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Ethnicity, Immigration and Cancer Screening: Evidence for Canadian Women

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SEDAP Research Paper No. 145

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Ethnicity, Immigration and Cancer Screening: Evidence for Canadian Women

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Ethnicity, Immigration and Cancer Screening: Evidence for Canadian Women

Abstract

Introduction. Canada's annual immigrant intake is increasingly composed of visible minorities, with 59% of immigrants arriving in 1996-01 coming from Asia. However, only a small number of studies have used population health surveys to examine Canadian women's use of cancer screening. We use recent population health surveys to analyze immigrant and native-born women's use of Pap smears, breast exams, breast self-exams, and mammograms.
Methods. We study women aged 21-65 drawn from the National Population Health Survey and Canadian Community Health Surveys that together yield a sample size of 105,000 observations.
Results. We find that for most forms of cancer screening, recent immigrants have markedly lower utilization rates, but these rates slowly increase with years in Canada. However, there is wide variation in rates of cancer screening by ethnicity. Screening rates for white immigrants approach Canadian-born women's utilization rates after 15-20 years in Canada, but screening rates for immigrants from Asia remain significantly below native-born Canadian levels.
Discussion. Health authorities need to tailor their message about the importance of these forms of cancer screening to reflect the perceptions and beliefs of particular minority groups if the objective of universal use of preventative cancer screening is to be achieved.

Keywords: **Immigrants, Ethnic groups, Cancer, Screening, Acculturation**

JEL Classifications: I10, I18, J15

Résumé

Introduction. La fraction annuelle des nouveaux arrivants au Canada membres d'une minorité visible s'accroît chaque année avec 59% des immigrés arrivés entre 1996 et 2001 provenant de l'Asie. Un nombre restreint d'études a utilisé les enquêtes sur la santé de la population pour documenter l'utilisation des examens de dépistage du cancer des femmes canadiennes. Nous utilisons des enquêtes récentes sur la santé de la population pour examiner l'utilisation par les femmes issues de l'immigration et les Canadiennes de naissance des tests de Papanicolaou, des auto-examens et examens cliniques du sein et des mammogrammes.
Méthodes. Notre examinons un échantillon de 105.000 femmes, âgées de 21 à 65 ans, tiré de l'Enquête sur la santé dans les collectivités canadiennes.
Résultats. Nous observons que les nouvelles arrivantes ont des taux d'utilisation de la majorité des formes de dépistage du cancer nettement inférieurs aux Canadiennes de naissance, mais que ces taux d'utilisation augmentent avec le nombre des années passées au Canada. Les variations des taux de dépistage demeurent cependant importantes selon l'appartenance ethnique. Le taux de dépistage des immigrées de race blanche, qui résident au Canada depuis 15-20 ans, se rapproche du taux de dépistage des Canadiennes de naissance, alors que le taux de dépistage des immigrées originaires de l'Asie demeurent significativement inférieur.
Discussion. Les autorités sanitaires doivent adapter leur message concernant l'importance de ces diverses formes de dépistages du cancer pour refléter les perceptions et les croyances propres à certaines minorités ethniques si l'on veut effectivement atteindre l'objectif de l'utilisation universelle de ces tests de prévention.

Ethnicity, Immigration and Cancer Screening: Evidence for Canadian Women

1. Introduction

Canada's annual immigrant intake is increasingly composed of visible minorities. According to the 2001 Census, 59% of immigrants arriving in the 1996-01 period originated in Asia, and another 12% originated from Africa and the Caribbean. A significant amount of research has focused on breast and cervical cancer screening of immigrant and minority group women in Canada, with a typical conclusion that immigrant and minority women generally have relatively low use of these preventative health services. It is notable that many relevant studies are based on a small sample size of less than 100 observations (see for example Bottorff et.al., 1998, Clark et.al., 1999, and Ahmad and Stewart, 2004), while relatively few studies use population-based health surveys to examine women's use of cancer screening on a wider scale. Mercer and Goel (1994) and Goel (1994) use the 1990 Ontario Health Survey to examine mammography and Pap Smear testing respectively, and find that women who are Canadian-born or who had immigrated more than 10 years ago are more likely to engage in these forms of cancer screening than those who had immigrated less than 10 years ago. (Woloshin et.al., 1997, and Edwards and Boulet, 1997, use the same data.) Maxwell et.al. (1997) analyze the 1994-95 wave of the National Population Health Survey and find that women born in Asia or South America are at higher risk of never having had a mammogram. Evidence from other countries also indicates lower incidence of cancer screening among certain immigrant and minority groups (Raja-Jones, 1999, Remmenick, 1999).

Early detection of cancer allows for a greater range of treatment options and also significantly improves the affected person's prognosis both in terms of life expectancy and

quality of life. An understanding of the factors that determine the use of cancer screening is necessary for the design of effective public health policies to increase awareness of both the availability and the importance of cancer screening, particularly for groups that might otherwise face barriers to the use of these preventative services. This paper presents an analysis of immigrant and native-born women's use of cancer screening that is based on a large pooled cross-sectional dataset of recent population health datasets published by Statistics Canada that spans the years 1996-2003.

We focus on key components of cancer screening that are specific to women's health: pap smears, mammograms, and breast exams. These health services are largely personal behavioral choices, and as such are likely to reflect the social and cultural environment, including possible cultural barriers to their use, as well as personal socio-economic and demographic characteristics. We are interested in the extent to which the use of these important health services varies between immigrant and non-immigrant women, and across immigrants by year of arrival and age at arrival. Further, since a majority of recent immigrants to Canada have come from a host of countries that are culturally and economically very different from Canada, we are also interested in the extent to which the use of cancer screening varies by country of origin and ethnicity. Combining multiple cross-sections of population health data generates sufficient sample sizes to obtain statistically meaningful estimates of the determinants of health services use for a wide range of specific immigrant groups distinguished by race and ethnicity, year of arrival, and age at arrival.

2. **Methods**

Data Sources, Key Variables and Sample Specification

Since our interest is in the incidence of cancer screening among particular immigrant and ethnic groups, a sample size large enough to allow for statistically meaningful estimates for particular groups is a necessity. To this end, we combine individual data on immigrant and Canadian born women drawn from the principal population-based health datasets published by Statistics Canada: the 1996 wave of the National Population Health Survey (NPHS) and the 2000-01 and 2002-03 waves of the Canadian Community Health Survey (CCHS). The NPHS and CCHS are both population-based surveys that are comparable in terms of survey design and collection (although the NPHS collects information on people of all ages while the CCHS is limited to people aged 12 years or older).[1] Definitions of survey questions and response categories are almost identical among the surveys.

We measure the incidence of various forms of cancer screening: Pap smear, mammogram, breast exam and breast self-exam. We also specify dependent variables for particular frequencies of cancer screening that include whether the woman participated in cancer screening according to Health Canada guidelines (e.g., every 1-2 years for a Pap Smear; every month for a breast-self exam) and whether the woman has ever participated in that particular form of cancer screening. In considering complementary measures of the timing of cancer screening, we will gain additional insights into the effects on cancer screening use arising from moving to Canada. For example, a bigger negative gap in cancer screening for immigrants compared to native-born women in "recently used" compared to "ever used" might indicate that moving to Canada disrupted an immigrant woman's use of services that she appeared to use and understand prior to migration. In her study of breast

[1] Because of provincial buyins in that year, the sample size of the 1996-97 wave of the NPHS is about five times larger than for other waves.

screening practices among Russian immigrant women in Israel, Remmenick (1999) finds two thirds of surveyed women underwent breast screening practices prior to migration but only one third continued with the practice following migration to Israel. Thus relatively low rates of cancer screening among those immigrants do not appear to reflect a lack of understanding of the nature of and need for this preventative screening practice, although the low rates may be due to barriers to service delivery in Israel among these immigrants.

One of our main issues of interest is how cancer-screening practices vary among immigrants from different ethnic groups. Our principal measure of ethnic minority status is an individual's self-reported 'visible minority' status, and ten specific ethnic groups can be identified in the data: White, Black, Hispanic, Arab/West Asian, Chinese, Korean, Japanese, South Asian, South-East Asian, and Filipino. The geographic origin of some ethnic groups is as follows: for Hispanic people, region of origin is mainly Central and South America; for South Asian people it is India, Pakistan and adjacent countries; for Arab/West Asian people it is the Arab countries plus Iran, Afghanistan and surrounding areas; and for Black people, it is mainly the Caribbean but also sub-Saharan Africa. When combined with information on country of birth that indicates whether the individual is Canadian or foreign-born, we are able to identify twenty specific population subgroups: e.g., Canadian-born whites, foreign-born whites, Canadian-born Blacks, foreign-born blacks, etc.

Two caveats should be noted. First, even with a total combined sample of over 100,000 individuals, some subgroup samples are still too small to allow meaningful estimation – in particular native-born individuals of certain ethnic groups for which large-scale immigration to Canada has been a fairly recent phenomenon. Second, the subgroup of

immigrant whites is still a very heterogeneous group and encompasses immigrants from the USA and UK as well as immigrants from central and Eastern Europe, the Mediterranean and other areas.[2] Thus, we also differentiate among 1) white women from English-speaking backgrounds (denoted ESB - primarily USA, UK and Ireland, and Australia), 2) white women from French-speaking backgrounds, and 3) white women from other non-English speaking backgrounds (denoted NESB – primarily Continental Europe).

In specifying the final dataset used for estimation, we restrict attention to women aged 21-65 who are not self-identified as belonging to one of Canada's First Nations peoples. We restrict the sample to adults less than age 66 to avoid the complication of differential mortality rates by ethnic group leading to non-random sample selection. We also exclude individuals who report either belonging to multiple ethnic groups or who report belonging to the 'other' ethnic group (usually an amalgam of smaller groups). For the incidence of mammograms, we restrict the sample to women aged 40-65. As well, survey questions on breast exams and breast self-exams are only available in the CCHS datasets for a subset of Canadian provinces and regions, resulting in substantially smaller sample sizes when these measures are analyzed.

Empirical Framework

This paper follows much of the literature in relying on the Health Belief Model for its theoretical foundation (e.g., Strecher and Rosenstock, 1997). The model states that participation in health screening is a function of an individual's perceptions of

[2] This is also true of other ethnic minority groups, in particular the grouping together of Black immigrants from both the Caribbean and Africa. However, sample size limitations mean that further decomposition of ethnic minority groups by country of origin is only feasible for immigrant whites.

susceptibility to the condition and the seriousness of the condition, perceived benefits from screening (whether behavioral change or treatment will reduce the risk, and whether any required behavior change or actions will be sustained), and barriers to actions conducive to health (Remmenick, 1999). Since direct measures of these factors are often not available, particularly in population-based survey data, the usual approach is to specify the use of health screening as a function of demographic and socio-economic characteristics that will reflect one or more of these determinants. Control variables typically used include age, education level, region of residence, marital status, and measures of income and assets, and we include these variables as regressors.

Explanations for the lower incidence of cancer screening among immigrants include a lack of understanding about preventative health services (Luke, 1996), differences in beliefs about the necessity of preventative cancer screening (Juon et.al., 2003), differences in beliefs about the availability of screening services and in referrals from physicians (Raja-Jones, 1999), and cultural/communication barriers and low health motivation (Remmenick, 1999). Rajaram and Rashidi (1999) emphasize that particularly for immigrant and minority groups, knowledge, attitudes and beliefs about cancer screening will be shaped in part by the person's social and cultural background. For example, traditions of modesty among some Asian and Hispanic populations might lead immigrants from those regions to continue avoiding certain physical examinations after migration to Canada (Bottorff et.al., 1998, Gupta et.al., 2002). From a population health perspective, this discussion suggests an important explanatory role for factors that reflect an individual's cultural identity, such as ethnicity and country of origin, years in Canada, language fluency, measures of socio-economic status, and also characteristics of one's ethnic group in his or her area of

residence. In other words, use of cancer screening services may reflect the extent to which the immigrant woman has acculturated into Canadian society.[3] Acculturation can be thought of as a process by which recent immigrants adopt characteristically Canadian attitudes and behaviors. Vissandjee et.al. (2001) cite 'degree of acculturation' (variously measured) as an important determinant of the preventative health services use of immigrants.

A related explanation for immigrant cancer screening rates being lower than native-born women is that because of language difficulties or similar factors, immigrants and minority groups may face barriers to access for health services generally. However, there is evidence that access barriers cannot explain differences in the takeup of cancer screening. For example, Harlan et.al. (1991) analyze the 1987 wave of the US NHIS and find that it is not barriers to physician access that explains lower incidence of cervical cancer screening among US Hispanics but rather differences in beliefs about the necessity of the procedures. Wen et.al. (1996) find that immigrants and ethnic minorities in Ontario had access to regular health services that was comparable to that of native-born majority Ontario women, while Goel et.al.(2003) find that including controls for access to health services only partially attenuates disparities in cancer screening between the US born and foreign born Hispanic and Asian/Pacific Island ethnic minorities. Also, McDonald and Kennedy (2004) find that for new immigrants to Canada, there is rapid convergence to native-born levels in general indicators of access to health services, including blood pressure testing, regular doctor visits, and having a family doctor. The implication would seem to be that *if* there is

[3] Alternatively, it could also reflect the degree to which health services are delivered in a manner that reflects the predominant culture.

an access problem that underlies different rates of cancer screening, it is specific to cancer screening services and not reflective of barriers to access of health services generally.

We focus on variables that will reflect how cancer-screening behaviors are influenced by a woman's social and cultural environment. To do this, we include variables based on ethnicity and country of origin, year of arrival, years in Canada, age at arrival, language fluency, and local ethnic neighborhood characteristics. Our specific functional forms follow McDonald and Kennedy (2004, 2005). We estimate the determinants of cancer screening across a pooled sample of immigrant and native-born women and include specific controls for immigrant status, years in Canada, and year of arrival, which in the presence of common controls for socio-economic and demographic characteristics will reflect differences in cancer screening relative to *comparable* native-born women. Specifically, we include an indicator variable FB that takes the value 1 if the person was born outside of Canada and zero otherwise, and linear-quadratic years-since-migration (YSM) terms to capture the (possibly nonlinear) effect of an extra year in Canada. A positive coefficient on YSM implies that with additional years in Canada, immigrants are becoming more likely to use cancer screening relative to a native-born person of the same age, education, region of residence, and other included factors. We also include indicator variables for a sequence of five-year arrival periods that will reflect unobserved differences in immigrant flows across time, such as changing composition of immigrants by visa category.

To this specification we add various controls for ethnicity. Our basic specification includes a simple set of indicator variables for the visible minority groups identified in the data and mentioned earlier. We also employ more flexible empirical specifications

including interactions of ethnicity controls with immigrant-specific variables. Finally, we also experiment with interactions of the ethnicity and immigration variables with controls for socio-economic status since, as argued by Rajaram and Rashidi (1999), a person's degree of ethnic group affiliation (or the extent of acculturation) is unlikely to be independent of her socio-economic status.

3. Results

Descriptive statistics for the four main forms of cancer screening (Pap smear, Mammogram, breast self-exam (BSE) and breast exam administered by a health care professional (BE) are presented in tables 1a-1d. Each table presents the incidence of cancer screening for each ethnic group identified in the data, and disaggregated further by immigrant status. The tables indicate some important results. Immigrant women who belong to Asian visible minorities are substantially less likely than native-born Canadian women to have participated in recent cancer screening, and are also less likely to have ever participated in cancer screening.[4] For example, while 92.6% of native-born women have had a Pap smear at some time in the past, only 65.2% of immigrant Chinese women have ever had a Pap smear. Similarly, while 80.5% of native-born women had a pap smear in the last three years, the associated figure for Chinese immigrants is only 59.1%.The incidence of ever having had a pap smear for other Asian minority groups is comparable, and ranges from 62.6% for Korean immigrants to 74.5% for Southeast Asian immigrants. The fact that the gap is present in terms of recent service use suggests that any disadvantage in home-

[4] The incidence of a mammogram in the last year is the only exception. The difference in incidence between native-born women and Asian immigrants is generally smaller than for other measures of cancer screening, and is even negative for some groups. However, the pattern is reversed for the incidence of a mammogram in the last two years or ever had a mammogram, where the figures are more consistent with what is found for other cancer screening.

country access prior to migration (which would contribute to differences in ever having had screening) is not overcome after migration to Canada.

Tables 1a-1d here

Canadian-born Asian visible minority groups also have substantially lower rates of cancer screening compared to Canadian-born women, and in some cases lower rates compared to immigrant women of the same ethnic group. This suggests that cultural barriers to health service use might persist among the children of immigrants, although since large-scale immigration from Asia is a fairly recent phenomenon, Canadian-born Asian minorities tend to be younger and this would also lead to lower incidence of cancer screening, particularly in terms of whether a particular test was ever performed. (We return to this point in the subsequent regression analysis.)

For Hispanic and Black women, the incidence of cancer screening is generally lower than for native-born women but the differences are smaller than for immigrants from other visible minorities. For white women, using first language spoken at home and country of birth (if an immigrant) enables us to disaggregate this group further by imputed ethnicity. While there are some differences by ethnic origin across these groups in cancer screening incidence, the differences tend to be small. ESB immigrants tend to have marginally higher rates of cancer screening, while non-ESB immigrants tend to have lower rates, but again this may be due to differences in the age of the various subgroups.

These descriptive statistics indicate that immigrant status and ethnicity matter in cancer screening, and Asian immigrants have among the lowest utilization rates of all of the

groups considered. We turn now to an analysis of what might explain these differences, focusing on the longer recall periods of each cancer screening activity.

Probit Results

Probit regression results are presented in Table 2a and 2b. Each column presents marginal effects for a particular form of cancer screening – Pap smear in the last 3 years, breast exam in the last 2 years, breast self-exam in the last 12 months, and mammogram in the last 2 years. In each instance, the marginal effect for the FB variable is negative while the marginal effect of an extra year in Canada (YSM) is positive. Taken together, the results indicate that after controlling for age, education, region of residence and other demographic and socio-economic factors, immigrant women still have significantly lower incidence of cancer screening on arrival than comparable native-born women, but that the incidence of cancer screening increases with time in Canada. The negative effect of the quadratic term on the increase in cancer screening with years in Canada is small relative to the positive linear term, implying that incidence continues to increase (though at a decreasing rate) until 35 years in Canada. While the coefficients on FB and YSM are significant at the 5% level for only Pap smears and breast exams, Wald tests confirm their joint significance for all forms of screening. Ethnicity also exerts a statistically and analytically significant effect on cancer screening that is in addition to other socio-economic and demographic characteristics. For immigrants in all ethnic minority groups except for Blacks and Hispanics, the incidence of cancer screening is generally in the order of 10-20% lower than for white immigrants (which in turn is significantly lower than for native-born white women). The ethnic minority indicators are not specific to immigrants, however, so that native-born minority women are also predicted to have lower rates of

cancer screening than their majority white fellow Canadians.[5] Allowing for arrival period cohort effects does not have a strong impact on the results, and the estimated marginal effects are not large. The only notable exception is that those women arriving in Canada in 2001-03 were significantly more likely to have had a mammogram within the last two years.

Tables 2a and 2b here

Other selected results are presented in Table 2b. Speaking a language at home other than French or English is associated with lower cancer screening rates, which reinforces the ethnic gap in services since most recent immigrants do not have English-speaking backgrounds. Women with less than high school education are less likely to engage in any of the four forms of cancer screening, while post-secondary education is generally associated with higher screening rates. Cancer screening also increases with age but at a decreasing rate, and is higher in urban areas. Interestingly, in general, cancer screening rates are found to be lower in Quebec than in other provinces. Marital status and the presence of young children are both significant determinants of cancer screening but in different ways. Married women are more likely than single women to have undergone all four types of cancer screening, but for women with young children at home, Pap smears were more common (not surprisingly given prenatal monitoring by physicians) but breast exams and mammography were less common. There are differences across the survey years

[5] Since most ethnic minority groups are predominantly immigrants, and since a common YSM profile is assumed, it is likely that the visible minority indicator variables will mainly reflect differences in cancer screening among immigrant groups. Later in the paper, we relax these restrictions using specifications that allow separate effects for immigrants and native-born women for each ethnic group.

for some forms of cancer screening, although no clear pattern towards increasing or decreasing use over time is apparent.

In order to assess when or if immigrant cancer screening rates reach native-born levels, we use the econometric results to generate predicted profiles for each form of cancer screening. For illustration, we specify a 'baseline' individual with a particular set of demographic characteristics – white, age 40 (age 50 for Mammograms), with high school education, residing in Ontario outside of a CMA, and English usually spoken at home. (We discuss results for minority ethnic groups in the next section.) We then generate two sets of predictions for the same baseline individual but on the assumption that she is 1) native-born; and 2) foreign born. For the latter case, we predict the incidence of cancer screening across a range of values for years in Canada and year of arrival in Canada. Thus, for expositional simplicity, we present predicted immigrant and native born health screening profiles by YSM but holding age and other factors constant. (Note that the profile for native-born women will be a horizontal line since YSM is zero.)

Figure 1 illustrates that for a baseline immigrant white woman, the incidence of having a Pap smear in the last three years is around 43% soon after arrival in Canada, compared to 71% for a native-born white woman with the same characteristics. The incidence then steadily increases with additional years in Canada, and after approximately 16-20 years in Canada, immigrant white women and native-born white women exhibit comparable rates of Pap smears. Figures for Pap smear incidence in the last year and incidence of ever having had a Pap smear (not reported) both show a very similar pattern.

For breast exams in the last two years and self exams in the last 12 months, a similar pattern is apparent, with relatively slow convergence to native-born levels after

about 16-20 years in Canada. The gap in screening between recent immigrants and native-born women is also somewhat smaller – in the order of 18%, with some variation by arrival cohort. The pattern for mammograms in the last two years shows a smaller initial gap between immigrants and native-born white women that is quickly closed. Rates of mammography screening then remain at or above native-born levels. Other frequencies of breast cancer screening are generally comparable to what is reported in Figures 2-4, although the incidence of ever having had a mammogram is significantly lower for recent immigrants and increases with years in Canada, reaching native-born levels in 10-15 years. Taken together, the results for mammograms suggest that relatively few immigrant women had mammograms prior to migration but that there are few barriers to use for recent immigrant women whose doctor prescribes a mammogram, and this recent usage gradually closes the overall gap in mammogram use.

The generally slow rate of convergence in cancer screening is in contrast to the much more rapid convergence to native-born levels in other forms of health service use. As illustrated in McDonald and Kennedy (2004), both male and female immigrants exhibit incidence of having a family doctor, having a doctor visit in the last year, and having a blood pressure test in the last year that all converge to native-born levels within 5-8 years in Canada. Thus the implication is that it is not persistent barriers to accessing basic health services that underlies the patterns in cancer screening for immigrant women.

We turn now to differences in cancer screening by ethnicity, with a focus on Pap smears and breast exams. As noted earlier, the basic specification imposes a YSM profile that is constant for all immigrants, and constrains ethnic variation to be the same for both native-born and immigrant members of a particular ethnic group. Since this might be overly

restrictive, we augment the specification by allowing separate YSM profiles in cancer screening for each minority group, and for white immigrants divided by broad region of origin into English-speaking regions (mainly UK, USA, Australia and New Zealand) and non-English speaking regions (mainly continental Europe).[6] The interpretation of the indicator variables is then the difference in cancer screening between native-born white women and native-born women of a specific ethnic group.

Rather than present multiple sets of regression results, we simply generate predicted cancer screening YSM profiles for women of each ethnic group, for both native-born and immigrant members of that group. Figures 5-7 contain the results for the predicted probability of having a Pap smear in the last three year, for selected groups. Figure 5 illustrates that there are very large differences between white immigrant women from English and non-English speaking backgrounds, with the former having rates of cancer screening very close to native-born white levels regardless of years in Canada and the latter exhibiting slow convergence in cancer screening that approaches native-born levels only after 25 years in Canada.

Figure 6 illustrates the trajectory in Pap smear testing for the Chinese visible minority group. South Asian women, Southeast Asian women, and West Asian women (not reported) also show a comparable upward trajectory in the incidence of Pap smear testing. For immigrants from these Asian ethnic subgroups, initial levels of cancer screening are in the order of 15-25% (compared to over 70% for native-born white women with similar socio-economic and demographic characteristics) and this increases slowly with additional years in Canada. However, even after many years, convergence to native-born white levels

[6] Due to smaller sample sizes and ease of exposition, we also exclude the arrival cohort terms from the regressions. The inclusion of arrival cohort terms does not significantly affect the main results.

is not achieved; in other words, Asian immigrant women are consistently less likely to obtain Pap smears than their native-born white counterparts. Further, for Asian minority women born in Canada, the level of cancer screening is also significantly less than for majority white women although caution should be used in interpreting these results as the underlying sample sizes for some native-born minority groups are not large. One conclusion is that there may be persistent cultural barriers to the use of particular forms of cancer screening for Asian minority women, regardless of immigrant status.

Figure 7 presents the predicted incidence of Pap smear testing for Black women, and the trajectory for Hispanic women (not reported) is comparable. Canadian-born black and Hispanic women exhibit rates of Pap smear testing that are very close to Canadian-born white levels. Immigrants from both of these minority groups exhibit increasing rates of cancer screening with years in Canada, reaching native-born white levels for Pap smear testing after around 20 years in Canada.

Figures 8-10 report predicted trajectories in breast exams for selected ethnic groups. For white women, differences between immigrant women from English speaking and other backgrounds are smaller than for Pap smears, but the general pattern is the same: ESB immigrants have rates of breast exam screening close to native-born white levels, while NESB immigrants have lower rates that exhibit gradual convergence with additional years in Canada. For immigrants from South Asia, the initial rate of breast exam screening is over 30% less than for comparable native-born white women, and again there is slow convergence to native-born levels. It is notable that the rate of breast exam testing for these immigrants exceeds that for native-born South Asian women after about 10 years in Canada. Patterns for both West Asian women and Hispanic women are similar. In contrast,

Figure 10 shows that for Chinese immigrant women, the rate of convergence to native-born levels is negligible, and even after many years in Canada, Chinese women have rates of breast exam screening that are in the order of 20% less than for comparable native-born white women. As well, for Southeast Asian women and Black women, there is no upward convergence in the incidence of breast exams – screening frequency remains significantly below native-born white levels. Interestingly, the rate of breast exams for native-born Black women is comparable to that of native-born whites.

Extensions – ethnic neighborhood effects and age at arrival in Canada

We briefly summarize the outcomes of two extensions to our empirical approach that might help to explain the gap in cancer screening use for many visible minority immigrants compared to native-born white women. First, since the influence of one's local community is likely to be an important source of information and cultural mores with regard to cancer screening, we introduce ethnic group community controls into the regression analysis. Following the approach outlined in Bertrand et.al (2000), we capture local ethnic group peer effects through an interaction of the concentration of the person's ethnic group in her local area and the average incidence of use of the particular cancer screening service among members of that person's ethnic group. Network effects are identified by the inclusion of fixed effects for neighborhood (here measured at the level of the Census Subdivision), for ethnic group, and for the concentration of each individual's ethnic group that resides in her local area. This approach has been applied to issues of immigrant health services use in Deri (2005) and the incidence of obesity/overweight

among immigrants in McDonald and Kennedy (2005). In both papers, significant evidence of ethnic neighborhood effects on health service use and obesity/overweight rates is found.

For brevity we focus only on the results for Pap smears, but similar ethnic neighborhood effects are also found for the other forms of cancer screening.[7] Results indicate the presence of ethnic neighborhood effects that are both economically and statistically significant. When the incidence of Pap smear testing among the minority woman's ethnic group is lower than the Canadian average, a larger local ethnic community is associated with a larger negative effect on the probability that an individual in that local ethnic neighborhood has had a Pap smear. In other words, when a minority woman's ethnic community is large AND women in that ethnic community are less likely to use cancer screening, then this reduces the chance that any particular woman in that community will use cancer screening. More generally, it appears that there are negative spillover effects exerted by a woman's local ethnic community on her use of preventative cancer screening. Furthermore, this ethnic neighborhood effect is estimated after controlling for ethnic group and neighborhood unobserved effects as well as unobserved factors likely to lead members of ethnic communities to locate in particular areas where there is already a concentration of individuals of that ethnic community. However, ethnic network effects only explain part of the gap in incidence of cancer screening between visible minority women and native-born white women. For Pap smears, the difference is in the order of 10% for Chinese women - i.e., other things equal, a Chinese woman who resides in a neighborhood with a relatively high proportion of people of her ethnic group has an incidence of Pap smear testing that is

[7] Detailed results are available from the authors on request.

10% less than a comparable Chinese woman who resides in a neighborhood with a low proportion of people of her ethnic group.

The second extension to the main regressions is to allow an immigrant woman's age at arrival to affect her use of cancer screening. For women who entered Canada as children or youth, at least some of their schooling would have taken place in Canada. This implies greater exposure to English (or French) language, greater exposure to health awareness issues through the Canadian school system, and more generally, greater exposure to majority Canadian social and cultural mores. The results indicate that white and black immigrants who arrived as children have rates of Pap smear screening that are comparable to those of native-born white women, while Chinese and South Asian immigrants have screening rates that are comparable to those of native-born women of the same ethnic minorities.[8] It appears that child arrivals have more in common with second generation immigrants than with first generation immigrants who arrived as adults. More generally, this result confirms that social or cultural factors rather than access barriers underpin the lower utilization rates for immigrants from certain visible minorities.

Discussion

Pap smears and Breast exams (clinical and self exams) are relatively low cost, accessible, and routine procedures that are effective at identifying conditions that could prevent potentially life threatening cancers. Yet we find robust evidence that immigrants and visible minority groups exhibit significantly lower rates of most forms of cancer screening, even after controlling for age, demographics, education levels, other measures of

[8] We are precluded from considering the results for the other visible minority groups owing to small sample sizes for child and youth arrivals.

socio-economic status, and language spoken at home. Immigrant women do exhibit increasing usage rates for most forms of cancer screening with years in Canada, but for immigrants from Asia, native-born rates of cancer screening are not achieved even after many years in Canada.

Informational barriers to the access of health services – such as language difficulties, lack of understanding about how the Canadian health system operates, or lack of understanding about the services that are available – may contribute to lower cancer screening rates for recent immigrants from some minority ethnic groups. However, the slow rate of increase in the use of these services combined with evidence from other research of much more rapid convergence in general use of health services suggests that general barriers to access of health services cannot explain the differences between the native-born majority and immigrant minorities. In addition, members of Asian visible minority groups who were born in Canada also exhibit significantly lower rates of cancer screening, even though these women would be expected to be fluent in English or French and quite familiar with the Canadian health system.

The results of our analysis suggest the presence of persistent serious social and/or cultural obstacles to the use of these important services by many visible minority groups. These may take the form of social taboos against the use of particular services or cultural perceptions that the importance of particular services are overstated. Our research clearly indicates that health authorities need to tailor their message about the importance of these forms of cancer screening to reflect the perceptions and beliefs of particular minority groups if the objective of universal use of preventative cancer screening is to be achieved.

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Incidence of Preventative Health Services Use (Percentage)

Table 1a: Pap Smears (women aged 20-65)

	Pap smear last year		Pap smear last three years		Ever had a pap smear	
	Foreign-born	Native-born	Foreign-born	Native-born	Foreign-born	Native-born
All women	49.0	57.4	70.3	80.5	79.9	92.6
Ethnicity						
White (all)	53.2	57.6	77.3	80.7	89.0	93.0
White (ESB) **	60.7	59.4	83.9	83.4	96.2	95.4
White (French)	*	54.2	*	75.7	*	88.6
White (other)	50.4	55.1	73.3	78.4	83.3	89.7
Black	53.5	60.2	78.0	77.1	84.6	82.3
Hispanic	47.9	54.2[s]	76.5	87.0[s]	82.5	88.2[s]
Arab	50.3	45.0[s]	61.4	62.2[s]	69.9	69.8[s]
South Asian	40.6	34.9	57.9	53.2	65.7	55.6
SE Asian	47.5	31.5[s]	63.9	43.3[s]	74.5	50.8[s]
Filipina	37.3	31.3[s]	53.5	39.5[s]	62.8	50.6[s]
Chinese	42.5	41.4	59.1	60.0	65.2	66.6
Korean	42.8	41.9	55.5	65.0	62.6	79.0
Japanese	24.5	52.9	39.2	72.6	66.8	82.3

* Value suppressed due to small sample size (less than 30 observations)

s Sample size between 30 and 50 observations

** For immigrants, ESB denotes white women from UK, Ireland, USA, Australia and New Zealand. For native-born women, ESB denotes white women whose first language learned was English

Table 1b: Mammogram (women aged 40-65)

	M-gram last year		M-gram last two years		Ever had a M-gram	
	Foreign-born	Native-born	Foreign-born	Native-born	Foreign-born	Native-born
All women	36.9	35.4	55.3	52.8	70.7	70.6
Ethnicity						
White (all)	39.2	35.5	59.7	52.9	77.0	70.5
White (ESB) **	40.5	37.1	60.9	53.7	77.8	69.7
White (French)	32.9	32.6	55.0	51.7	82.0	73.0
White (other)	39.0	33.4	59.9	50.1	77.0	66.8
Black	40.3	32.5	58.7	38.8	70.7	47.0
Hispanic	29.6	*	48.4	*	68.2	*
Arab	41.0	*	50.7	*	66.9	*
South Asian	31.7	*	46.6	*	59.5	*
SE Asian	25.9	*	39.2	*	57.9	*
Filipina	35.8	*	45.9	*	59.8	*
Chinese	33.2	22.9	49.1	32.9	58.7	61.5
Korean	48.2	43.7[s]	64.0	54.6[s]	70.7	78.4[s]
Japanese	*	32.8	*	57.5	*	73.2

* Value suppressed due to small sample size (less than 30 observations)

s Sample size between 30 and 50 observations

ESB denotes white immigrants from UK, Ireland, USA, Australia and New Zealand

** For immigrants, ESB denotes white women from UK, Ireland, USA, Australia and New Zealand. For native-born women, ESB denotes white women whose first language learned was English

Table 1c: Breast Self-Exam (women aged 20-65)

	BSE last month		BSE last 12 months		Ever had a BSE	
	Foreign-born	Native-born	Foreign-born	Native-born	Foreign-born	Native-born
All women	35.1	38.6	54.3	61.0	71.1	81.4
Ethnicity						
White (all)	40.0	38.7	62.9	61.1	79.1	81.5
White (ESB) **	40.0	39.7	67.1	62.5	85.5	82.5
White (French)	*	35.1	*	56.4	*	77.9
White (other)	39.8	43.0	60.5	62.6	75.0	83.7
Black	42.2	39.2	60.0	55.9	75.3	79.4
Hispanic	30.2	*	49.0	*	73.3	*
Arab	23.0	*	38.5	*	62.6	*
South Asian	25.4	*	39.8	48.3[s]	54.0	65.6[s]
SE Asian	40.4	*	51.1	*	68.2	*
Filipina	23.4	*	30.7	*	47.4	*
Chinese	23.6	25.7	36.0	44.5	56.1	61.1
Korean	12.9[s]	*	33.1[s]	*	50.8[s]	*
Japanese	*	22.6[s]	*	35.6[s]	*	56.9[s]

* Value suppressed due to small sample size (less than 30 observations)

s Sample size between 30 and 50 observations

ESB denotes white immigrants from UK, Ireland, USA, Australia and New Zealand

** For immigrants, ESB denotes white women from UK, Ireland, USA, Australia and New Zealand. For native-born women, ESB denotes white women whose first language learned was English

Table 1d Breast Exam by a Health Care Professional (women aged 20-65)

	BE last year		BE last two years		Ever had a BE	
	Foreign-born	Native-born	Foreign-born	Native-born	Foreign-born	Native-born
All women	49.1	53.3	61.4	69.8	70.4	81.3
Ethnicity						
White (all)	56.0	53.5	70.3	70.1	80.7	81.6
White (ESB) **	62.4	53.9	76.1	71.1	88.1	83.3
White (French)	*	53.1	*	67.3	*	77.0
White (other)	54.4	50.1	67.6	67.4	76.5	79.5
Black	44.9	51.8	57.7	62.3	62.5	69.4
Hispanic	44.2	*	58.8	*	75.5	*
Arab	52.2	*	60.0	*	72.5	*
South Asian	39.2	27.5	49.8	35.5	54.7	40.8
SE Asian	44.0	*	52.2	*	62.7	*
Filipina	32.9	*	45.1	*	55.8	*
Chinese	39.4	40.0	47.8	58.8	54.0	69.5
Korean	39.6	*	48.6	*	64.0	*
Japanese	23.8[s]	45.5[s]	32.3[s]	54.1[s]	48.3[s]	64.3[s]

* Value suppressed due to small sample size (less than 30 observations)

s Sample size between 30 and 50 observations

ESB denotes white immigrants from UK, Ireland, USA, Australia and New Zealand

** For immigrants, ESB denotes white women from UK, Ireland, USA, Australia and New Zealand. For native-born women, ESB denotes white women whose first language learned was English

Table 2a: Regression Results – selected health services use (marginal effects)
Immigrant and Ethnicity Controls

	Pap last 3 years (age 20-64)		BE last 2 years (age 20-64)		BSE last 12 mths (age 20-64)		Mammogram last 2 yrs (age 40-64)	
Immigrant status	Marginal effect	t-stat	Marginal effect	t-stat	Marginal effect	t-stat	Marginal effect	t-stat
Native born	--		--		--		--	
Foreign born	-0.4393	-6.75	-0.2445	-2.58	-0.1967	-1.43	-0.1664	-1.20
Years since migration	0.0208	5.94	0.0152	2.59	0.0130	1.58	0.0155	1.87
YSM – squared	-0.0003	-3.82	-0.0003	-2.54	-0.0002	-1.15	-0.0004	-2.58
Ethnicity								
White	--		--		--		--	
Chinese	-0.1486	-7.49	-0.1597	-5.06	-0.2009	-4.76	-0.0685	-1.89
Japanese	-0.2015	-3.48	-0.2498	-2.77	-0.4113	-3.84	-0.1450	-1.63
Korean	-0.1523	-3.55	-0.1801	-2.69	-0.1902	-2.22	0.0610	0.81
South Asian	-0.1774	-8.39	-0.1403	-4.37	-0.1410	-3.43	-0.0677	-1.69
Black	0.0215	1.12	-0.0641	-2.07	0.0463	1.25	0.0514	1.44
Arab/W.Asian	-0.0905	-2.88	-0.0212	-0.44	-0.1379	-2.38	-0.0009	-0.01
SE Asian	-0.1274	-4.71	-0.1554	-3.42	-0.0656	-1.21	-0.1759	-4.40
Filipino	-0.2302	-6.29	-0.1539	-2.40	-0.2102	-2.86	-0.0152	-0.23
Hispanic	0.0451	1.64	-0.0172	-0.31	-0.0099	-0.14	-0.0012	-0.02
Period of Arrival								
Arrived 01-03	0.0285	0.73	0.0940	1.47	0.1514	1.22	0.2950	2.79
Arrived 96-00	0.0813	2.20	0.0434	0.60	0.0700	0.60	0.0325	0.27
Arrived 91-95	0.0768	2.28	0.0460	0.76	-0.0218	-0.22	0.1128	1.20
Arrived 86-90	0.0772	2.76	0.0644	1.27	0.0003	0.00	0.1217	1.79
Arrived 81-85	0.0567	2.08	0.0540	1.19	0.0258	0.41	0.0354	0.64
Arrived 76-80	0.0510	2.03	0.0411	1.06	-0.0335	-0.66	0.0343	0.83
Arrived 71-75	--		--		--		--	
Arrived 66-70	0.0113	0.42	0.0087	0.20	-0.0720	-1.34	0.0867	2.12
Arrived 61-65	-0.0160	-0.42	0.1115	2.12	-0.0561	-0.80	0.0908	1.70
Arrived 56-60	0.0347	0.71	0.1315	1.91	0.0118	0.11	0.1269	1.75
Arrived 51-55	0.0470	0.76	0.1966	2.46	-0.0598	-0.47	0.2324	2.72
Wald test of cohort effects (p-value)	0.0442		0.0521		0.4197		0.0038	
Wald test of cohort and ysm effects (p-value)	0.0000		0.0001		0.0369		0.0030	
Pseudo-Rsq	0.0787		0.0505		0.0365		0.1170	
Sample size	105062		48012		46691		59250	

Table 2b: Regression Results (marginal effects) – continued from Table 2a
Socio-economic and demographic Controls

	Pap last 3 years (age 20-64)		BE last 2 years (age 20-64)		BSE last 3 mths (age 20-64)		Mammogram last 2 yrs (age 40-64)	
Usual Language at home								
English	--		--		--		--	
French	0.0016	0.24	0.0075	0.68	0.0166	1.29	0.0097	0.77
Other language	-0.0350	-4.43	-0.0440	-3.34	0.0061	0.39	0.0131	0.98
Other language only	-0.0211	-1.12	-0.0168	-0.44	-0.0706	-1.61	-0.1256	-3.42
Education								
No high school	-0.0565	-7.51	-0.0595	-4.27	-0.0258	-1.68	-0.0306	-2.53
High school only	--		--		--		--	
Finished degree	0.0640	8.81	0.0584	4.46	-0.0232	-1.52	0.0294	2.08
Finished post-sec	0.0273	4.77	0.0298	2.89	0.0240	2.04	0.0215	2.08
Finished higher deg.	0.0749	6.57	0.0864	4.07	-0.0018	-0.07	0.0125	0.60
Geographic area								
Newfoundland	0.0038	0.32	-0.0953	-5.19	-0.0477	-2.21	-0.0331	-1.61
PEI	0.0220	1.64	-0.0141	-0.40	0.0067	0.31	0.0039	0.18
Nova Scotia	0.0195	1.67	-0.0262	-0.82	-0.0876	-2.57	0.0240	1.23
New Brunswick	0.0137	1.25	-0.0515	-2.83	-0.0139	-0.74	0.0736	3.90
Quebec	-0.0713	-7.96	-0.0843	-3.87	-0.1233	-5.32	-0.0315	-2.00
Ontario	--		--		--		--	
Manitoba	0.0127	1.47	0.0697	4.10	0.0169	0.91	-0.0540	-3.72
Saskatchewan	-0.0111	-0.96	-0.0433	-1.78	-0.0297	-1.47	-0.0236	-1.25
Alberta	0.0161	2.58	-0.0158	-1.48	-0.0324	-3.73	0.0215	1.86
BC	0.0131	1.56	-0.0206	-1.24	-0.0019	-0.07	0.0609	4.31
Rural area	-0.0030	-0.49	-0.0232	-2.01	-0.0079	-0.63	-0.0116	-1.15
Urban, non-CMA	--		--		--		--	
Census Metropolitan area	0.0357	6.66	0.0305	3.20	-0.0069	-0.67	0.0372	4.19
Demographics								
Age	0.0133	4.24	0.0250	6.42	0.0172	4.18	0.1823	7.91
Age^2	-0.0002	-5.79	-0.0003	-5.76	-0.0002	-3.19	-0.0016	-7.09
Year 2001	-0.0418	-0.58	0.0069	0.07	-0.2293	-2.35	-0.1811	-0.28
Age * year 2001	-0.0001	-0.03	-0.0019	-0.39	0.0091	1.87	0.0009	0.03
Age^2*year 2001	0.0000	0.62	0.0000	0.76	-0.0001	-1.51	0.0001	0.29
Year 2003	0.0435	0.61	-0.2317	-1.97	-0.4310	-2.87	0.5546	0.94
Age * year 2003	-0.0042	-1.14	0.0074	1.34	0.0203	2.55	-0.0335	-1.26
Age^2*year 2003	0.0001	1.54	-0.0001	-0.97	-0.0002	-2.37	0.0004	1.64
Single	--		--		--		--	
Married	0.1251	17.67	0.0611	4.70	0.0296	1.97	0.0616	3.88
WSD	0.0747	9.91	0.0160	0.97	0.0051	0.27	0.0143	0.84
Kids under 12	-0.0025	-0.59	-0.0107	-1.51	0.0084	1.06	-0.0081	-0.80
Kids under 5	0.0583	8.19	-0.0039	-0.37	-0.0261	-2.32	-0.0578	-2.64

Figure 1: Pap Smear predictions for white native-born women and immigrant women by period of arrival in Canada (default group)

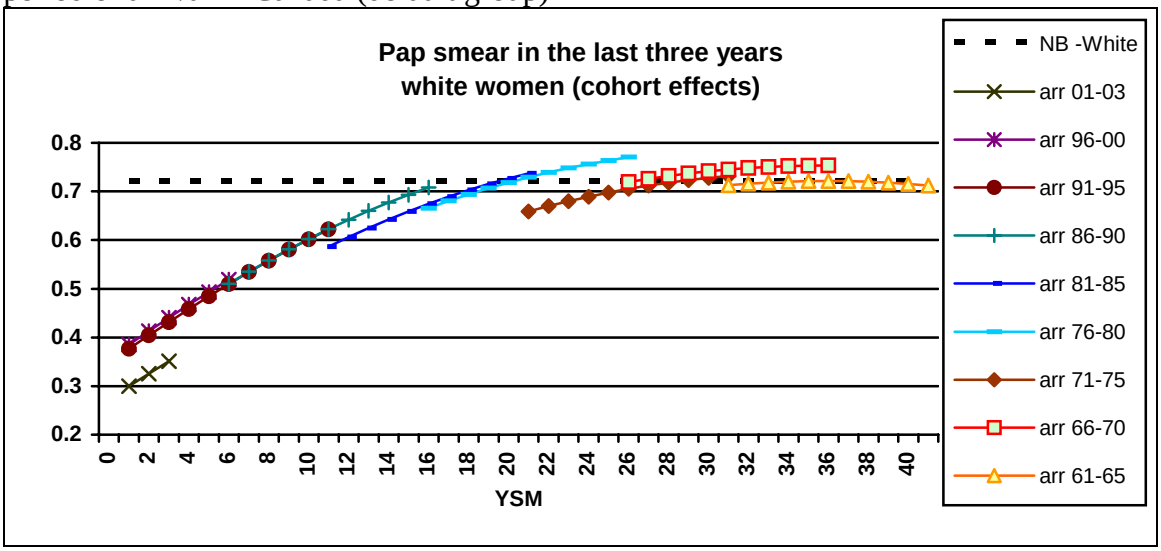


Figure 2: Breast exam predictions for white native-born women and immigrant women by period of arrival in Canada (default group)

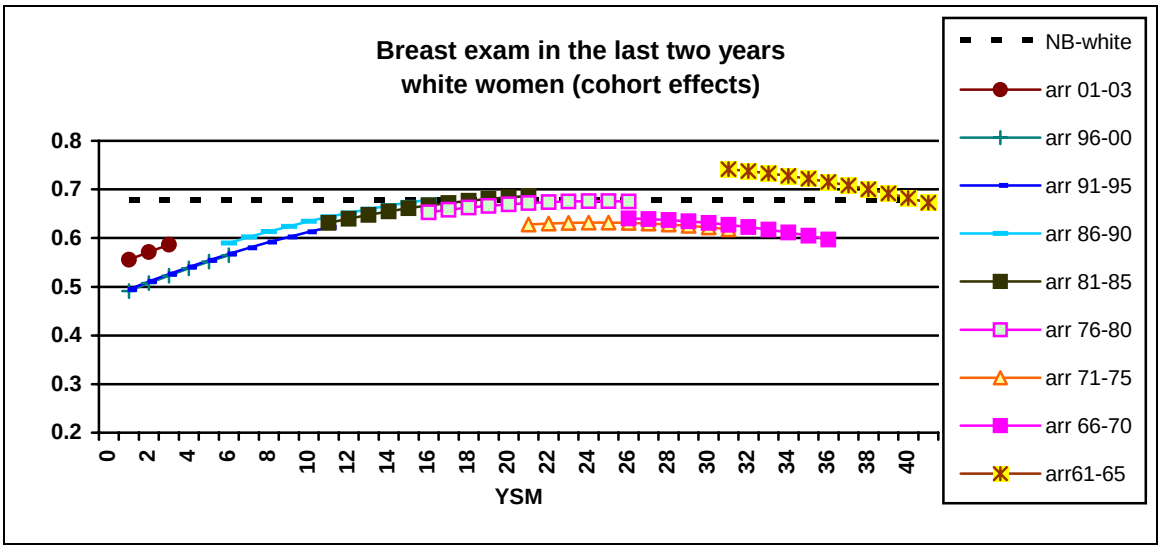


Figure 3: Breast self-exam predictions for white native-born women and immigrant women by period of arrival in Canada (default group)

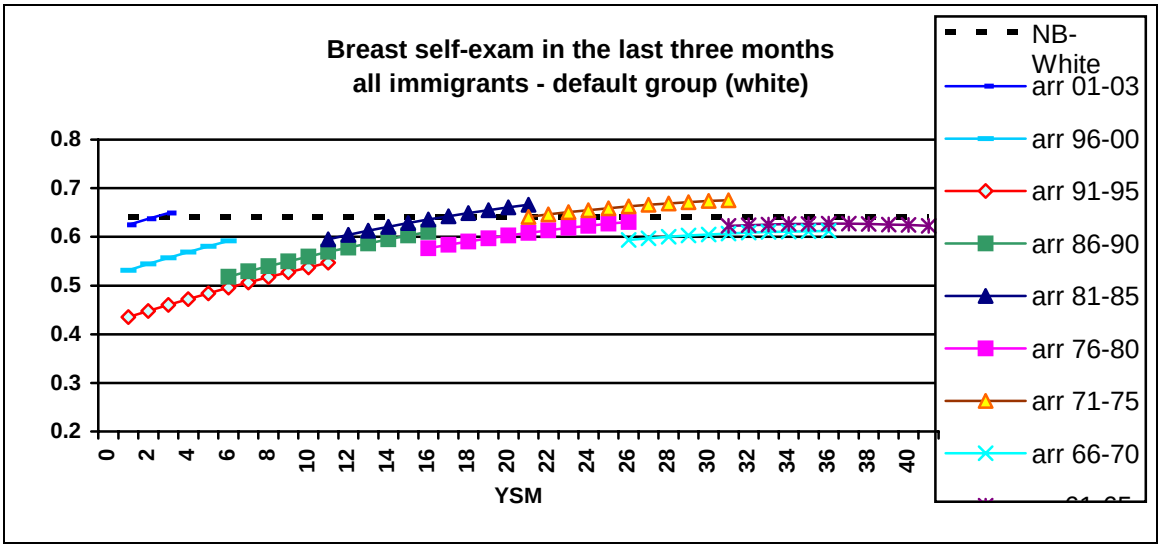


Figure 4: Mammogram predictions for white native-born women and immigrant women by period of arrival in Canada (default group)

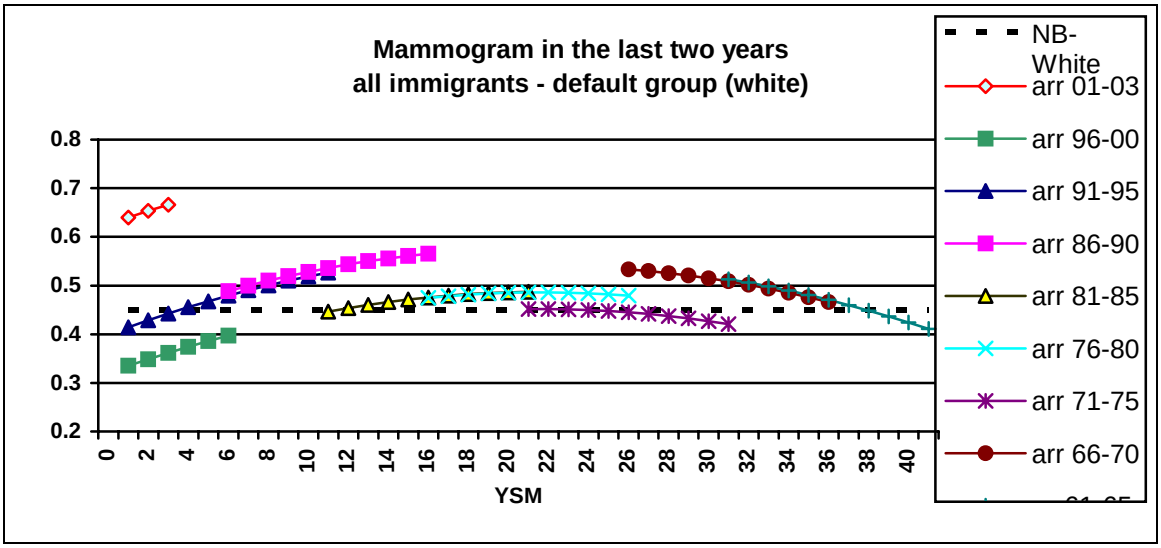


Figure 5: incidence of Pap smear testing in the last three years for native-born white women and immigrant women by broad region of origin (English speaking, non-English speaking)

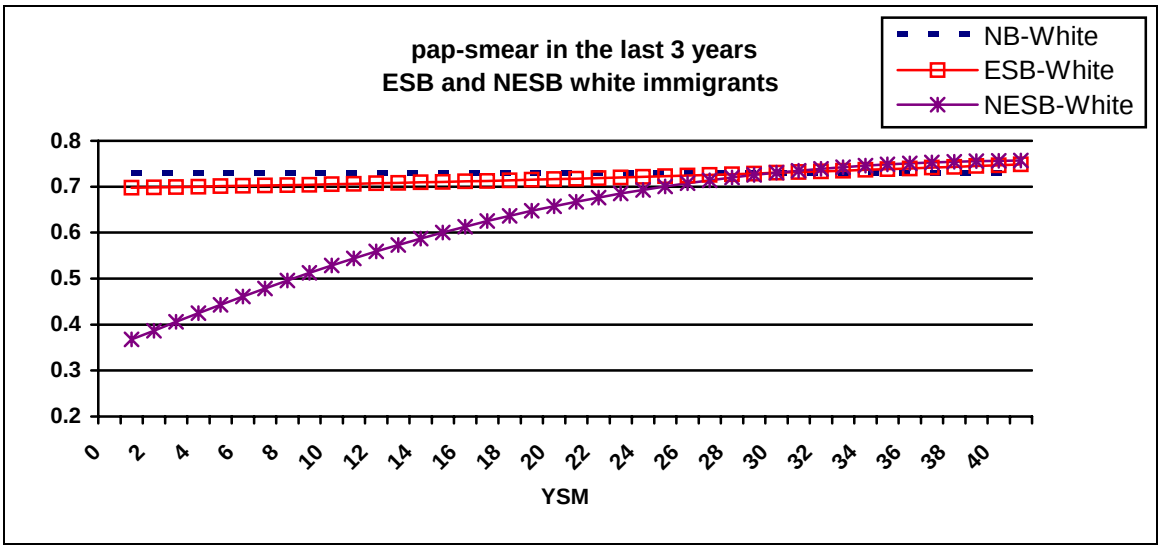


Figure 6: incidence of Pap smear testing in the last three years for native-born white women and Chinese women

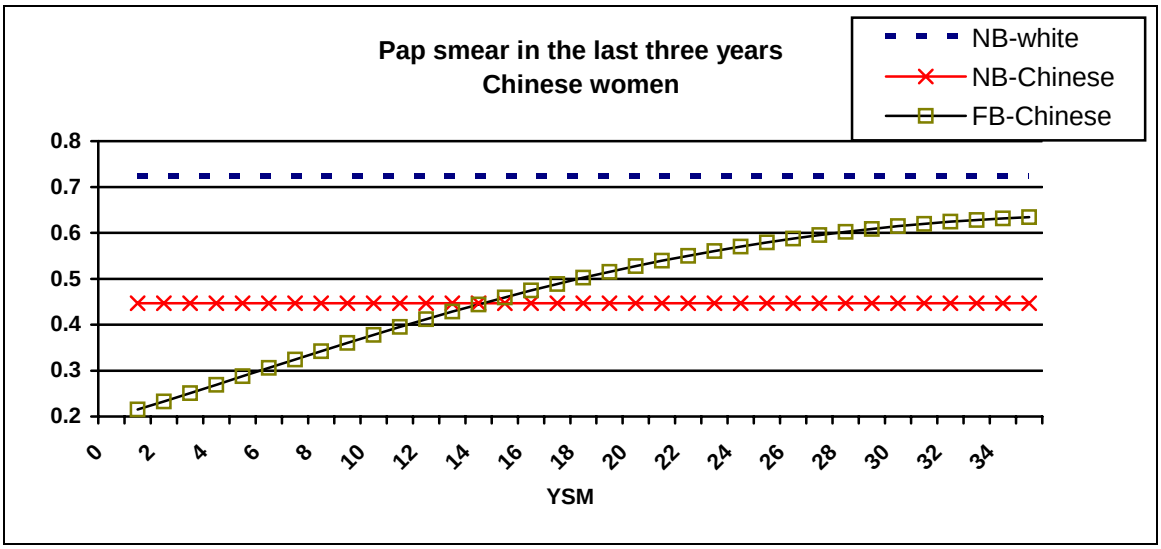


Figure 7: incidence of Pap smear testing in the last three years for native-born white women and Black women

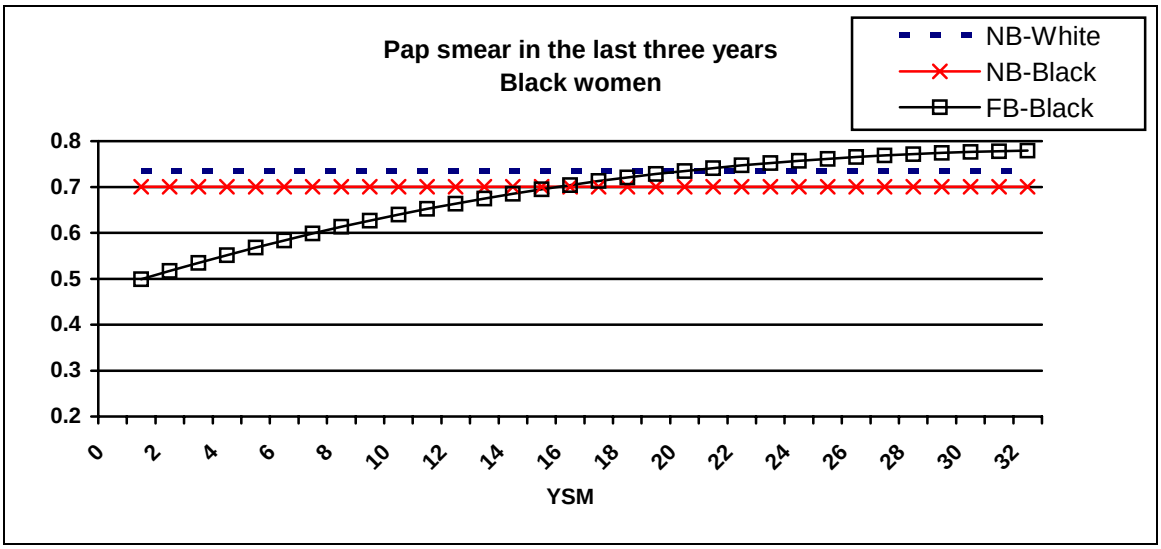


Figure 8: incidence of breast exam in the last two years for native-born white women and immigrant white women by broad region of origin (English speaking, non-English speaking)

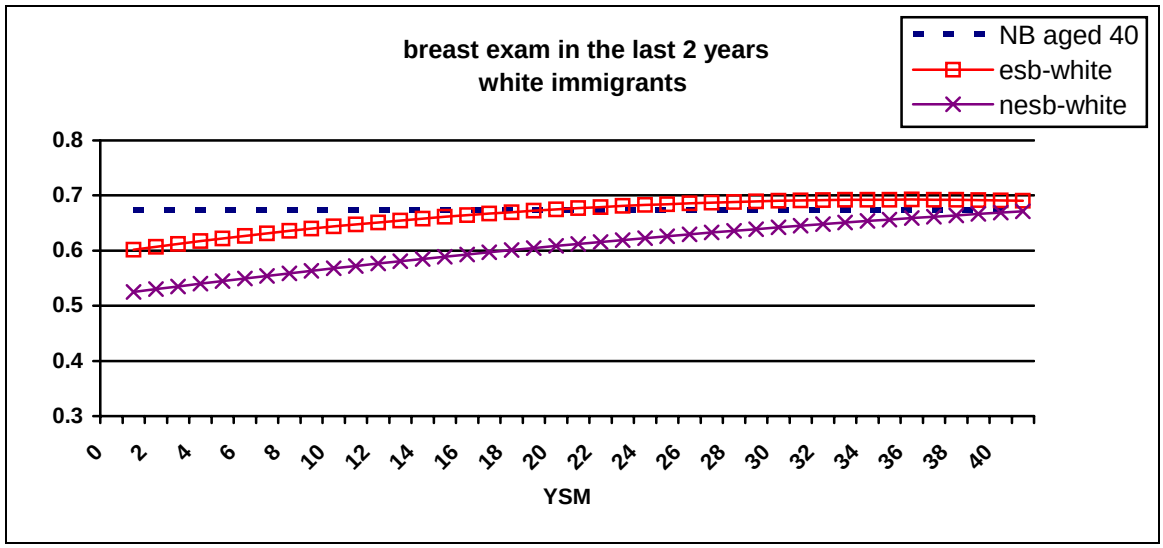


Figure 9: incidence of breast exam in the last two years for native-born white women and South Asian women

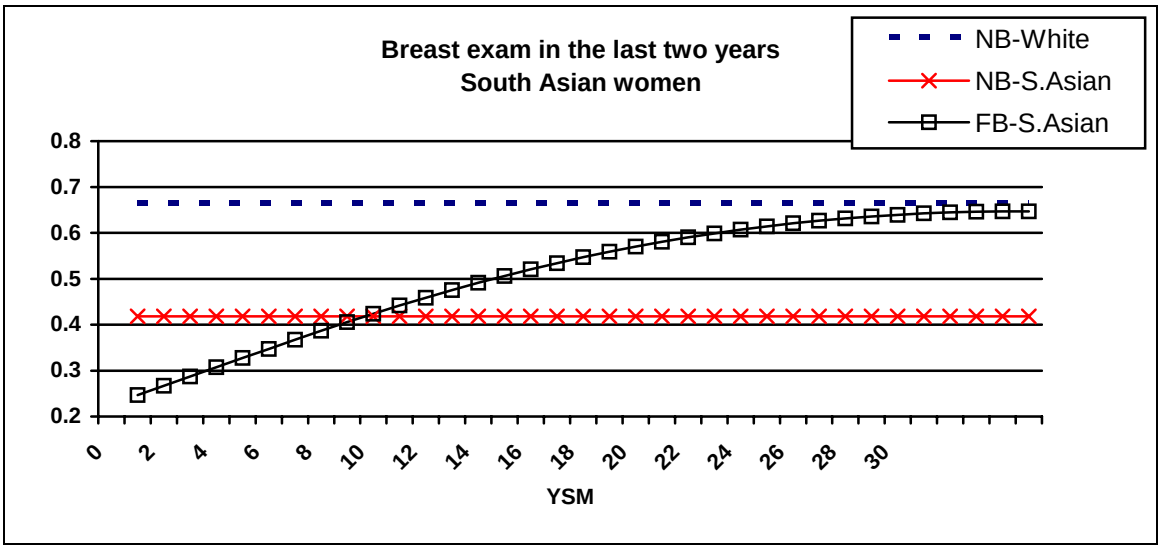
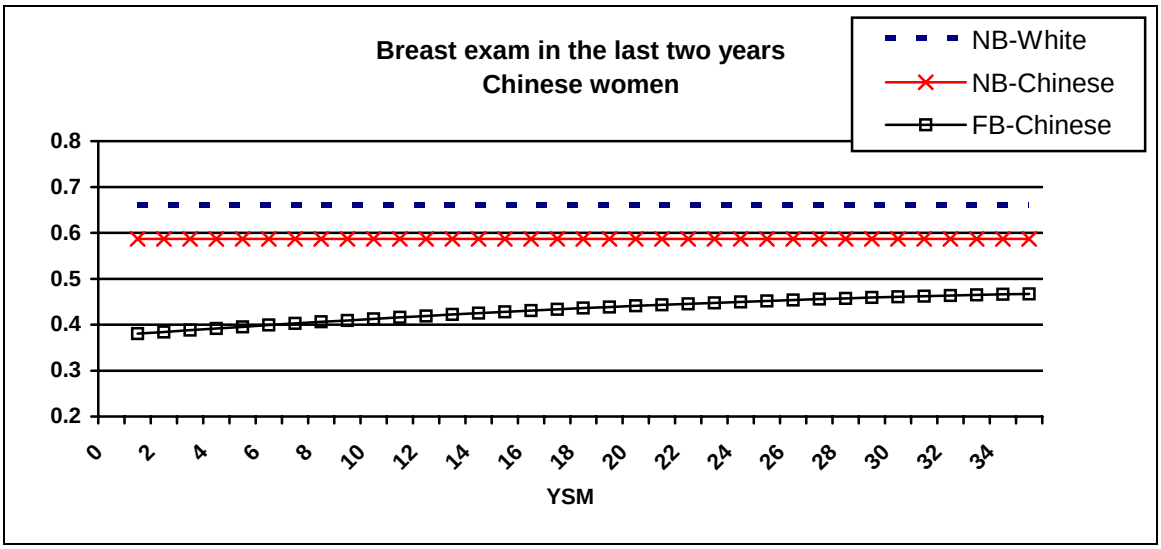


Figure 10: incidence of breast exam in the last two years for native-born white women and Chinese women



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