RESEARCH ARTICLE

Factors Associated with Underscreening for Cervical Cancer among Women in Canada

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Abstract

Background: Cervical cancer is the second most common cancer among women worldwide. Failure to prevent cervical cancer is partly due to non-participation in regular screening. It is important to plan and develop screening programs directed towards underscreened women. In order to identify the factors associated with underscreening for cervical cancer among women, this study examined Pap test participation and factors associated with not having a time-appropriate (within 3 years) Pap test among a representative sample of women in Ontario, Canada using Canadian Community Health Survey (CCHS) data. Materials and Methods: Univariate analyses, cross-tabulations, and logistic regression modeling were conducted using cross-sectional data from the 2007-2008 CCHS. Analyses were restricted to 13,549 sexually active women aged 18-69 years old living in Ontario, with no history of hysterectomy. Results: Almost 17% of women reported they had not had a time-appropriate Pap test. Not having a time-appropriate Pap test was associated with being 40-69 years old, single, having low education and income, not having a regular doctor, being of Asian (Chinese, South Asian, other Asian) cultural background, less than excellent health, and being a recent immigrant. Conclusions: Results indicate that disparities still exist in terms of who is participating in cervical cancer screening. It is crucial to develop and implement cervical cancer screening programs that not only target the general population, but also those who are less likely to obtain a Pap tests.

Keywords: Pap tests - cervical cancer screening - women's health - participation factors - Canada

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Introduction

Cervical cancer is the second most common cancer among women worldwide, with 530,000 new cases and over 270,000 deaths each year (WHO, 2013). Recent estimates suggest that 1,350 Canadian and 12,170 US women will be diagnosed this year with cervical cancer; 390 and 4,220 respectively, will die from the condition (CCS/NCIC, 2006; American Cancer Society, 2012; Canadian Cancer Society, 2013). The risk of developing and dying from cervical cancer can be significantly reduced among women who are sexually active through participation in regular Papanicolau (Pap) testing (Peto et al., 2004). Current Canadian and US guidelines generally recommend that women should be tested for cervical cancer every three years between the ages of 21 and 70 (Canadian Cancer Society, 2012; Cancer Care Ontario, 2012; American Cancer Society, 2013).

There have been efforts to increase cervical cancer screening in both Canada and the United States over the past years. For example, the Breast and Cervical Cancer Mortality Prevention Act of 1990 in the United States prompted the Centers for Disease Control and Prevention (CDC) to create a program to provide screening to underserved women (CDC, 2013). In Canada, numerous provinces have established organized cervical cancer screening programs, such as Ontario's Cervical Cancer Screening Program (CCO, 2012). Despite these efforts, however, between 21% and 28% of women at risk for cervical cancer in Canada have not participated in screening in the previous three years (CCS/NCIC, 2006; Cancer Quality Council of Ontario, 2012). Additionally, non-participation rates in cervical cancer screening are higher among certain groups of women. Past research has identified numerous factors associated with a decreased likelihood of cervical cancer screening among women, such as older age (Latif, 2010; Olesen et al., 2012), lower education (McDonald and Kennedy, 2007; Lopez-de-Andres et al., 2010), lower income (Lee et al., 1998), being single (Rodvall et al., 2005; Latif, 2010), being a visible minority (Latif, 2010), not speaking English or French (Hislop et al., 2000), recent immigration (Lofters et al., 2007), living in rural areas (McDonald and Kennedy, 2007), and not having a regular physician (Latif, 2010). In order to plan and develop screening programs that will address and be tailored towards underscreened women, it is important to identify those less likely to participate. For example, Ahmad, Cameron, and Stewart (2005) developed an effective socioculturally tailored intervention to increase breast cancer screening among South Asian

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immigrant women; results indicated an increase in reported clinical breast examinations post-intervention. Similarly, Lynch, Whitlock, Valanis, and Smith (2004) identified that a tailored intervention screened significantly more women who were overdue for tests compared to usual care, and in addition, reported cost-effectiveness benefits to the program.

The Canadian Community Health Survey (CCHS) provides representative data on self-reported Pap test participation in Canada. Previous research using the CCHS have reported cervical cancer screening participation rates among specific groups such as visible minority women or have analyzed CCHS data drawn from 2000-2001, 2003, or 2005 files (Kaida et al., 2008; Amankwah et al., 2009; Xiong et al., 2010). Thus, the first objective of the study was to identify Pap test participation among women at a provincial level in Ontario, Canada using 2007-2008 data. The second objective was to identify the characteristics of underscreened populations of women in order to inform the need for and development of cervical cancer screening programs in Ontario.

Materials and Methods

Data were drawn from the 2007-2008 CCHS master file. The CCHS is a cross-sectional survey which collects data on health status, health care use, and health determinants of the Canadian population on a yearly basis (Statistics Canada, 2009a). The CCHS covers 98% of the Canadian population aged 12 years and older in the provinces and 71-97% in the territories. It excludes persons 'living on Indian reserves and on Crown Lands, institutional residents, full-time members of the Canadian Forces, and residents of certain remote regions' (Statistics Canada, 2009a).

Study sample

The sample for this study was restricted to female respondents living in Ontario at the time of the survey who were between the ages of 18 and 69 (the recommended screening age range in Ontario during the analysis of this data). Women who reported a history of hysterectomy were excluded from the analysis sample (because they are not at risk for cervical cancer). Those that identified themselves as Aboriginal [The sample excluded those that identified as Aboriginal because past studies have reported demographic, health status, and health behaviour differences between Aboriginals and the rest of the Canadian population (Young et al., 1997; McDonald and Trenholm, 2010), and would need to be analyzed separately, which was outside the scope of the study] (i.e., North American Indian, Métis, Inuit) or never had sexual intercourse (because their risk of cervical cancer is very low) were also excluded. Missing data (Missing cases on the CCHS are categorized as 'don't know', 'refused', and 'not stated') on the Aboriginal status, sexual intercourse, and outcome variable were identified and deleted as these variables were used to restrict the sample for analysis. The variables 'Aboriginal status', 'sexual activity', and 'last time had a Pap test' had 2.83%, 5.37%, and 1.90% missing cases, respectively, and were subsequently deleted from the analysis sample.

Outcome variables

The primary outcome of interest was how long it had been since respondents had their last Pap test, categorized as either within the past 3 years (time-appropriate Pap test) or over 3 years ago or never. This was done to align results with Canadian (and Ontario) recommendations on Pap testing (Cancer Care Ontario, 2012).

Independent variables

Independent variables consisted of demographic, socioeconomic status (SES), health and health care variables. Demographic variables included age, marital status, area of residence, location of birth, cultural/racial background, and immigrant status. Immigrant status 'yes' was further broken down by number of years since immigration to be used in the logistic regression. Additionally, language(s) spoken at home and language of interview were included in analyses. SES variables included education level and total household income. Health and health care variables included history of hysterectomy, perceived health, and access to a regular medical doctor. Lastly, the variables 'reasons for not having a Pap smear test in the previous three years' [Each reason was framed as an independent question (yes; no) and therefore, participants may have responded 'yes' to more than one reason for not having a Pap test in the previous three years] (have not gotten around to it; didn't think necessary; doctor didn't think necessary; personal/family responsibilities; not available when required; not available in area; waiting time too long; transportation problems; language problem; cost; did not know where to go; fear; hysterectomy; hate/dislike having one done; unable to leave house/health problem; other) were included in the descriptive analyses.

Data analysis

Cases with missing data were identified. Less than 1% of cases had missing values for any given independent variable, except total household income (11.38%) and history of hysterectomy (17.18%). The high proportion of missing responses on the hysterectomy variable was due to an error during the flow of the interview, where women aged 50 and above inadvertently skipped this question. (Statistics Canada, 2009b) Missing data for both income and hysterectomy were retained as separate categories among each variable and remained in all analyses, whereas missing cases on the remaining variables were allowed to drop from analyses.

Characteristics of the sample were described using weighted percentages.

Bivariate analysis using Rao-Scott Chi-Square was conducted between the independent variables and the outcome variable to test for associations. The p value cut-off for inclusion in the logistic regression was set at >0.20 (Katz, 1999). Based on this cut-off, location of residence was not retained in the logistic regression analysis. A variance inflation factor (VIF) of greater than 10 was used to identify possible multicollinearity among independent variables (Schroeder, 1990). Using this technique, location of birth was excluded from further analyses

due to possible multicollinearity with other variables. Logistic regression modeling was used to determine predictors of not having a time-appropriate Pap test. All independent variables were simultaneously entered in the logistic regression and backward selection was employed to remove non-significant variables (p>0.20), one at a time until new models failed to produce additional significant benefits, as determined through the value difference using -2 Log Likelihood between the models.

Weighting and bootstrapping

In order to take into account the unequal probabilities of selection and non-response and for the analysis results to be representative of the population of interest, sample weights provided by Statistics Canada were applied to all analyses. Normalized weights {Normalized weights were created by taking the ratio of unweighted N to weighted N and multiplying that value by the population weight [***normalized weight=(unweighted N/weighted N)×population weight***]} were created after restricting the data to 18-69 year old women living in Ontario. Bootstrap variance estimation was also conducted on analyses in order to account for the survey design effect on the precision of estimates. Significance was set at p<0.05 unless otherwise stated. All analyses were performed using SAS 9.3. The university's Office of Research Ethics granted full ethics clearance to conduct the study.

Results

The final unweighted sample for analysis consisted of 13,549 women. Participants were mostly educated, White, married or in common-law relationships, and living in urban locations. Characteristics of the sample are illustrated in Table 1.

Overall, 16.80% of women in Ontario did not report a time-appropriate Pap test (Table 2). The top three reasons given by women who had not had a Pap test in the past three years were that they did not get around to it (33.41%), they did not think the test was necessary (33.77%), or that their doctor did not think it was necessary (16.26%).

To identify predictors of not having a time-appropriate Pap test, a logistic regression analysis was conducted. As shown in Table 3, the final model identified that women who were 40-49, 50-59, or 60-69 years old (compared to 18-29 years old; OR 1.31, 95%CI 1.01, 1.69, OR 2.02, 95%CI 1.57, 2.59, and OR 2.72, 95%CI 2.08, 3.56, respectively); single (compared to married/common-law; OR 1.42, 95%CI 1.16, 1.75); had some secondary school education or up to a secondary school graduation (compared to post-secondary graduation; OR 2.03, 95%CI 1.61, 2.56, and OR 1.41, 95%CI 1.16, 1.71, respectively); reported a household income of $15,000-$29,999, $30,000-$49,999, or did not respond to the question (compared to those with a household income of $80,000

Table 2. Pap Test History

Variables		Sample %
Last time had a Pap test		
Less than 3 years ago	Less than 6 months ago	24.40
	6 months to less than 1 year ago	34.00
	1 year to less than 3 years ago	24.70
3+ Years Ago	3 years to less than 5 years ago	4.94
	5 or more years ago	5.36
Never		6.50
Reasons for not having a recent Pap test*		
Have not gotten around to it		33.40
Respondent didn't think necessary		33.80
Doctor didn't think necessary		16.30
Personal/Family responsibilities		1.04
Not available when required		1.57
Not available in area		0.68
Waiting time too long		1.05
Transportation problems		0.57
Cost		0.23
Did not know where to go		2.39
Fear		4.21
Hate/dislike having one done		4.97
Unable to leave house/Health problem		0.11
Other		13.70

*Among those who did not report having a Pap test within the past 3 years

Table 1. Descriptive characteristics of sample

Variables		Total Sample %
Age	18-29	21.00
	30-39	22.90
	40-49	23.90
	50-59	20.30
	60-69	11.90
Marital status	Married/Common-law	68.00
	Widowed/Separated/Divorced	12.60
	Single, Never Married	19.40
Area of residence	Urban	86.40
	Rural	13.60
Location of Birth	Canada	65.00
	Other North America	1.60
	South, Central America and Caribbean	5.78
	Europe	11.50
	Africa	2.06
	Asia	14.00
	Oceania	0.11
Cultural/Racial Background	White	76.10
	Black	4.58
	Chinese	4.39
	South Asian	5.63
	Other Asian	5.84
	All Others	3.43
Education	Some Secondary School	9.82
	Secondary School Graduation	18.10
	Some Post-Secondary	7.51
	Post-Secondary Graduation	64.50
Household Income	$0-$14,999	4.23
	$15,000-$29,999	8.49
	$30,000-$49,999	14.80
	$50,000-$79,999	22.90
	$80,000+	38.20
	Missing	11.40
History of Hysterectomy	No	82.80
	Missing	17.20
Perceived Health	Excellent	22.70
	Very Good	40.10
	Good	27.30
	Fair	7.24
	Poor	2.63
Access to a Regular Medical Doctor	Yes	92.40
	No	7.57
Language Spoken at Home	English and/or French	84.30
	Not English/French (Other)	15.70
Language of Interview	English and/or French	97.30
	Not English/French (Other)	2.66

Table 3. Odds Ratios for not Having a Time-Appropriate Pap Test

Variables		Unadjusted OR (95%CI)	Adjusted OR (95%CI)
Age (ref=18-29)	30-39	0.87 (0.70-1.08)	1.08 (0.84-1.40)
	40-49	0.93 (0.75-1.17)	1.31* (1.01-1.69)
	50-59	1.39** (1.11-1.75)	2.02*** (1.57-2.59)
	60-69	2.08*** (1.68-2.57)	2.72*** (2.08-3.56)
Marital status (ref=Married/Common-law)	Widowed/Separated/Divorced	1.14 (0.96-1.35)	1.15 (0.91-1.46)
	Single, Never Married	1.41** (1.13-1.74	1.42*** (1.16-1.75)
Education (ref= Post-Secondary Graduation)	Some Secondary School	2.77*** (2.20-3.49)	2.03*** (1.61-2.56)
	Secondary School Graduation	1.49*** (1.24-1.79)	1.41*** (1.16-1.71)
	Some Post-Secondary	1.24 (0.95-1.62)	1.12 (0.84-1.50)
Household Income (ref=$80,000+)	$0-$14,999	2.61*** (1.89-3.61)	1.39 (0.98-1.98)
	$15,000-$29,999	2.28*** (1.75-2.97)	1.41* (1.06-1.88)
	$30,000-$49,999	1.96*** (1.59-2.40)	1.36** (1.08-1.70)
	$50,000-$79,999	1.34** (1.10-1.64)	1.09 (0.88-1.37)
	Missing	1.99*** (1.55-2.56)	1.32* (1.02-1.71)
Access to a Regular Medical Doctor (ref=Yes)	No	2.91*** (2.34-3.61)	3.12*** (2.50-3.89)
Perceived Health (ref=Excellent)	Very Good	1.36** (1.10-1.69)	1.26* (1.01-1.57)
	Good	1.69*** (1.37-2.07)	1.29** (1.02-1.62)
	Fair	1.89*** (1.39-2.59)	1.21 (0.89-1.65)
	Poor	2.41*** (1.65-3.51)	1.64** (1.11-2.44)
Cultural/Racial Background (ref=White)	Black	1.09 (0.70-1.70)	0.91 (0.54-1.52)
	Chinese	2.23*** (1.44-3.46)	1.93** (1.23-3.03)
	South Asian	2.44*** (1.72-3.47)	1.85** (1.23-2.80)
	Other Asian	1.88*** (1.34-2.63)	1.69* (1.11-2.56)
	All Others	0.91 (0.60-1.40)	0.82 (0.52-1.30)
Immigrant Status (ref=Non-Immigrant)	Recent Immigrant (Less than 10 years)	2.61*** (2.01-3.41)	1.81** (1.24-2.63)
	Long-Term Immigrant (10+ years)	1.37** (1.13-1.66)	0.87 (0.68-1.10)
Language Spoken at Home (ref=English and/or French)	Not English/French (Other)	2.16*** (1.69-2.76)	1.30 (0.94-1.79)
Language of Interview (ref=English and/or French)	Not English/French (Other)	1.99* (1.09-3.61)	0.66 (0.34-1.28)

*p<0.05, **p<0.01, ***p<0.001; OR Odds Ratio; CI Confidence Interval

or more; OR 1.41, 95%CI 1.06, 1.88, OR 1.36, 95%CI 1.08, 1.70, and OR 1.32, 95%CI 1.02, 1.71, respectively); did not have access to a regular doctor (compared to those who did have access; OR 3.12, 95%CI 2.50, 3.89); were of Chinese, South Asian, or other Asian cultural background (compared to White; OR 1.93, 95%CI 1.23, 3.03, OR 1.85, 95%CI 1.23, 2.80, and OR 1.69, 95%CI 1.11, 2.56, respectively); perceiving having poor, good, or very good health (compared to excellent; OR 1.64, 95%CI 1.11, 2.44, OR 1.29, 95%CI 1.02, 1.62, and OR 1.26, 95%CI 1.01, 1.57, respectively); and who were recent immigrants (compared to non-immigrants; OR 1.81, 95%CI 1.24, 2.63), were significantly more likely to report not having a time-appropriate Pap test.

Discussion

While Pap testing rates may have improved over the last decade (Cancer Quality Council of Ontario, 2012) and efforts made to increase screening, there still remains a substantial proportion of the population who are underscreened. This underscreening remains a substantial public health challenge. As illustrated in the current study, nearly 17% of women in Ontario are at excess risk of cervical cancer because of insufficient Pap testing.

In the current sample, the three most common reported reasons for not getting a time-appropriate Pap test consisted of: *i*) not getting around to it; *ii*) not thinking it was necessary; and *iii*) the doctor not thinking it was necessary, consistent with past research (Xiong et al., 2010). These top reasons may reflect other priorities deemed more important or urgent, low risk perception, insufficient knowledge, unfavourable beliefs towards Pap tests (Van Til et al., 2003; Garces-Palacio and Scarinci, 2012; Demirtas and Acikgoz, 2013), and/or physicians not following medical guidelines or perceiving their patients to be at low risk for cervical cancer. The fact that women reported that their physicians did not think Pap testing was necessary is troubling, given all the efforts to help physicians adopt evidence-based screening protocols. However, this finding is not completely inconsistent with other reports, as a previous study found that physicians' perception of screening guidelines diverged from Canadian Task Force guidelines set up for specific cancer screening (Tudiver et al., 2002).

The second objective was to identify the factors associated with underscreening for cervical cancer among women in Ontario. Underscreening tends to be particularly problematic for certain groups, including those who were between 40-69 years of age, single, had low education, in a lower income group, reported less than optimal health, without access to a regular doctor, were Asian (Chinese, South Asian, other Asian), and a recent immigrant. These characteristics have consistently been associated with low access to and use of health services and poorer health status. For example, age, marital status, education, and income have consistently been reported to be associated with cervical and other cancer screening, such as mammography (Kaida et al., 2008; Amankwah et al., 2009; Shields and Wilkins, 2009). Past research found that older women placed low priority on Pap tests in addition to reporting negative experiences during the procedure (Van Til et al., 2003). Women with low SES may have less knowledge on the importance and purpose of getting Pap tests (Akers et al., 2007). Single women may hold more responsibilities at home without the help

of a partner, and have less time to get a Pap test (Branoff et al., 1997).

The finding that women who perceive having less than excellent health are more likely to not have a time-appropriate Pap test may be due to placing priority on more demanding health issues, compared to focusing on secondary prevention methods. Past research has identified that those with many co-morbidities are less likely to screen for cervical cancer (Lofters et al., 2010).

Results also indicated that recent immigrants and women from an Asian cultural background are less likely to get a recent Pap test. These findings are consistent with past studies (Lofters et al., 2007; McDonald and Kennedy, 2007; Amankwah et al., 2009; Xiong et al., 2010). Recent immigrants may face challenges due to immigration and cultural differences (Fowler, 1998) such as language difficulties (Weerasinghe et al., 2000) and migration stress (George and Ramkissoon, 1998). Additionally, recent immigrants may not be familiar with Pap tests or the health care system in the host country in general. Women from different cultural backgrounds may hold values or beliefs that differ from Western ones which may serve as unique barriers to participation in recommended health screening, such as screening without the presence of symptoms and holding values related to modesty and keeping the body private (Schoueri-Mychasiw et al., 2013). Women from Asian backgrounds have been especially highlighted in past research as being less likely to get a Pap test (Akers et al., 2007; Amankwah et al., 2009) and may be due to cultural factors as discussed above, or a lack of culturally-appropriate services or lack of access to them. Additionally, recent immigrants and those of Asian cultural/racial background may have low health literacy, which has been associated with a decreased likelihood of participating in cancer screening (Akers et al., 2007). Having a regular doctor was also associated with Pap test participation and is consistent with past research (Akers et al., 2007; Kaida et al., 2008; Amankwah et al., 2009). Having a regular doctor may be an indication of access to care, providing women with the mechanism to obtain a Pap test. This finding underscores the importance of having access to a doctor and their influence on women's health decisions and behaviour through screening recommendations and/or referrals.

The characteristics of underscreened women identified in the current study reflect a marginalized group of women, with several factors linked to socioeconomic status. In Canada, these women make up a substantial part of the population. For example, half of the Canadian population as of 2012 was older than 40 years (Statistics Canada, 2012). Additionally, over 17% of immigrants in Canada are recent immigrants and the two largest visible minority groups are South Asians and Chinese (Statistics Canada, 2013). These statistics underscore the importance of reducing health disparities among such groups.

Implications for practice and/or policy

The findings have potential implications for health promotion and screening interventions, as it is essential to tailor public health efforts towards populations less likely to access a Pap test. For example, a recent intervention that was tailored to specific refugee groups in the United States was shown to reduce breast cancer screening disparities between refugee and English- and Spanish-speaking women (Percac-Lima et al., 2013). Improving knowledge, reducing and replacing unfavourable beliefs and more accurate risk perceptions through screening education and targeted programs represent possible interventional goals by public and clinical health professionals, voluntary advocacy groups, and others. Successful targeted cancer screening programs reported in past research have included patient navigator programs tailored to women's language and culture (Percac-Lima et al., 2013), tailored health articles in targeted cultural newspapers (Ahmad et al., 2005), and culturally tailored education interventions (Ukoli et al., 2013).

However, it would be a mistake to place responsibility for change solely on women themselves. More must be done to understand how and why physicians diverge from screening guidelines. For example, it would be helpful to know whether more must be done to change physician behaviour, or whether guidelines are too general and need to be more specific with respect to certain sub-populations of women. New efforts are required to identify those least likely to have histories consistent with current screening recommendations and to find ways of encouraging and enabling these women to be tested. For example, among those who do not have a regular physician or have experience barriers to accessing care, services can be brought to them through mobile screening units (Brooks et al., 2013). Additionally, the findings from this study have potential implications for physicians and other health care providers. Women may have other competing health-related priorities and so it is important for health care practitioners to help determine and maintain appropriate screening practices among all their patients. However, some women may not have access to a physician and this must be improved. It is imperative for women to gain access to a doctor if we are to reduce health disparities.

Additionally, using an equity lens when developing or revising screening guidelines and programs may help to decrease such health service inequities. By using both a general population level approach to screening through organized screening programs in addition to applying an equity lens to policy and program development, we can target the general population in addition to those experiencing health inequities (Pauly et al., 2013).

As with all research studies, limitations exist. The cross-sectional nature of the data does not allow us to make causal conclusions between independent and outcome variables, as data was collected at a single point in time. Additionally, data was self-reported and response and recall bias may be present. The current study also has several strengths. Using the CCHS offers population-based data, which is representative of the Ontario population, allowing us to generalize the findings to this population. Additionally, using self-reported Pap test data may have captured screening that occurred outside of Ontario or Canada, which may be missed when using administrative data or health records among immigrant women.

These findings contribute to the literature by providing an update on the factors associated with underscreening for cervical cancer among women in Ontario, Canada using population-based data. While previous studies focused on specific groups of women, the current study examined Pap test participation among a more representative sample of Ontario women at risk for cervical cancer. The findings

from this study underscore the importance of efforts through public health promotion and interventions to target screening efforts towards women less likely to obtain Pap tests and to encourage primary health care physicians' role in women's screening decisions. The current research contributes to the growing literature on cervical cancer screening among women and has implications for the continual improvements in our health care system and cancer prevention efforts. With recent changes to screening guidelines, it is important to continue to evaluate screening participation and develop policies and programs that target not only the general population, but also those who are less likely to obtain Pap tests or access other health care services.

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