variable
Elementary/some secondary	• less than secondary
Secondary graduate/some post secondary	• secondary school graduation • beyond high school
Post secondary degree	• college or university degree
Languages Spoken (able to conduct conversation)	
	Derived NPHS variable
English only	• English only
French only	• French only
Bilingual	• English and French only
Other	• English and French and other • English and other (not French) • French and other (not English) • Neither French nor English (other)
Birth Place	
Canada	• Canada
US/Europe/Australia	• France • Germany • Greece • Hungary • Italy • Netherlands/Holland • Poland • Portugal • United Kingdom • United States
Asia	• China • Hong Kong • India • Philippines • Vietnam
Other	• Guyana • Jamaica • Others
Marital Status	
Married/common-law/partner	• Married • Common-law • Living with a partner
Widowed/separated/divorced	• Widowed • Separated • Divorced
Single	• Single (never married)

(continues, second set of columns)

Selected Variables	1996-97 NPHS Variable Values
Regular Medical Doctor	
No/Yes	• No/Yes
Number of Consultations with Medical Doctor (GP or specialist) / past year	
None / 1-3 / 4+	• 0-366 visits
Last Blood Pressure Check	
<2 years	• Yes to ever had blood pressure taken and • less than 6 months ago • 6 months to less than a year ago • 1 year to less than 2 years ago
Never/2+ years	• Yes to ever had blood pressure taken and • 2 years to less than 5 years ago • 5 or more years ago or • No to ever had blood pressure taken
Frequency of Physical Activity	
Regular/occasional	Derived NPHS variable (monthly frequency of physical activities lasting 15+ minutes) • Regular • Occasional } (4+ times/month)
Infrequent	• Infrequent (0-3 times/month)
Current Smoking Status	
Never / Former	• Former daily smoker • Former occasional smoker • Never smoker
Daily / Occasional	• Daily smoker • Occasional smoker (former daily smoker • Always occasional smoker
Member of a Voluntary Group (voluntary organizations or associations)	
No / Yes	• No / Yes
Perceived Social Support	
Moderate / High (score of 3-4) Low (score of 2 or less)	Derived NPHS variable • Score of 0-4 (higher scores – greater perceived social support)
Mobility Problems (extent of limitations)	
No	• No mobility problems
Yes	• Problem, no aid required • Problem requires mechanical support • Problem requires wheelchair • Problem requires help from people • Cannot walk
Emotional Well-being	
Happy / interested in life	• Happy and interested in life
Somewhat happy	• Somewhat happy
Somewhat/very unhappy	• Somewhat unhappy • Unhappy with little interest in life

with women reporting no mobility problems, those with limitations were equally likely to have a regular medical doctor and significantly more likely to have multiple (4+) medical consults in the past year.

Given the limitations of the cross-sectional design, the estimates from the NPHS fail to indicate the dynamic nature of Pap test participation (i.e., regular, opportunistic and first time testing) and the temporal relationship between promoting factors and participation. Factors that precipitate the initiation of screening may differ from those that foster ongoing participation. Our analyses, especially regarding ethnic background, are also limited by a lack of data regarding the role of women's attitudes, beliefs and knowledge regarding cancer and preventive health practices.

Despite these limitations, our findings confirm the continued under-utilization of routine Pap testing among sub-groups of Canadian women (e.g., younger and older women, those born outside Canada and/or experiencing language barriers, those with low education and poor social support). Interventions aimed at these groups may not always be best delivered via physicians since these 'at-risk' groups may not access health care in general. Population registry-based organized cervical screening programs may help to recruit under-served women across Canada.

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