Community-based Cultural Predictors of Pap Smear Screening in Nova Scotia

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ABSTRACT

Background: Pap smear screening is effective in reducing the incidence of cervical cancer. However, some subgroups of women are less likely to be screened than others. Since Canadian provincial health databases do not contain data fields identifying ethnicity or language, analyses employing these variables are typically not available. This paper overcomes this problem by using community- rather than person-based measures. Associations with having had a recent Pap smear are reported by community income, language, ethnic group, and urban/rural status, as well as the woman's age.

Methods: The provincial Health Card Number and Cytology Registries were linked to ascertain the screening status of women in mainland Nova Scotia and Cape Breton. Postal codes were linked to census enumeration areas and then to Statistics Canada census data to create community-based cultural measures for each woman.

Results: Women in mainland Nova Scotia were more likely to have had a recent Pap smear (Odds Ratio (OR)=1.36; 95% Confidence Interval (CI):1.33-1.39). Women living in low income (OR=1.19;CI:1.15-1.22), Aboriginal (OR=1.60,CI:1.46-1.76), mixed Black (OR=1.25;CI:1.19-1.30) and rural (OR=1.09;CI:1.07-1.11) communities and who were older were less likely to have had a recent Pap smear.

Discussion: These findings were not unexpected. In the United States and elsewhere, associations between Pap screening status and women with low income, rural residence, Aboriginal and Black heritage have been reported using person-based methods. Our findings demonstrate a method of providing measures of ethnicity and language that should be considered for use in Canadian studies of service utilization, disease status, and well-being.

La traduction du résumé se trouve à la fin de l'article.

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Participation in regular, high quality Pap smear screening by all eligible women has been recognized as the most effective means of decreasing incidence and mortality rates from invasive cervical cancer.[1-4] The need for organized Pap smear screening has been recognized for more than twenty years. [1-4] However, Nova Scotia is one of only two Canadian provinces with a long-standing organized cervical screening program.[1] In recent years, other provinces have begun to develop organized Pap screening programs.[1]

The provincial cytology registry for Nova Scotia is the heart of the organized screening program. The registry contains all Pap smears performed in the province over the past 25 years. It is used to monitor screening participation rates by age, county, and district; target underscreened populations; issue reminder letters to physicians and nurses regarding abnormal Pap smears; support quality assurance activities for laboratories and colposcopists; monitor quality of smears for physicians and nurses; support guideline development; and evaluate projects and the organized program.

In the mid 1990s, a case-control study in Nova Scotia demonstrated that women diagnosed with cervical cancer were more likely to be unscreened and under-screened or to have inadequate follow-up of abnormal smears than to be adequately screened.[5] (Figure 1) These findings led to a major "Pap Screening for Life" intervention funded by the Population Health Fund (PHF) of Health Canada from 1997 to 2000.[6] Letters were sent to 23,000 women in Cape Breton who were unscreened and under-screened.[7] Cape Breton was selected for the intervention because of its high cervical cancer rates and low screening rates.[7] Women in mainland Nova Scotia were the control group. The objectives of the PHF were to 1) increase capacity for action on or across the determinants of population health, 2) develop, implement and disseminate innovative models for applying the population health approach, and 3) increase the knowledge base for future policy and program development.[8]

It is known that some subgroups of women are less likely to be effectively screened than others. For example, studies have shown lower rates of cervical cancer screening and higher rates of cervical can-

cer among Aboriginal women in Canada,[9-16] and Aboriginal and Black women in the United States.[17-19]

However, Canadian health databases do not typically contain data fields identifying the ethnicity or language of women. Therefore, it is difficult and expensive to carry out Canadian health services research focusing on ethnicity, language and other cultural variables when using provincial administrative databases.

The studies of cervical cancer incidence and Pap smear screening among Aboriginal women in Canada used various methods to identify these women. Native Indian status was recorded on death certificates in one province prior to 1984[9] and after 1990.[13] Band membership lists have been linked to provincial cytology databases.[10-12] Registration in provincial health insurance files as being Native Indian has been used with cancer registry data.[14] While Vital Statistics records, Treaty Indian band lists, and provincial health insurance registration files may all be sources to identify Aboriginal status, concordance among these sources has been problematic,[13] and other cultural groups cannot be identified using these methods.

Health Canada has identified culture as a determinant of health and illness, but Canadian measures of culture in administrative databases have been very limited. Dominant cultural values may contribute to marginalization, stigmatization, devaluation of language or culture, and lack of access to culturally appropriate services.[20] This paper demonstrates a method of generating an indicator of the culture of a person's community that can be used in health surveillance and project assessment. The use of the method is demonstrated by reporting predictors of the screening history of women in Nova Scotia by community measures of income, language, ethnic group, and urban/rural status, as well as the woman's age.

METHODS

The findings reported herein use the data set prepared to define the screening status of Nova Scotian women for the PHF-funded letter intervention and its evaluation.[7] The purpose of this secondary data analysis is to demonstrate the use of community measures of culture by computing their association with having had a recent Pap smear.

TABLE I

Number and Percent of Women Who Had a Recent Pap Smear by Age and Community Characteristics for Mainland Nova Scotia and Cape Breton Women with a Postal Code

Factor	Level	Mainland	Cape Breton
Age	18-29	47,708 (80.3%)	8,259 (71.2%)
	30-44	74,929 (81.0%)	12,560 (74.2%)
	45-59	47,630 (70.5%)	9,014 (63.9%)
	60-74	20,182 (47.2%)	4,190 (41.7%)
	75+	4,669 (17.7%)	1,003 (15.7%)
Residence	Rural	105,906 (65.4%)	20,397 (57.8%)
	Urban	89,212 (70.4%)	14,629 (61.0%)
Income	≤$12,500	33,559 (64.4%)	10,578 (59.1%)
	>$12,500-17,500	94,078 (67.1%)	21,228 (59.4%)
	>$17,500	66,153 (70.9%)	3,064 (61.8%)
Aboriginal	<50%	193,254 (67.8%)	34,202 (59.7%)
	50%+	536 (66.4%)	668 (50.0%)
Mixed Black	<10%	186,677 (67.9%)	34,395 (59.6%)
	10%+	7,113 (65.6%)	475 (54.2%)
French	<50%	190,071 (67.9%)	33,379 (59.5%)
	50%+	3,719 (65.3%)	1,491 (58.6%)
Total		**193,790 (67.6%)**	**34,870 (59.5%)**

TABLE II

Odds Ratios and Confidence Intervals of Predictors of No Recent Pap Smear Versus Recent Pap Smear for Nova Scotian Women (n=344,255)

Factor	Level	Odds Ratio (95% CI)
Region of residence	Mainland	1.00
	Cape Breton	1.36 (1.33-1.39)
Age (years)	18-29	1.00
	30-44	0.94 (0.92-0.96)
	45-59	1.65 (1.62-1.69)
	60-74	4.30 (4.20-4.41)
	75+	17.29 (16.71-17.89)
Income	≤$12,500	1.19 (1.15-1.22)
	>$12,500-$17,500	1.11 (1.09-1.14)
	>$17,500	1.00
Urban/rural status	Urban	1.00
	Rural	1.09 (1.07-1.11)
Aboriginal community	<50%	1.00
	50%+	1.60 (1.46-1.76)
Mixed Black community	<10%	1.00
	10%+	1.25 (1.19-1.30)
French (Acadian) community	<50%	1.00
	50%+	0.93 (0.89-0.99)

Study subjects

With approval from the Nova Scotia Department of Health, the provincial physician claims administration organization which is called Maritime Medical Care (MMC) identified 360,587 study subjects who were 18 years and over who had a provincial Health Card Number (HCN) and resided in Nova Scotia between June 1998 and April 1999. The 1996 Statistics Canada census shows a comparable number (360,450) of Nova Scotia women 18 years and over.

Database linkages

The provincial HCN database and Provincial Cytology Registry (PCR) were linked deterministically using health card numbers and other personal identifiers to ascertain the screening status of all women in Nova Scotia.[7] Health card numbers were sufficient for the great majority of links that identified the women who had had a recent Pap smear. From 1994 to 1999, 97% of the women who had Pap smears had valid Nova Scotia HCNs recorded in the PCR. First and last names, date of birth, and address information were available in both the PCR and HCN databases to complete the remaining linkages.

Since measures of language and ethnic group are not directly available in either the HCN or PCR databases, a method that has been used to obtain a measure of community income[21-23] was extended to identify language and ethnic groups. Postal codes of residence were linked to census enumeration areas (EA) and then to 1996 census data to obtain community measures for each woman.[7] An EA is the geographic area canvassed by one census representative, typically one or more adjacent blocks. It could be one apartment building. A rural

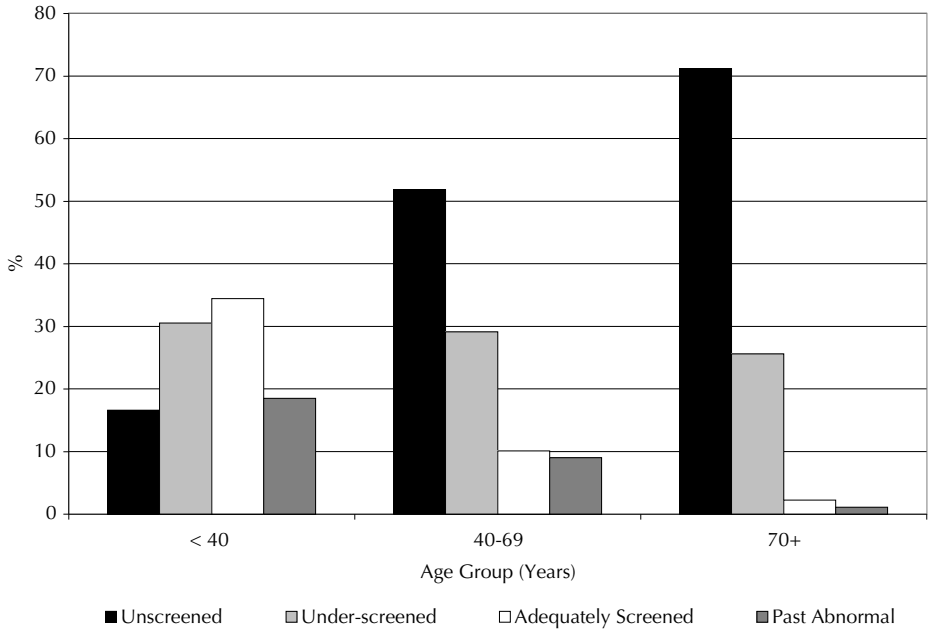

Figure 1. Pap screening history of invasive cervical cancer cases in Nova Scotia from 1988 to 1994 (n=441)

EA has a minimum of approximately 125 dwellings and could cover an area of many square kilometres.[24]

Dependent variable

The study outcome or dependent variable in the multivariate analysis is no recent Pap smear versus recent Pap smear. *No recent Pap smear* is defined as having had no Pap smear recorded in the PCR between January 1, 1995 and the study letter intervention date.[7]

Women with a *recent Pap smear* had one or more Pap smears recorded between January 1, 1995 and their letter-mailing date. This time period was 3.5 to 4.4 years; letters were mailed by age groups over a 10-month period to distribute the increased workload over time for family physicians and cytology labs.[7] Age was used to assign a letter-mailing date for mainland and recently screened Cape Breton women who were not sent letters.[7]

Predictors

Independent variables or predictors of prior screening status were investigated. The women's ages were computed as of December 31, 1997 from birth dates provided by MMC. Postal codes obtained from MMC were classified as urban or rural by Canada Post. Statistics Canada conversion tables were used to link each postal code to a census enumeration area (EA). Each EA was linked to 1996 Statistics Canada census data to create community demographic measures for each woman.

Since median household income (MHI) for native reservations was unavailable in 1996 census reports, the mean income for females aged fifteen years and older in an EA was used. Income cut points were chosen to give an approximately equal number of Nova Scotia women in three income groups (≤ $12,500 for low income, > $12,500-$17,500 for middle income and > $17,500 for high income).

The Aboriginal people in Nova Scotia are heavily concentrated on a few reservations. At least two thirds of the population of reservation EAs was Aboriginal whereas no other EA had more than one third. Hence, a woman in our study was considered to be from an Aboriginal community if she resided in a community with a majority Aboriginal population. Although there are more Blacks than Aboriginals in Nova Scotia, Blacks are more dispersed. No Cape Breton EA had more than 15% Black residents. A woman was coded as being from a mixed Black community if her EA was at least 10% Black. A woman was considered to be from a Francophone community if at least 50% of the residents of her EA had French as their mother tongue. These cut points were selected based on a review of the distribution of census-based measures to identify clearly demarcated community dichotomies by EA in Nova Scotia.

Data analysis

The number and percentage of women who had a recent Pap smear were determined by age group and community measures of income, urban/rural status and cultural group. Logistic regression was carried out to compare women with a recent Pap smear to those without a recent Pap smear. This multivariate analysis was advisable since previous studies have shown that part of the variation in cervical cancer incidence and mortality rate differences among ethnic groups is related to socio-economic and urban-rural differences[19] as well as age. The 1.1% of women who did not have a postal code in the MMC database were excluded from the analyses.

Multi-level modeling would be one appropriate method to account for community clustering. Clustering creates confidence intervals that are likely too narrow in the findings we report, but would not change the point estimates. Therefore, caution should be used in assessing statistical significance when the confidence intervals for the community variables reported herein approach the value of 1.0. Regarding the point estimates, previous studies have shown that using ecological proxies introduces a conservative bias to the analysis. This would mean that covariate associations may be underestimated when aggregate data for the EA are used as a surrogate for a woman, rather than data being at the level of the individual woman.[22,23]

RESULTS

Women were less likely to have had a recent Pap smear if they resided in Cape Breton and were from Aboriginal or mixed Black communities, or were living in lower income areas. Women who were 30 to 44 years were most likely to have had a recent Pap smear. (Table I)

The multivariate analysis in Table II shows similar patterns. Women who were older (Odds Ratio (OR) ≥ 75 to < 30 = 17.29) and living in low income (OR=1.19), Aboriginal (OR=1.60), mixed Black (OR=1.25) and rural (OR=1.09) communities were less likely to have had a recent Pap smear. Women in mainland

Nova Scotia (OR=1.36) were more likely to have had a recent Pap smear. Women in majority Francophone communities did not differ markedly from other women regarding whether they had had a recent Pap smear.

DISCUSSION

The lower rates of recent Pap smear screening in Cape Breton parallel higher cervical cancer incidence and mortality rates compared to mainland Nova Scotia. The association between screening status and age, income, Aboriginal, mixed Black, and rural residence are in the direction observed elsewhere.[9-19] Pap screening rates for Francophone and mixed Black communities in Canada are not known to have been previously reported.

The ethnicity and language cut-points used herein are based on an analysis of patterns of community structure in Nova Scotia. Extension of this method to other geographic areas will require the review of census-derived cultural measures for each region studied. As studies are carried out in other provinces, it will be possible to determine the measures that are useful for cross-Canada comparisons and those that describe unique regional characteristics.

Methods employed herein show potential for application beyond the assessment of Pap smear screening practices for use in studies of other health services utilization, disease status, and well-being by ethnic or language group. The methods demonstrate considerable promise in extending health surveillance and program assessment in Canada to include analysis by cultural group and other community attributes that can be defined using Canadian census data.

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RÉSUMÉ

Contexte : Le test de Papanicolaou est un moyen efficace de réduire l'incidence du cancer du col utérin. Cependant, certaines catégories de femmes sont moins susceptibles que d'autres de subir un test de dépistage. Comme les bases de données sanitaires des provinces canadiennes ne contiennent pas de champs de données indiquant l'appartenance ethnique ou la langue, nous ne disposons pas en général d'analyses employant de telles variables. Nous avons contourné le problème en utilisant des mesures collectives plutôt qu'individuelles pour déterminer la relation entre le fait d'avoir subi récemment un test de Papanicolaou et le revenu de la collectivité, la langue, le groupe ethnique, le milieu (urbain ou rural) et l'âge de la femme.

Méthode : Nous avons mis en correspondance le numéro de carte Santé et les registres cytologiques provinciaux afin d'établir avec précision la situation des femmes de la Nouvelle-Écosse continentale et du cap Breton à l'égard du dépistage. Nous avons relié les codes postaux aux arrondissements de secteurs de dénombrement, puis aux données du recensement de Statistique Canada pour créer des mesures culturelles collectives pour chaque femme.

Résultats : Les femmes de la Nouvelle-Écosse continentale étaient plus susceptibles d'avoir subi récemment un test de Papanicolaou (rapport de cotes [RC]=1,36; intervalle de confiance [IC] de 95 %=1,33-1,39). Les femmes vivant dans des collectivités à faible revenu (RC=1,19; IC=1,15-1,22), autochtones (RC=1,60; IC=1,46-1,76), à population noire mixte (RC=1,25; IC=1,19-1,30) et rurales (RC=1,09; IC=1,07-1,11) et qui étaient par ailleurs plus âgées étaient moins susceptibles d'avoir subi récemment un test de Papanicolaou.

Discussion : Nous nous attendions à de tels résultats. Aux États-Unis et ailleurs, les méthodes individuelles ont permis de constater des associations entre la situation à l'égard du dépistage par le test de Papanicolaou et les femmes à faible revenu, vivant en milieu rural et d'ascendance autochtone ou noire. Nos constatations font état d'une méthode de mesure de l'appartenance ethnique et de la langue dont on pourrait envisager l'utilisation dans les études canadiennes sur l'utilisation des services, l'état de santé et le bien-être.