EXAMINING THE HEALTH STATUS OF ASIAN IMMIGRANTS IN CANADA

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Examining the Health Status of Asian Immigrants in Canada

by

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Abstract

This study examined the health status of Asian immigrants, and mammogram and Pap smear use among Asian immigrant women, using data from the 2003 Canadian Community Health Survey cycle 2.1. It shows that Asian immigrants were in better health than non-immigrants, with respect to chronic conditions, but were disadvantaged in terms of their self-perceived health. Non-Asian immigrants had patterns similar to non-immigrants in terms of chronic conditions, but were also disadvantaged with respect to self-perceived health. Socioeconomic status and lifestyle factors did not explain the differences between non-immigrants and Asian and non-Asian immigrants. Asian immigrant women had low rates of mammogram and Pap smear use compared with non-immigrant women. Non-Asian immigrant women had significantly lower rates of Pap smear use than non-immigrant women, but had patterns similar to non-immigrant women in mammography use. While language is an important barrier to mammogram use for many Asian immigrant women, a perceived lack of necessity and lack of time are major barriers to Pap smear use. The study suggests that additional research is needed to explore the health effect of factors such as culture and the immigration experience in general, which were not considered in this study. Targeted efforts should be made to promote screenings in Asian immigrant women.

Keywords: health status, immigrants, Asian immigrants, Asian immigrant women, self-perceived health, chronic conditions, breast cancer, breast cancer screening, mammogram, cervical cancer screening, and Pap smear

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Table of Contents

Abbreviations

BC	British Columbia
BMI	Body mass index
CCHS	Canadian Community Health Survey
DES	Diethylstilbestrol
HPV	Human papillomavirus
KKD	An average daily energy expenditure of per kilogram of body weight
NPHS	National Public Health Survey
OR	Odds ratio
Pap smear	Papanicolaou smear

List of Tables

CHAPTER 1: INTRODUCTION

1.1 Background of this study

Immigrants represent a sizeable proportion of the population in Canada. In 2001, about 18.4% of Canadians (5.4 million) were born outside of the country, including 2 million Asian immigrants, representing 6.6% of the total Canadian population.[1] Canada now receives more than 200,000 new immigrants every year, and they account for about 60% of Canadian population growth.[2, 3]

With respect to the growing number of immigrants in Canada, the countries of origin have changed since 1970.[4] Before 1970, 70% of Canada's immigrants came from Europe, while Asia accounted for only 10% of all immigrants.[5] Since 1970, Canada has received many Asian immigrants, and now they represent the greatest proportion of immigrants in Canada. In 2006, 48.4% of Canada's immigrants came from Asia and the Pacific, 21.8% from Africa and the Middle East, 15.8% from Europe and the United Kingdom, 9.9% from South and Central America, and 4.4% from the United States.[6]

Literature indicates that immigrants in North America, especially recent immigrants, are healthier than non-immigrants. They have lower mortality rates and are less likely to have chronic conditions or disabilities.[7-16] Based on the Canadian Immigration Act, only persons with good health are allowed entry into Canada. However, this health advantage diminishes rapidly within 10 years after arrival.[7, 8] Results from these studies suggests that length of residence in Canada is associated with health status

deterioration over time. A recent Canadian study, using longitudinal data from five cycles of the National Public Health Survey (NPHS), shows that both recent and long-term non-European immigrants were twice as likely as the Canadian-born residents to report their health status changing from good, very good or excellent health to fair or poor health.[17]

With the "population health" framework identified by Health Canada there are many broad determinants of health,[18] and both socioeconomic and lifestyle factors may explain the differences in health status between immigrants and non-immigrants. While one study indicates that socioeconomic status is the most important determinant of health among immigrants[11], another study shows that lifestyle, over time, is the most important factor contributing to health deterioration.[10] However, another study finds that either socioeconomic status or lifestyles can explain differences in health status between immigrants and non-immigrants.[13] Since Asian immigrants are the fastest growing population in Canada, there is a need to examine the health status of Asian immigrants and assess potential risk factors that affect their health.

With respect to health service utilization, research indicates that immigrants have patterns similar to Canadian-born residents in terms of visits to general practitioners, specialists, nurses, and overnight hospital stays.[7, 9, 19] However, patterns of under-utilization in preventive health care were observed among immigrants, especially for Asian immigrant women. Asian immigrant women were less likely to receive breast cancer and cervical cancer screening than Canadian-born women.[20-24] A study suggests that length of residency and language may be barriers to Asian immigrants receiving breast or cervical cancer screening due to a lack of familiarity with the Canadian health

care system.[25] However, a recent study reveals that the rates of Pap smear screening among long-term Asian immigrant women remained below that of Canadian-born women,[21] and the results suggest that length of residency may not completely explain the difference in Pap smear screening between Asian immigrant and non-immigrant women. Given the low rates of preventive health care in this specific group, more research is needed on the determinants of breast and cervical cancer screening among Asian immigrant women.

1.2 Purpose of the study

This study used the 2003 Canadian Community Health Survey (CCHS) to examine the health status of Asian immigrants, and to assess the effects of socioeconomic and lifestyle factors on their health. The more recent 2005 CCHS was not available for remote access when this study was conducted. The focus of this study was to examine breast and cervical cancer screening behaviours among Asian immigrant women, and to identify barriers to screening among this group.

In Chapter 3, the results of a study examining the health status of Asian immigrants in Canada are reported. The specific objectives were:

- to describe the health status of Asian immigrants on selected health status indicators, including self-perceived health, chronic conditions and selected specific chronic conditions,

- to compare the health status of Asian immigrants with non-immigrants; to compare the health status of recent and long-term Asian immigrants with non-immigrants,
- to examine whether socioeconomic status or lifestyle factors can explain the differences in the health status between Asian immigrants and non-immigrants, which could inform public policy about risk factors related to Asian immigrants' health status.

In Chapter 4, this study assessed breast cancer screening among Asian immigrant women in Canada. The specific objectives were:

- to measure and compare the rates of mammography screening between Asian immigrant, non-immigrant and non-Asian immigrant women in Canada,
- to assess whether the determinants of breast cancer screening use in this population were different than those of non-immigrant women and non-Asian immigrant women,
- to examine the reasons why Asian, non-immigrant and non-Asian immigrant women, who have had mammograms, have failed to have one within the recommended two-year period.

In Chapter 5, this study evaluated cervical cancer screening among Asian immigrant women in Canada. The specific objectives were:

- to examine whether Pap smear screening is being adequately utilized by Asian immigrant women,
- to assess whether the determinants of Pap smear screening use in this population are different than those of non-immigrant women and non-Asian immigrant women,
- to examine whether there are differences in the reasons for not having Pap smears within the last three years between Asian immigrant women, non-immigrant women, and non-Asian immigrant women, in order to gain better understanding of their screening behaviour.

In the present study, an Asian immigrant is defined as anyone who was born outside of Canada, was not born a Canadian citizen, and whose racial origin is Asian. Based on the 2003 Canadian Community Health Survey Questionnaire, Asians include Korean, Filipino, Japanese, Chinese, South Asian (East Indian, Pakistani or Sri Lankan), South East Asian (Cambodian or Indonesian), Laotian, Vietnamese, Arab, and West Asian (Afghani or Iranian).[26] In this study, immigrants who are not Asian are referred to as 'non-Asian immigrant'. Recent immigrants are those who have lived in a host country less than 10 years, otherwise they are called long-term immigrants.

1.3 Rationale

Asian immigrants are a rapidly growing component of Canadian society and their patterns of health, and health needs, may potentially differ from that of non-immigrants.

Their health is important to Canadian society because it can directly or indirectly affect the host country in terms of the health care and economic systems. A better understanding of the patterns in health status among Asian immigrants is crucial to assisting public policy as decision makers develop programs and policies to maintain their health and meet the health needs of this population group.

In terms of the general Asian immigrant population, the literature suggests that their health advantage may diminish over time. Their health status was examined in this study in terms of chronic conditions and self-perceived health, and factors associated with health status were assessed. Results from this study will be useful for public policy awareness of Asian immigrants' health status.

In terms of particular risks of breast[24, 27, 28] and cervical cancer,[22, 23] Asian immigrant women may have low rates of screening use. This study explored possible barriers to the screening in this specific population. Although several community-based studies have assessed the determinants of breast [20, 28-30] and cervical cancer screening among certain Asian immigrant group,[31, 32] very little is known about the determinants of screenings among Asian immigrant women on a national level. This study provides valuable information about the barriers to these two screenings among Asian immigrants women on a national level. Findings from this study may is expected to plan health promotion and to develop more effective education interventions to increase effective screening behaviour for Asian immigrant women.

1.4 Organization of the study

This study consists of six chapters. Chapter 1 is an overall introduction to this study. Chapter 2 is a literature review of prior research on immigrant health and preventive health care utilization in women. Chapter 3 examines the health status of Asian immigrants and compares it with non-immigrants. Chapter 4 examines breast cancer screening use in Asian immigrant women and compares it with non-immigrants women. Chapter 5 examines cervical cancer screening use between Asian immigrant women and non-immigrant women. Finally, chapter 6 summarizes findings and discusses their implications. There are some overlaps and redundancies across chapters because a manuscript format is used in this thesis.

CHAPTER 2: REVIEW OF LITERATURE

2.1 Health conditions

The literature suggests that North American immigrants, particularly recent immigrants, are healthier than non-immigrants. [2, 7, 8, 10, 12-14, 33-35] These studies used several health indicators to measure health, including chronic conditions, disability, life expectancy and mental health. For example, Canadian studies show that immigrants are less likely to have a chronic condition, and more likely to have a longer life expectancy with more years of life free from disability and dependency, than Canadian-born residents. [7, 8] With respect to specific chronic conditions, one study shows that South Asian immigrants had a higher rate of type-2 diabetes than Canadian-born residents.[36] Another study, using data from the 1994 NPHS, indicates that there is a lower prevalence of arthritis among Asian immigrants than among North American-born Canadians, even after adjusting for age, gender, socio-economic variables, and body mass index.[37]

Although immigrants are generally healthy at the time of arrival, immigrants' health advantage diminished with increasing length of residence in the host countries. Many studies have reported this so-called "healthy immigrant effect".[2, 7, 12, 13] For example, one study shows that both male and female immigrants had a lower prevalence of chronic conditions even after controlling for age, gender, education and income. With respect to length of residence in Canada, the prevalence of chronic conditions in the immigrants increased over time and approached that of the non-immigrants.[13] In terms of

self-perceived health studies show that immigrants were at higher risk of a deterioration in health from good, very good or excellent to fair or poor health.[2, 11]

Some literature suggests there are no differences in health status between the immigrants and non-immigrants. One study, using the 1985 and 1991 General Social Survey, examined the health status of Canadian immigrants. The results from three measures of health status (perception of health, chronic illness, and long-term activity limitation) show that the health status of immigrants did not differ significantly from that of the non-immigrants.[19]

Although research using data from national surveys have examined Canadian immigrants' health status,[2, 7-9, 11, 12, 19, 34, 38-40] this previous research aggregated Asian immigrants into a single immigrant population or a single non-European immigrant population. Several studies reveal that non-European immigrants can explain the difference in health status between immigrants and non-immigrants.[2, 7] Without considering length of residence, non-European immigrants were more likely than Canadian-born residents to report a deterioration in health.[2] As far as we know, there is no current Canadian research on the health status of Asian immigrants. Given that they are the fastest growing minority in Canada, Asian immigrants' health status is important to public policy, because Asian immigrants may present differently in their patterns of health status, health behaviours and health care needs. Therefore, this study examined the health status, and assessed the socioeconomic and lifestyle factors among Asian immigrants.

2.2 Factors associated with health status

Health Canada has adopted the "population health" framework for guiding program and policy development. The population health framework introduced many broad determinants of health, including human biology, demography, socioeconomic status, physical environment, lifestyle, healthcare services utilization, gender, culture, and social environment.[18] Thus, this thesis can only be selective on a few factors that are likely to explain the differences in health status between immigrants and non-immigrants, such as demographic, socioeconomic, and lifestyle factors.

2.2.1 Demographic and socioeconomic factors

There is evidence that age, gender and marital status are associated with chronic conditions for both immigrants and non-immigrants.[12, 41] Moreover, studies indicate that age and gender are also associated with self-perceived health.[42-45] Increasing age and female gender have been found to be related to poorer self-perceived health.[46-48] One study found that older female Indian-American immigrants from India were more likely to report poor self-perceived health than male counterparts.[49] Gender difference in chronic conditions and mortality have been observed. Another study shows that cardiovascular disease mortality rates were consistently higher for males than for females in both immigrants and Canadian-born residents.[50] Another study indicates that immigrant and non-immigrant females with low income, or with a less than secondary education, were more likely to suffer from long-term disabilities than their male counterparts.[19] In addition to age and gender factors, marital status is another factor

related to health. A study indicates that married adults were generally found to be healthier than adults in other marital status categories.[41]

Literature suggests that length of residence in a host country is also associated with the health status of immigrants,[7-15, 33, 51] and one study indicates that length of residence is a risk factor for poor physical health among the immigrants.[51] Immigrants, especially recent immigrants, are healthier than the Canadian-born residents. However, their health advantage dissipates with increasing length of residence. For example, research found that the prevalence of chronic conditions and disability for immigrants rises with longer length of residence.[7, 12, 13, 15] With respect to specific chronic conditions, the health status of long-term immigrants residing in Canada more than 20 years, was worse than that of the non-immigrants with respect to such diseases as diabetes and high blood pressure. [13]

Research consistently demonstrates a positive association between health and socioeconomic characteristics such as income and education. One Canadian study conducted by Laroche used data from two cycles (1985 and 1991) of the General Social Survey[19]. The aim of this study was to examine whether health status and rate of health services utilization of immigrants are different from non-immigrants. The research found that highly educated immigrants tend to perceive themselves as being in better health than less-educated immigrants. Moreover, higher incomes are associated with better health in immigrants. Several studies reveal that many immigrant women are either unemployment, in low-wage jobs and live in a low-income situation, even though they held professional and technical occupations in their original countries.[52, 53] For example,

8.1% of immigrant women were unemployed in 2001 and 7.0% of non-immigrant women were unemployed.[53] Moreover, recent immigrant women are the most likely to be unemployed. In 2001, 12.1% of recent immigrant women who immigrated to Canada in the past 10 years were unemployed, compared with 7.8% of those who have been in Canada for 10-20 years and 5% or less of those who have been in Canada for more than 20 years.

Interestingly, another Canadian study using data from the 1994-95 NPHS found no obvious consistent pattern of association between socioeconomic characteristics and the health status of immigrants.[27] However, results from logistic regression analyses found that socioeconomic factors are more important determinants of health status for immigrants than for non-immigrants. The study suggests that more evidence is needed to explain the complexities of immigrants' experiences.

2.2.2 Lifestyle factors

Lifestyle factors refer to a range of individuals' behaviour and risk factors. The personal lifestyle plays a key role in determining their health. An unhealthy lifestyle results in adverse consequences for health. Smoking, physical inactivity, unhealthy eating and excessive alcohol use are major risk factors for chronic disease. This study focused on three lifestyle factors including smoking, physical activity and alcohol consumption.

Smoking

Smoking is associated with many diseases, and reduced quality of life, life expectancy and mortality.[54-56] Smokers have markedly increased risk of mortality from lung cancer, and risk of heart disease, strokes, emphysema and many other fatal and non-fatal diseases. [57, 58] Smoking is estimated to cause 90% of all lung cancer, 75% of chronic bronchitis and emphysema, and 25% of cases of ischaemic heart disease.[58] One recent study shows that the prevalence of smoking in Canada slightly declined, from 23% in 2003 to 21.8% in 2005. This figure includes both daily and occasional smoking. Males were more likely to smoke than females in 2005, with 23.7% of males and 19.9% of females smoking, respectively. The lowest prevalence of smoking is in youth aged 12 to 17 (8.1%). [59]

The literature indicates that smoking is less common among the immigrants than among non-immigrants in Canada.[2, 7, 13, 60] For example, one study found that non-European immigrants are more likely to have never smoked than non-immigrants.[7] However, the prevalence of smoking among immigrants increases with length of residence in Canada. Nevertheless, another study, using five cycles of longitudinal data from Statistics Canada's National Population Health Survey, found that non-European immigrants were less likely than Canadian-born residents to become daily smokers.[2] Both these studies also found that non-European immigrant women have lower smoking rates than their male counterparts.

Physical activity

Many studies indicate that physical inactivity contributes to many chronic conditions such as type 2 diabetes, cardiovascular disease, some cancers, hypertension, osteoporosis, arthritis, back pain, obesity, as well as anxiety, depression, and stress.[61, 62] People who are physically active or moderately active in their leisure time are more likely to report their health as excellent or very good, and less likely to have had a chronic condition.[11, 12, 38] Physical inactivity is the most modifiable risk factor for chronic conditions in the Canadian population.[61]

One recent study shows that 48% of Canadians were physically inactive in 2005.[63] Males were less likely to be physically inactive than females, with 45.2% of males inactive, compared with 50.3% of females. Young people aged 12 to 17 were the most active. Regardless of the length of residence in Canada, immigrants were less likely to report being at least moderately active in their leisure time compared with Canadians.[63]

Patterns of physical activity vary among the ethnic groups and the immigrant groups. Based on pooled data from two cycles of the CCHS, one Canadian study indicates that the prevalence of being leisure-time moderate-to-high in physical activity, accumulating a daily average of at least 3.0 kcal/kg/day (KKD) of physical activity, is lower in Asian Canadian adults than in white Canadian adults. For example, the prevalence is 39% for East/Southeast Asians, 36% for West Asians/Arabs and 34% for South Asians, compared with 49% for whites[64]. Another study shows that South Asian and East or Southeast Asian immigrants are less likely to be physically active than white immigrants. [65] The study also suggests that there is little change in the patterns of

physical activity over time among the Asian immigrants. There were no large differences in physical activity between recent and long-term East or Southeast Asian immigrants, nor in South Asian immigrant women, although there was differences in South Asian immigrant men. Although an early study states that the high prevalence of leisure-time physical inactivity in non-European immigrants changed little with time,[7] a recent longitudinal study reveals that both recent and long-term non-European immigrants are more likely than Canadian-born residents to have become physically inactive in their leisure time.[2]

Alcohol consumption

Although smoking and physical inactivity increase the risk of chronic conditions, the relationship between alcohol consumption and health is U-shaped.[66] While the heavy consumption of alcohol is well known to be linked to adverse outcomes from mental disorders and road accidents to liver diseases, moderate alcohol intake has also been observed to be beneficial to health.[66-68] People with moderate alcohol intake are more likely to report good health,[66] while another study reveals that women with moderate alcohol consumption (two to nine drinks in the past week) have a low risk of heart disease.[69]

A recent study shows that only 6.0% of Canadians are high-risk drinkers.[70] A previous study indicates that immigrants are less likely to report heavy drinking than non-immigrants.[13] Gender difference in heavy drinking was also observed. Women, especially immigrant women, are less likely to report heavy drinking than their male counterparts.

With respect to immigrants, a Canadian study assessed the pattern of alcohol use among newcomers to Windsor, Ontario, and the findings revealed that alcohol use was higher in men than in women. The prevalence of alcohol use is high among newcomers with higher income and education, but both male and female newcomers consumed less alcohol than Canadian-born residents.[71]

2.3 Preventive health screening in women

2.3.1 Breast cancer screening

2.3.1.1 Breast cancer

Breast cancer is the most common cancer in Canadian women, followed by colorectal and lung cancer. It is the second leading cancer cause of death among Canadian women.[72] In 2007 in Canada, it was estimated that there would be 22,300 new cases of breast cancer diagnosed, and that 5,300 women would die from breast cancer.[73] One out of every nine women in Canada will develop breast cancer in her lifetime, and one out of every 27 of these women will die of this disease.[73]

Although research shows that the breast cancer incidence rate is higher in North America than in Asian countries,[74] Asian immigrant women are at increasing risk of breast cancer as the longer they reside in North America. For example, a study comparing the risk of breast cancer between Asian-American women and U.S. White women, found that Asian-American women who had lived in the West for 10 or more years had an 80% higher risk of breast cancer than recent Asian immigrant women.[75] Moreover, Asian-

American women's risk of breast cancer rises over generations and approaches that of U.S. white women. The study suggests that Western lifestyles and environment might impact on breast cancer risk in Asian immigrant women. The impact of exposure to new environments and lifestyles on breast cancer risk in immigrant women was also observed in Canada. The incidence rates of breast cancer among immigrant women were found to increase toward those of native-born Canadian.[76, 77] Yavari found that the incidence of breast cancer in female Iranian immigrants living in Canada increased four times as much as that of female Iranians who remained in Iran.[76] Kliewer's study shows that the incidence rates of breast cancer for 12 of 20 Canadian immigrant groups from lower risk countries, and four of five Canadian immigrant groups from higher risk countries, converged to the rate of Canadian-born residents.[77]

Known risk factors for breast cancer include reproductive/hormonal factors related to age, lifestyle behaviours (e.g. obesity, physical inactivity, and alcohol consumption) and heredity.[73] Except for lifestyle, most of these risk factors are not modifiable. However, modifiable risk factors such as lifestyle only contribute to a small fraction of breast cancer incidence. Currently, there are no effective primary prevention strategies to reduce breast cancer incidence. Secondary prevention strategies for breast cancer are available and have been proven to be an effective, such as mammograms, clinical breast examination, and breast self-examination. [78-80]

2.3.1.2 Mammography

Mammography is a low-dose X-ray examination of the breast that can detect early tumors and cysts. Literature indicates that mammography can reduce mortality from breast cancer. The Canadian Cancer Society and National Cancer Institute of Canada report that breast cancer mortality rates have been decreasing since the mid-1980s.[73] Evidence shows that the declining mortality rates of breast cancer are attributed to mammography screening and adjuvant therapies following breast cancer surgery.[78-80] Regular mammography screening and clinical breast exams with early diagnosis of breast cancer followed by early treatment have been estimated to reduce breast cancer mortality by 25%.[81]

Although mammography can detect breast cancer and reduce mortality, there is a debate on recommendations encouraging screening starting at age 40 or at age 50. Strong evidence supports the claim that mammography screening can reduce breast cancer mortality for women aged 50 to 69. Evidence for women aged 40 to 49 years is weak.[82] One study review indicates that more women aged 40 to 49 years have risks from false positive and false negative mammography such as mastectomy, death, and negative effects on psychological health. However, few women aged 50 years or older have these risks from mammography.[83] It is worth noting that half of all new cases of breast cancer are estimated to be diagnosed in Canadian women aged 50 to 69 years, only 29% in women aged 70 years or older, and 20% in women aged under 50 years.[73] Therefore,

mammography screening is recommended every two years for asymptomatic women aged 50-69 years in Canada. [18, 84]

Health Canada has set a target that 70% of women aged 50 to 69 years should receive a mammogram every two years for the purpose of early detection of breast cancer.[85] Results from the 2005 CCHS show that 50.8% of all Canadian women aged 50 to 69 years received a mammogram within the last two years for the purpose of routine screening and 19.6% of them reported having had a mammogram within the last two years for other reasons.[86] These figures of mammogram use included women who received screening at private facilities as well as public facilities. However, results of studies show that women born in Asia were at higher risk of never having had a mammogram than women born in Canada.[24, 27, 28]

2.3.1.3 Barriers to breast cancer screening

Research has identified a number of factors associated with the under-use of mammography in Canadian women age 50 to 69 years, including older age, not having a regular physician, recent immigration, being single, current smoking, and infrequent physical activity.[24, 27] However, Asian Canadian women may face other barriers to mammography utilization. A study shows that receiving a recommendation for a mammogram from medical personnel or from a family member, and believing that cancer cannot be prevented by faith, were positively associated with mammogram use among Chinese women.[28] Fluency in English and believing that mammography is the best way

to detect breast cancer were only associated with routine mammography among the Chinese women.

Facilitators and barriers to breast cancer screening among Asian American women are well documented in the United States.[87-95] For example, a study review indicates that several demographic factors, and one socio-cultural factor, are commonly associated with the use of mammography in Chinese, Korean, Filipino and Asian Indian women in the United States.[94] These factors include physician's recommendation, length of residence in the United States, and social support. Insurance status and recent physical examination factors are only associated with mammography among Chinese and Korean women. Lack of fluency in English is not associated with mammography in these women, with the exception of Chinese women. Another study reveals that low education, low level of acculturation, forgetting, lack of time, poor cancer and mammography knowledge, a perceived lower need, and cost related to screening are additional barriers to the above mentioned in Chinese American women.[96] In addition to low education, lack of insurance and low level of acculturation, older age and never having been married are also negatively associated with breast cancer screening among Vietnamese American women. The results from these two study reviews suggest that future interventions regarding these factors may increase use of mammography in Asian American women. The same may be true for Asian Canadian women.

Results from Canadian national data indicate that women with higher age, residence in a rural area, Asia born, no involvement in volunteer groups, no regular physician, a current habit of smoking, infrequent physical activity and no hormone

replacement therapy are at risk of never having had a mammogram.[24, 27] Based on these factors, simple interventions of health promotion and education are ineffective for Asian immigrant women in terms of differences between Canadian women and Asian immigrant women in language, culture, and health. As far as we know, research on breast cancer screening among Asian immigrant women in Canada is very limited, and there is no study on barriers to use of breast cancer screening among this specific group on a national level in Canada. Only a few studies examined barriers to use of breast cancer screening in certain Asian women in Canada, while barriers to breast cancer screening among Asian women have been studied and well documented in the United States.[87-94]

However, these barriers to breast cancer screening cannot automatically be generalized to Asian women in Canada. One reason is that the Canadian health care system differs from the United States health care system. The Canadian system is a universal public health insurance system, so there are fewer financial barriers to use of breast cancer preventive screening for immigrants. Moreover, preventive screening behaviour may be different between Canadian immigrants and American immigrants in terms of differences in demographic characteristics and socioeconomic status. One study shows that Chinese women in Vancouver did not have higher use rates of mammography screening than that of Chinese women in Seattle, even though Chinese women in Canada are in a universal health care coverage society, more educated and fluent in English.[20] Therefore, there is a need to identify barriers to breast cancer screening for this specific population.

2.3.2 Cervical cancer screening

2.3.2.1 Cervical cancer

Cervical cancer is the 11th most frequently diagnosed cancer among Canadian women and the 13th most common cancer-related cause of death. In 2007, it was estimated that 1,350 new cases of cervical cancer would be diagnosed, and 390 cervical cancer-related deaths would occur among Canadian women.[73] Cervical cancer is also the most common cancer in some Asian countries. Between 1988 and 1992, the age-standardized cervical cancer incidence rates were higher in the Philippines: Manila (21.6 per 100,000), India: Bombay (20.2 per 100,000), Hong Kong (15.3 per 100,000), and Japan: Osaka (9.2 per 100,000) than the rate (7.8 per 100,000) in Canada.[23, 97, 98] From 1993 to 1997, the age-standardized cervical cancer incidence rates were higher in India: Mumbai (Bombay) (17.1 per 100,000), Singapore (13.9 per 100,000), and China, Hong Kong (12.3 per 100,000) than the rate (7.3 per 100,000) in Canada. The cervical cancer incidence rate in Japan: Osaka Prefecture (7.1 per 100,000), however, was similar to Canada.[74, 99] One report suggests that the variation of cervical cancer incidence may be due to differences in receipt of Pap smear screening and sexually transmitted infection.[74]

There are some factors that appear to increase the risk of developing cervical cancer. The main risk factor for cervical cancer is infection of the cervix with human papillomavirus (HPV).[100] HPV is a group of more than 100 types of viruses that can cause genital warts or changes in the cells of the cervix, and lead to cervical cancer. Some types of HPV can be passed from person to person during sex. A Pap smear can detect

the changes to cells in the cervix. Other risk factors for cervical cancer include not having regular Pap tests, becoming sexually active at a young age, having many sexual partners or a sexual partner who has had many partners, smoking, having a weakened immune system, using birth control pills for a long time, giving birth to many children, having taken diethylstilbestrol (DES), or being the daughter of a mother who took DES.

2.3.2.2 Pap smear

The Papanicolaou (Pap) smear is a screening test. It was developed by Dr. Papanicolaou in 1886. The process includes scraping cells from the surface of the cervix with a spatula and/or brush, placing them on a slide under a microscope to detect pre-cancerous changes.[72] A Pap smear can detect cancerous or precancerous cells of the cervix for an early detection of cervical cancer and allow treatment to start early if necessary. Research shows that the Pap smear can reduce the incidence of and mortality from cervical cancer. [101] Cervical cancer is preventable because about 90% of invasive cervical cancer can be prevented if women receive regular Pap smear screening. [102] As a result of the widespread regular use of Pap smear screening to detect cervical abnormalities, cervical cancer incidence and mortality rates have fallen across Canada. [73] The Canadian Task Force on the Preventive Health Care recommends annual screening with the Pap smear after initiation of sexual activity or at age 18. For women with two previous normal smears in the presence of an organized screening program, the screening frequency may be reduced to every 3 years until the age of 69. [103]

Results from the 2005 CCHS show that 72.8% of Canadian women aged 18 to 69 years reported having had a Pap smear within the last three years, and 11.5% of them reported never having had a Pap smear.[86] Although cervical cancer can be prevented by Pap smear screening, Asian immigrant women are at risk for this disease due to not taking advantage of screening. The literature indicates that Asian immigrant women have a low rate of Pap smear use. Results from population-based studies reveal that women born in Asia were more likely to report never having had a Pap smear than women born in Canada. [22, 23] Moreover, a recent Canadian study shows that Asian immigrant women had a lower rate of Pap smear screening than Canadian-born women, whether they were recent or long-term immigrants. [21] With respect to certain Asian immigrant subgroups, a community-based study found that 76% of Chinese women in BC reported having had a Pap smear at least once, and 57% of them reported having had one within the last two years.[31] One study examined knowledge about the Pap test and use of Pap smears in South Asian women in Canada, including South Asian students and Tamil women. Results indicate that only 27% of the South Asian students, and 23% of Tamil women, reported ever having had a Pap smear.[32] Moreover, results from the BC cancer registry show that South Asian women had lower survival rates from cervical cancer than BC women overall. The study suggests that variation in screening could explain some of the difference of survival rates. [104]

2.3.2.3 Barriers to cervical cancer screening

Research has shown that several factors are determinants of screening participation. Women who are old, single, who have a low socioeconomic status, who are non-English-speaking, whose birth place is outside of Canada, and/or who are recent immigrants, are less likely to receive Pap smear screening compared with their respective counterparts.[22, 23, 25, 104-106] Evidence from national surveys shows that women with Asian ethnic backgrounds were less likely to receive Pap smear screening than Canadian-born women,[22, 23] and few studies measure screening rates and risk factors for non-participation of Pap smear screening among Asian immigrant women in Canada.[21, 32, 107]

Even though several studies examined Pap smear utilization and determinants of screening among Asian immigrant women in Canada,[21, 32, 107] all these studies have various limitations, such as a small sample in Gupta's study[32] and an early community-based study.[107] While findings from both these studies cannot represent the current status and be generalized to Asian women on a national level, McDonald's study which used combined recent national data sets to assess Pap smear screening behaviours in immigrant and minority women.[21] However, McDonald's study aggregated Asian immigrant women into a single immigrant population and it did not assess what the barriers are to Pap smear use for Asian immigrant women. Because, overall, Asian immigrant women underutilize Pap smears, more research is needed to identify barriers to screening among this population.

CHAPTER 3: HEALTH STATUS OF ASIAN IMMIGRANTS IN CANADA

3.1 Introduction

The Asian immigrant population is a rapidly growing minority population in Canada. Before 1970, European immigrants were primary sources of immigrants to Canada, accounting for 70% of immigrant flows. Only 10% of immigrants came from Asia[5]. However, the pattern of immigrant sources has changed since 1970. Asian immigrants accounted for more than half of the overall immigrants who arrived in Canada in 2005, but Europe and the United Kingdom accounted for only 16% of the immigrant flow[108]. As a result, the total number of Asian immigrants was about 2 million people representing 6.6% of the total Canada population in the 2001 Census.[109] Moreover, the Asian immigrants consist of many different ethnic groups such as Chinese, Asian Indian, Filipino, Pakistani, Korean, Sri Lankan, Southeast Asian (e.g., Vietnamese and Indonesian), West Asian (e.g., Afghani, Iranian) and Middle East Asian.[1] The changing composition of immigrant sources calls for the need for public policy that will pay more attention to Asian immigrants' health status.

Observational studies suggest that immigrants, specifically recent immigrants, enjoy many health advantages over the non-immigrant population when they arrive in Western countries. [7, 8, 10, 12-14, 16, 17, 33-35] These studies, using various measures of health

status including chronic conditions, disability, life expectancy and mental health, have observed the "healthy immigrant effect."[7, 8, 10, 12-14, 16, 17, 33-35] Generally, immigrants' health advantage is attributed to the Canadian immigration screening process under the Canadian Immigration Act. Only individuals who are healthy can be allowed entry into Canada. However, their health advantages tend to diminish over time to that of the non-immigrant population.[7, 8] Those long-term immigrants who have lived in Canada for more than 10 years have a pattern of chronic conditions and long-term disabilities similar to that of the non-immigrants. [7, 8] Canadian studies using longitudinal data from the NPHS confirm the changing pattern of immigrants' health status, specifically recent immigrants.[11, 17, 39] Immigrants were more likely to report deterioration in health status than the Canadian-born population. Moreover, the recent study using data from the eight-year longitudinal NPHS, found that only non-European immigrants were more likely to rate their health as failing over time compared with the non-immigrants.[17] The study suggests that non-European immigrants accounted for the majority of difference in self-perceived health between immigrants and non-immigrants. Not all studies agree to the findings. For example, a study suggests that the health status of immigrants did not differ significantly from those of non-immigrants.[19]

With respect to specific chronic conditions, there are disparities in the health status between Asian immigrants and non-immigrants. A study shows that South Asian immigrants had a higher prevalence of type-2 diabetes than the Canadian-born population.[36] However, Asian immigrants have a lower risk of arthritis compared with the North American-born residents in Canada.[37] Studies find that Iranian and Chinese

immigrants have a higher risk of specific cancer than those who remained in their original countries. [76, 110]

Based on the "population health" framework identified by Health Canada, there are many broad determinants of health, some of which are demographic and socioeconomic characteristics.[111, 112] Immigrants differed from non-immigrants in terms of demographic and socioeconomic characteristics associated with health status. Based on a previous report,[7] recent non-European immigrants are much younger and long-term non-European immigrants who have been in Canada more than 10 years are much older than the Canadian-born residents. Recent non-European immigrants have lower household incomes than long-term non-European immigrants and Canadian-born residents. Another study shows that while the employment rate rose from 75.7% in 1981 to 83.2% in 2001 for Canadian-born residents who lived in Canadian metropolitan areas, the employment rate dropped from 78.2% in 1981 to 68.0% in 2001 for corresponding recent immigrants. In addition to demographic and socio-economic characteristics, lifestyle factors are related to health status. While the health status of immigrants declined over time, one of the potential reasons is that immigrants may adapt their lifestyle to the one in the host country.[10] For example, although previous studies show that recent immigrants were less likely to smoke than non-immigrants, the risk of smoking in immigrants rose with increased length of residence in Canada.[7, 113] While Asian immigrants were more likely to be physically inactive than non-immigrants, the prevalence of physical inactivity in Asian immigrants changed little with length of residence in Canada.[17, 64, 65]

Given the growing number of Asian immigrants in Canada, their health is important to Canadian society because it can directly or indirectly affect the host country, including effects on the health care and economic systems. As far as we know, there is no systematic study on the health status of Asian immigrants at the national level. Previous studies aggregate Asian immigrants into a single non-European immigrant population or a single immigrant population. [7, 8, 12-14, 16, 17, 34] Whether there are differences in health status between Asian immigrants and non-immigrants is unknown. The objectives of the present study were threefold. First, it estimated the health status of Asian immigrants on selected health status indicators, including self-perceived health, chronic conditions and selected specific chronic conditions. Second, it compared the health status of Asian immigrants with non-immigrants. As previous studies found the health status of immigrants diminished to those of non-immigrants after they have lived in Canada for more than 10 years, [7, 8] the present study also compared the health status of recent and long-term Asian immigrants with non-immigrants. Finally, it examined whether socioeconomic status or lifestyle factors can explain the differences in the health status between Asian immigrants and non-immigrants, which could inform public policy about risk factors related to Asian immigrants' health status.

3.2 Methods

Data Source

The secondary data from the 2003 Canadian Community Health Survey (CCHS cycle 2.1) was used in this study. The cross-sectional CCHS cycle 2.1 conducted by

Statistics Canada collects a very broad spectrum of health information on more than 135,000 Canadians every second year. The CCHS 2.1 conducted in 2003 provides individual-level information on various health determinants, health status, health care utilization, and socioeconomic and demographic attributes for 126 health regions across Canada.[26] The target population consists of respondents aged 12 or older, living in ten provinces and the three territories, excluding populations living on Indian Reserves or Crown Lands, in institutions, on Canadian Forces bases, and in some remote areas. It is weighted to represent approximately 98% of the Canadian population aged 12 and older.

The CCHS cycle 2.1 used a multistage stratified cluster sample design. Three sampling frames were employed to select the sample of households: area frame, a list frame of telephone numbers sampling, and a Random Digit Dialing sampling frame. Interviews with selected household residents were conducted either by computer assisted person or over the telephone. A proxy interview was employed when the selected individual was unable to complete an interview due to reasons of physical or mental health. In order to remove the barrier of language, the survey was conducted by interviewers with a wide range of language competencies. In addition, the final questionnaire was translated into multiple languages by the Statistics Canada, including Chinese, Punjabi, Inuktitut and Cree. The survey response rate was 80.7%.[114] Based on the CCHS 2.1 questionnaire, an Asian immigrant is defined as anyone who was born outside of Canada, who was not born a Canadian citizen, and their racial origin are Asian. Asian immigrants included Korean, Filipino, Japanese, Chinese, South Asian (East

Indian, Pakistani or Sri Lankan), South East Asian (Cambodian or Indonesian), Laotian, Vietnamese, Arab, and West Asian (Afghani or Iranian).

Dependent Variables

This study used the objective and subjective measures to estimate the health status of Asian immigrants, based on self-reported data. The health status indicators included self-perceived health, having at least one or more chronic conditions, and four selected common chronic conditions in Canadian population. Self-perceived health is an indirect measure of health status and it is related to many health outcomes such as chronic conditions, mental health and use of health care and subsequent mortality. [46, 115-119] Self-perceived health was measured by asking respondents, "In general, would you say your health is excellent, very good, good, fair or poor?" This study divided self-perceived health variable into two categories: good health (excellent, very good, or good self-perceived health) and poor health (fair or poor self-perceived health). The selected chronic conditions included arthritis/rheumatism, high blood pressure, diabetes and heart disease. Respondents checked "yes" or "no" to answer each chronic condition question.

Having at least one or more chronic conditions was measured by asking respondents a series of questions about any of long-term conditions (chronic conditions) which are expected to last or have already lasted 6 months or more and that have been diagnosed by a health professional. The chronic conditions included the following: food allergies, allergies other than food allergies, asthma, fibromyalgia, arthritis or rheumatism, back problems excluding fibromyalgia and arthritis, high blood pressure,

migraine headaches, chronic bronchitis, emphysema or chronic obstructive pulmonary disease, diabetes, epilepsy, heart disease, cancer, stomach or intestinal ulcers, the effects of a stroke, urinary incontinence, Alzheimer's disease or other dementia, cataracts, glaucoma, thyroid condition, chronic fatigue syndrome, multiple chemical sensitivities, schizophrenia, mood disorder, anxiety disorder, autism or any other developmental disorder, learning disability, eating disorder, and other long-term physical or mental health condition. Respondents who said they had at least one or more these conditions were coded as 'yes' while those who had none of these conditions were coded as 'no'.

Independent Variables

The main independent variable was immigrant status. Immigrant status was categorized as 'non-immigrant', 'non-Asian immigrant' and 'Asian immigrant'. Immigrants were those who were born outside of Canada and were not born Canadian citizens. An Asian immigrant was identified by culture/racial question "People living in Canada come from many different cultural and racial backgrounds. Are you ...?" Furthermore, Asian immigrant status was divided into two categories: recent Asian immigrant and long-term Asian immigrant. The long-term Asian immigrants were those who have lived in Canada for more than 10 years.

Other independent variables included demographic characteristics, socioeconomic status, and lifestyle. The demographic variables included age, sex (male/female), and marital status. Age was grouped as 18-29 years, 30-39 years, 40-49 years, 50-59 years,

60-69 years, and 70 years and over. Marital status was defined as 3 categories: married/common-law, widowed/separated/divorced and single.

The socioeconomic variables included highest level of education attainment and household income. Education attainment was grouped into 4 nominal categories: less than secondary school graduation, secondary school graduation, some postsecondary, and postsecondary school graduation. Based on Statistics Canada's definition in the CCHS 2.1, household size and household income were taken into account.[114] Because within the 5 levels of household income classified by Statistics Canada, the proportion of "not stated" is high, household income must be grouped into 6-level categories: lowest, lower-middle, middle, upper-middle, highest, and not stated.

The lifestyle variables included body mass index (BMI), smoking status (current smoker/non-smoker), physical activity (active, moderate, and inactive), and alcohol consumption (heavy drinker/non-heavy drinker). In this analysis, BMI was derived from self-reported values. BMI is calculated by dividing weight in kilograms by the square of height in metres. According to World Health Organisation (WHO) Canadian and Health Canada guidelines, BMI for adults is classified into four categories: underweight (BMI<18.5), normal weight (18.5<=BMI<25.0), overweight(25.0<=BMI<30.0), and obesity(BMI>=30.0). Non-smoker was defined as former smoker or never smoked. Current smoker was defined as occasional smoker or daily smoker. According to the Statistics Canada, the level of physical activity was based on total energy expenditure during leisure time. For each leisure time physical activity engaged in by the respondent, average daily energy expenditure was calculated by multiplying the number of times the

activity was performed by the average duration of the activity by the energy cost (kilocalories per kilogram of body weight per hour) of the activity. The index is calculated as the sum of the average daily energy expenditures of all activities. Based on an index of average daily physical activity over the past 3 months, the levels of physical activity were classified into three categories: physical activity (3.0 KKD or more), moderate activity (1.5 – 2.9 KKD), and physical inactivity (less than 1.5 KKD). Heavy drinkers were those who drank in the past 12 months before the survey and reported the total of number of drinks consumed that was 14 drinks or more in the past week prior to the interview.

Statistical Analyses

Descriptive analysis was performed to compare health status between Asian immigrants and non-immigrants, as well as to compare the background characteristics related to health status. Analyses were weighted to represent the Asian immigrant population in Canada. Additionally, a series of multivariate logistic regression model analyses were performed for all six health status indicators to compare the health status of Asian immigrants as a whole group, as well as subgroups, with non-immigrants after adjusting for demographic and socioeconomic variables, and lifestyle factors. Furthermore, a sex stratified series of multivariate logistic regression was performed to examine the differences in health status between Asian immigrants and non-immigrants. In order to take into account the unequal probabilities of selection, the rescaled weights were used to produce descriptive estimates. This was achieved by dividing the original

weight by the mean original weights. The mean original weight is the average of the original weights for the sampled respondents contributing to the estimator in question. The bootstrap technique (resampling method) was used in this study to estimate the variance.

The CCHS used a complex sampling design with stratification and multiple stages of selection, and unequal probabilities of selection of respondents. In order to account for the CCHS complex sampling design, the bootstrap re-sampling method was performed to estimate the variance and coefficients of variation, p-values and significance tests for simple and complex analyses such as totals, ratios, and multiple regressions. Statistics Canada provided bootstrap weights and bootstrap macros to calculate the point estimate by generating a random sample with replacement 500 times from within the CCHS sample and estimating the variance from these 500 estimates. Based on the Statistics Canada's CCHS guidelines, when the number of a sample size was less than 30, the estimate was suppressed by Statistics Canada in order to ensure the reliability of the estimate. When a coefficient of variation (CV) was between 16.6% and 33.3%, the point estimate and confidence intervals were interpreted with caution because the estimated variance might not be reliable.[114, 120] When a coefficient of variation (CV) was greater than 33.3%, the estimated variance was suppressed due to extreme sampling variability.[114, 120] The CCHS 2.1 Master files were used in this study.

The amount of missing data for all variables included in this study was negligible (less than 5%) in this study, exception of household income. Some amount of missing value were suppressed by Statistics Canada due to small sample size (cell count <30).

Therefore, these missing data were deleted in this study while performed data analyses, and missing category for these variables were not created. Household income information was missing for about 14% of respondents. A missing category was introduced in household income variable.

Statistics Canada provided the dummy file used for developing and testing the computer programs. The computer programs relevant to examining health status were submitted to the Statistics Canada by remote access. Statistical significance was measured at the 95% confidence interval level. The statistical analyses were performed using SAS software package version 9.1 (SAS Institute Inc., Cary NC) through the Statistics Canada remote access service.

3.3 Results

In this study, the number of respondents aged 18 years and older was 101,416 non-immigrants, 12,441 non-Asian immigrants and 4,060 Asian immigrants in Canada (Table 1). Of Asian immigrants, 1,569 were recent Asian immigrants and 2,491 were long-term Asian immigrants. The demographic and socioeconomic characteristics differed substantially between immigrants and non-immigrants; whether they were recent Asian immigrants or long-term Asian immigrants. While Asian immigrants as a whole were younger than the non-immigrant, non-Asian immigrants were older than non-immigrant. Almost half of the Asian immigrants were in the 30-49 age bracket and only 5.6% of them were in the 70 and over age bracket compared with 10.2% of non-immigrants. The majority of recent Asian immigrants was more concentrated in the

younger age bracket. Sixty-four percent of recent Asian immigrants were in the 20-39 age bracket and only 2.0% of them were in 70 and over age bracket. With respect to education attainment, Asian immigrants and non-Asian immigrants had higher levels of education attainment compared with non-immigrants. An average of 56% of immigrants had post-secondary degrees compared with 51.6% of the non-immigrants. A similar pattern of household income was observed between non-Asian immigrants and non-immigrants. However, Asian immigrants had lower levels of household income compared with non-immigrants. The difference of household income was seen between recent Asian immigrants and non-immigrants. Recent Asian immigrants were overrepresented in the middle and the less than middle household income levels.

In addition to socio-economic status associated with health status, personal lifestyles were observed in this study. Asian immigrants had lower prevalence of overweight/obese (30.4%) and current smokers (13.9%) compared with non-immigrants (50.8% and 26.5%, respectively). However, 60.3% of Asian immigrants were more likely to be physically inactive compared with 49.2% of non-immigrants. Physical inactivity of Asian immigrants did not vary much with length of residence in Canada. Among Asian immigrants, 64.7% of recent Asian immigrants and 57.3% of long-term immigrants were more likely to be physically inactive. With respect to alcohol consumption, few of the respondents were heavy drinkers in immigrant and non-immigrant population, only 1.5% for the Asian immigrants and 7.4% for the non-immigrants.

Table 1 Distribution of selected demographic, socio-economic characteristics and lifestyle, by immigrant status, household population aged 18 or older, Canada

Characteristic	Non-immigrant (n=101,416) (%)	Non-Asian immigrant (n=12,441) (%)	Asian immigrant (n=4060) (%)	Recent Asian immigrant (n=1,569) (%)	Long-term Asian immigrant (n=2,491) (%)
Age					
18-29	22.8	10.8	21.7	33.4	13.7
30-39	18.6	17.6	25.8	30.5	22.6
40-49	21.6	19.8	23.7	20.7	25.7
50-59	16.5	19.9	16.0	10.7	19.6
60-69	10.2	15.3	7.3	2.7	10.5
70+	10.2	16.7	5.6	2.0	9.0
Sex					
Male	48.8	48.6	51.3	51.2	51.4
Female	51.2	51.4	48.7	48.8	48.6
Marital status					
Married/Common-law	62.8	70.8	71.1	70.5	71.5
Widowed/ Separated/ Divorced	12.7	15.9	7.9	4.7	10.0
Single	24.5	13.3	21.1	24.8	18.5
Education					
Less than secondary school graduation	19.5	19.8	16.1	14.8	17.0
Secondary school graduation	20.3	18.2	19.2	16.8	21.0
Some post-secondary education	8.7	6.4	8.0	8.9	7.4
Post-secondary degree	51.6	55.6	56.7	59.5	54.7

Table 1 (Continued)

Characteristic	Non-immigrant (n=114,613) (%)	Non-Asian immigrant (n=12,837) (%)	Asian immigrant (n=4450) (%)	Recent Asian immigrant (n=1,850) (%)	Long-term Asian immigrant (n=2,600) (%)
Household income					
Lowest	2.2	2.4	5.0	8.6	2.6
Lower-middle	5.0	5.9	8.6	11.9	6.4
Middle	16.2	19.2	23.6	25.4	22.3
Upper-middle	31.0	28.9	26.3	25.4	26.9
Highest	34.0	29.9	20.7	11.6	26.8
Not stated	11.6	13.7	15.9	17.1	15.0
BMI					
Underweight	2.4	2.2	6.7	9.0	5.1
Normal	46.8	45.3	63.0	64.1	62.3
Overweight	34.4	37.5	25.3	22.7	27.0
Obese	16.4	15.0	5.1	4.2	5.7
Smoking status					
Current smoker	26.5	18.6	13.9	14.9	14.1
Non-smoker	73.5	81.4	86.1	85.1	85.9
Physical active					
Active	25.2	22.8	18.9	16.0	21.0
Moderate	25.6	24.8	20.8	19.4	21.7
Inactive	49.2	52.4	60.3	64.7	57.3
Heavy drinker					
Yes	7.4	5.8	1.5	-	-
No	92.6	94.3	98.5	-	-

Data source: Canadian Community Health Survey 2003, cycle 2.1

- Sample size of one cell is smaller than 30

Table 2 shows health status by immigrant status and sex. Non-Asian immigrants and female Asian immigrants were more likely than non-immigrants to report being 'poor health'. A similar pattern of self-perceived health was observed between female Asian immigrants and non-immigrants. There were differences between male and female respondents for reporting being 'poor health'. Among long-term Asian immigrants, 15.1% of male and 17.0% of female respondents reported being 'poor health'. After controlling for length of residence in Canada, recent Asian immigrants enjoy their lives more and long-term Asian immigrants were more likely to report their health as either fair or poor than non-immigrants.

While the prevalence of one or more chronic conditions was similar between non-Asian immigrants and non-immigrants, Asian immigrants had a lower prevalence of one or more chronic conditions compared with non-immigrants. Even when controlling for length of residence in Canada, both recent and long-term Asian immigrants reported lower rates of one or more chronic conditions than non-immigrants. However, the variation of chronic conditions between recent and long-term Asian immigrants was seen in that 42% of recent Asian immigrants had at least one chronic condition compared with 63% of long-term Asian immigrants. Moreover, female respondents were more likely to report one or more chronic condition than corresponding male counterparts without considering immigrant status.

With respect to specific chronic conditions, high blood pressure had the highest prevalence in Asian immigrant (13.8%), followed by arthritis/rheumatism (9.5%), diabetes (5.5%) and heart disease (2.7%). There were differences between immigrants

and non-immigrants for prevalence of these specific chronic conditions. Non-Asian immigrants had a higher prevalence of these chronic conditions than non-immigrants. However, Asian immigrants were less likely to report either arthritis or rheumatism than non-immigrants (9.5% vs. 18.6%). The difference in arthritis/rheumatism between recent and long-term Asian immigrants was also observed, with 5.2% of recent Asian immigrants and 12.4% of long-term Asian immigrants reporting having arthritis/rheumatism. There were differences between male and female respondents in the prevalence of arthritis/rheumatism. The disparity was greatest in the long-term Asian immigrants. The prevalence within the long-term female Asian immigrants was almost 2 times that of the long-term male Asian immigrants. For high blood pressure, Asian immigrants as a whole had no health advantage over the non-immigrants. Moreover, long-term Asian immigrants had a significantly higher prevalence of high blood pressure than non-immigrants (18.4% vs. 15.1%, respectively). The health disadvantage of Asian immigrants was observed in diabetes. Long-term Asian immigrants had a higher prevalence of diabetes than non-immigrants (7.5% vs. 4.7%, respectively). Considering heart disease, Asian immigrants were less likely to report this problem than non-immigrants (2.7% vs. 5.5%).

Table 2 Prevalence of selected health status indicators, by sex and immigrant status, household population aged 12 and over

Health status indicator	Non-immigrant (n=114,613) (%)	Non-Asian immigrant (n=12,837) (%)	Asian immigrant (n=4450) (%)	Recent Asian immigrant (n=1,850) (%)	Long-term Asian immigrant (n=2,600) (%)
Self-perceived health (Poor health)					
All respondents	11.4	15.0*	12.5	8.3*	15.4*
Male	10.6	12.9*	10.0	5.8*E	12.9
Female	12.1	17.0*	15.1*	10.1	18.0*
One or more chronic conditions					
All respondents	71.7	71.0	55.4*	42.9*	63.8*
Male	66.5	65.7	51.5*	40.4*	59.0*
Female	77.7	76.0	59.4*	45.6*	68.8*
Arthritis/ rheumatism					
All respondents	18.6	22.7*	9.5*	5.2*	12.4*
Male	14.3	16.6*	6.3*	F	8.5*
Female	22.7	28.5*	12.8*	7.4*E	16.5*
High blood pressure					
All respondents	15.1	20.9*	13.8	6.9*	18.4*
Male	13.9	19.7*	14.6	8.8*E	17.9*
Female	16.2	22.1*	12.9*	5.0*E	18.5*
Diabetes					
All respondents	4.7	6.4*	5.5	2.4*E	7.5*
Male	5.2	6.7*	5.8	F	8.0*
Female	4.3	6.1*	5.3	F	7.0*
Heart disease					
All respondents	5.5	6.8*	2.7*	F	3.7*
Male	6.0	7.6*	2.9*	F	4.4
Female	5.0	6.0*	2.4*E	F	3.1*E

Data source: Canadian Community Health Survey 2003, cycle 2.1

† Reference group.

* Significantly different from non-immigrant ($p<0.05$).

E Coefficient of variation between 16.6% and 33.3%.

F Coefficient of variation greater than 33.3%, estimate suppressed.

Results from multivariate logistic regression analyses show that differences of health status between Asian immigrants and non-immigrants persist, after adjustment for age, sex, socioeconomic status, and lifestyle (Table 3). After controlling age, all odds ratio changed to be close to 1 or far from 1. This results in that non-Asian immigrants were older than non-immigrants and more Asian immigrants were in age categories between 20 and 59 years. Results from age-adjusted logistic regression show that Asian immigrants and non-Asian immigrants were more likely to rate their health as fair or poor than non-immigrants with the exception of recent Asian immigrants. Asian immigrants and non-Asian immigrants were less likely to report at least one or more chronic conditions, arthritis or rheumatism, or heart disease. However, long-term Asian immigrants were more likely to report high blood pressure and diabetes compared with non-immigrants. There was no significant difference in diabetes between non-Asian immigrants and non-immigrants. After adjustment for socioeconomic status and lifestyle, most of significant differences in health status remained with the exception of high blood pressure between Asian immigrants and non-immigrants.

Table 3 Odds ratios for selected health status indicators, immigrant status, household population aged 18 and over

Health status indicator	Unadjusted OR	Age-adjusted OR	Adjusted OR‡	Adjusted OR§
Self-perceived health (Poor health)				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	1.38*	1.10*	1.15*	1.17*
Asian immigrant	1.12	1.30*	1.15	1.35*
Recent Asian immigrant	0.71*	1.05	0.76*	0.83
Long-term Asian immigrant	1.42*	1.43*	1.41*	1.70*
One or more chronic conditions				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	0.97	0.76*	0.77*	0.79*
Asian immigrant	0.49*	0.51*	0.50*	0.57*
Recent Asian immigrant	0.30*	0.37*	0.35*	0.40*
Long-term Asian immigrant	0.70*	0.64*	0.65*	0.72*
Arthritis/rheumatism				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	1.29*	0.91*	0.92*	0.95
Asian immigrant	0.46*	0.53*	0.49*	0.61*
Recent Asian immigrant	0.24*	0.41*	0.35*	0.42*
Long-term Asian immigrant	0.62*	0.58*	0.56*	0.70*
High blood pressure				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	1.49*	1.07	1.09*	1.10*
Asian immigrant	0.90	1.17*	1.14	1.52*
Recent Asian immigrant	0.42*	0.80	0.75	1.04
Long-term Asian immigrant	1.27*	1.35*	1.34*	1.75*
Diabetes				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	1.37*	1.03	1.03	1.04
Asian immigrant	1.17	1.48*	1.34*	1.82*
Recent Asian immigrant	0.53*	0.95	0.82	1.15
Long-term Asian immigrant	1.63*	1.71*	1.59*	2.13*

Table 3 -- Continued

Health status indicator	Unadjusted OR	Age-adjusted OR	Adjusted OR‡	Adjusted OR§
Heart disease				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	1.26*	0.86*	0.87*	0.85*
Asian immigrant	0.48*	0.63*	0.55*	0.63*
Recent Asian immigrant	0.19*	0.41*	0.34*	0.37*
Long-term Asian immigrant	0.68*	0.71*	0.63*	0.73

Data source: Canadian Community Health Survey 2003, cycle 2.1

OR: Odds ratio.

† Reference category.

‡ Adjusted for age, sex, marital status, education, household income.

§ Adjusted for age, sex, marital status, education, household income, smoking status, physical activity, and alcohol consumption. Addition to these variables, BMI was also controlled in self-perceived health analysis.

* Significantly different from non-immigrant ($p<0.05$).

Differences of health status between Asian immigrants and non-immigrants were also observed in multivariate logistic regression analyses by sex (Table 4, 5). In a age-adjusted model, male Asian immigrants were less likely to report arthritis or rheumatism, heart disease and one or more chronic conditions but were more likely to report high blood pressure and diabetes than male non-immigrants. Female Asian immigrants were less likely to report arthritis or rheumatism, and one or more chronic conditions but were more likely to report fair or poor health and diabetes compared with female non-immigrants. The patterns of sex difference in health status between Asian immigrants and non-immigrants did not changed much, after controlling for demographic, socioeconomic and lifestyle factors.

Table 4 Odds ratios for selected health status indicators, by immigrant status, male respondents aged 18 and over

Health status indicator	Unadjusted OR	Age-adjusted OR	Adjusted OR‡	Adjusted OR§
Self-perceived health (Poor health)				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	1.25*	0.96	1.03	1.14
Asian immigrant	0.94	1.06	0.94	1.41
Recent Asian immigrant	0.52*	0.74	0.56*	0.98
Long-term Asian immigrant	1.25	1.23	1.20	1.65*
One or more chronic conditions				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	0.96	0.77*	0.78*	0.80*
Asian immigrant	0.53*	0.54*	0.53*	0.56*
Recent Asian immigrant	0.34*	0.40*	0.38*	0.41*
Long-term Asian immigrant	0.72*	0.66*	0.66*	0.70*
Arthritis/ rheumatism				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	1.19*	0.83*	0.85*	0.86*
Asian immigrant	0.40*	0.45*	0.39*	0.45*
Recent Asian immigrant	0.19*	0.29*	0.22*	0.24*
Long-term Asian immigrant	0.56*	0.51*	0.47*	0.56*
High blood pressure				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	1.53*	1.11	1.13*	1.19*
Asian immigrant	1.06	1.28*	1.23*	1.71*
Recent Asian immigrant	0.60*	1.00	0.94	1.30
Long-term Asian immigrant	1.41*	1.43*	1.39*	1.94*
Diabetes				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	1.31*	0.93	0.91	0.93
Asian immigrant	1.12	1.38*	1.26	1.72*
Recent Asian immigrant	0.46*	0.80	0.73	1.00
Long-term Asian immigrant	1.59*	1.64*	1.51*	2.07*

Table 4 -- Continued

Health status indicator	Unadjusted OR	Age-adjusted OR	Adjusted OR‡	Adjusted OR§
Heart disease				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	1.30*	0.85	0.86	0.88
Asian immigrant	0.48*	0.59*	0.49*	0.57*
Recent Asian immigrant	0.13*	0.25*	0.22*	0.25*
Long-term Asian immigrant	0.72	0.72	0.61*	0.70

Data source: Canadian Community Health Survey 2003, cycle 2.1
OR: Odds ratio.
† Reference category.
‡ Adjusted for age, marital status, education, household income.
§ Adjusted for age, marital status, education, household income, smoking status, physical activity, and alcohol consumption. Addition to these variables, BMI was also controlled in self-perceived health analysis.
* Significantly different from non-immigrant ($p<0.05$).

Table 5 Odds ratios for selected health status indicators, by immigrant status, female respondents aged 18 and over

Health status indicator	Unadjusted OR	Age-adjusted OR	Adjusted OR‡	Adjusted OR§
Self-perceived health (Poor health)				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	1.49*	1.22*	1.25*	1.37*
Asian immigrant	1.30*	1.55*	1.37*	2.43*
Recent Asian immigrant	0.89	1.38*	0.97	2.02*
Long-term Asian immigrant	1.59*	1.64*	1.63*	2.62*
One or more chronic conditions				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	0.97	0.75*	0.76*	0.78*
Asian immigrant	0.45*	0.47*	0.32*	0.57*
Recent Asian immigrant	0.26*	0.33*	0.32*	0.38*
Long-term Asian immigrant	0.67*	0.62*	0.65*	0.75*
Arthritis/rheumatism				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	1.36*	0.98	0.97	1.02
Asian immigrant	0.50*	0.60*	0.58*	0.75*
Recent Asian immigrant	0.27*	0.51*	0.46*	0.59*
Long-term Asian immigrant	0.67*	0.64*	0.63*	0.81
High blood pressure				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	1.46*	1.06	1.06	1.03
Asian immigrant	0.76*	1.06	1.04	1.31*
Recent Asian immigrant	0.27*	0.57*	0.52*	0.67
Long-term Asian immigrant	1.16	1.27*	1.28*	1.55*
Diabetes				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	1.43*	1.12	1.16	1.15
Asian immigrant	1.23	1.58*	1.45*	2.04*
Recent Asian immigrant	0.62	1.12	0.93	1.48
Long-term Asian immigrant	1.67*	1.77*	1.71*	2.27*

Table 5 -- Continued

Health status indicator	Unadjusted OR	Age-adjusted OR	Adjusted OR‡	Adjusted OR§
Heart disease				
Non-immigrant†	1.00	1.00	1.00	1.00
Non-Asian immigrant	1.21*	0.85*	0.86*	0.82*
Asian immigrant	0.47*	0.66	0.61	0.74
Recent Asian immigrant	0.26*	0.66	0.54	0.60
Long-term Asian immigrant	0.61*	0.66	0.64	0.79

Data source: Canadian Community Health Survey 2003, cycle 2.1
OR: Odds ratio.
† Reference category.
‡ Adjusted for age, marital status, education, household income.
§ Adjusted for age, marital status, education, household income, smoking status, physical activity, and alcohol consumption. Addition to these variables, BMI was also controlled in self-perceived health analysis.
* Significantly different from non-immigrant ($p<0.05$).

3.4 Discussion

This study examined the health status of Asian immigrants and compared it with that of non-immigrants. Consistent with previous research, [7, 8, 10, 12-14, 16, 17, 33, 34] this study observed "the healthy immigrant effect" in chronic conditions in Asian immigrants. Findings from this study show that Asian immigrants are healthier than non-immigrants, as measured by chronic conditions. As previous studies, [7, 34] both male and female Asian immigrant were less likely to report at least one chronic condition diagnosed by health professionals compared with their non-immigrant counterparts. Specifically, recent Asian immigrants had a low prevalence of chronic conditions (42.9%), but long-term Asian immigrants reported high prevalence of chronic conditions (63.8%) close to that of non-immigrants (71.7%). Even after controlling for age, other demographic variables, socioeconomic status and lifestyles, Asian immigrants continue to be less likely to report one or more chronic conditions than non-immigrants. In contrast to chronic conditions, Long-term and non-Asian immigrants were more likely to report being 'poor health' than non-immigrants. Female long-term Asian immigrants contributed to the majority of differences in self-perceived health. Female long-term Asian immigrants were more likely to report being 'poor health' compared with non-immigrants. However, recent Asian immigrants were as likely as non-immigrants to report being 'poor health'. Previous studies have shown similar results, that immigrants were more likely to report being 'poor health' than non-immigrants, even after controlling for the arrival cohort.[9, 11, 12] Because self-perceived health is a subjective measure of health status, it could be non-consistent with other measures of health status, such as presence of chronic conditions.

As studies point out, there might be different perceptions of health in different racial groups. [34, 121] Interestingly, studies suggest that many people with chronic condition and disability also report good health, since other factors other than disease are related to self-perceived health, such as age, education, marital status, physical activity, smoking, alcohol use, and coping efforts.[122, 123]

With respect to specific chronic conditions, Asian immigrants exhibited mixed patterns. Asian immigrants were more likely to report high blood pressure and diabetes after adjusting for age, but they were less likely to report arthritis/ rheumatism and heart disease. However, the adjusted odds of reporting these chronic conditions increase with the length of residence in Canada, even after Asian immigrants were broken down by sex. As the health status of Asian immigrants worsened with increasing length of residence in self-perceived health and chronic conditions, our results suggest that the length of residence in Canada is one of the important determinants of health status for Asian immigrants. Nevertheless, only a longitudinal study design would allow for the assessment of the direction of the association between length of residence and changes in health status. Other factors may play important roles in explaining differences in health status. For example, since the age of immigrants increases with length of residence, long-term immigrants are older than recent immigrants and would be more likely to have chronic conditions. Moreover, a previous study suggests that some of the differences in health status among immigrant subgroups may be attributed to cohort effects, in addition to length of residence effects.[13] Recent immigrant arrivals may be healthier than earlier immigrant arrivals when they enter the country. Evidence of the cohort effects on

differences in health status across the immigrant population was observed by a longitudinal study.[34]

In multivariate logistic regression analyses, lifestyles did not explain the differences in health status between Asian immigrants and non-immigrants. Our findings show that the odds ratio of reporting being 'poor health' and 'any chronic condition' did not change much after adjustment for the addition of lifestyle variables to demographic and socioeconomic status variables. A previous study, aggregating Asian immigrants into a single non-European immigrant population, suggests that the results are perhaps due to their mixed patterns of lifestyles.[13] Consistent with previous studies considering Asian immigrants as part of non-European immigrants,[7, 13, 17] Asian immigrants had lower prevalence of current smoker and heavy drinker, but higher prevalence of physical inactivity. Although lifestyles can not explain the majority of difference in health status between Asian immigrants and non-immigrants, weight gain may play an important role in explaining differences in chronic conditions. Obesity is associated with an increased risk of type 2 diabetes, heart disease, stroke, hypertension or high blood pressure, osteoarthritis, and some cancers.[124] A longitudinal study observed that recent non-European immigrants were more likely to have higher risk of weight gain on at least a 10% increase in their BMI compared with non-immigrants.[17] Other studies confirmed that long-term immigrants had a higher prevalence of overweight and obesity combined than non-immigrants in Canada.[13, 125] Our findings, in respect with specific chronic conditions, support this argument. Long-term Asian immigrants were more likely to report arthritis, high blood pressure, diabetes and heart disease compared with recent

Asian immigrants. The higher prevalence of overweight and obesity was observed in long-term immigrants.[125] With respect to ethnicity in obesity, South Asian and West Asian/Arabic immigrants were as likely as white immigrants to be overweight and were at high risk of becoming obese.

The CCHS is a population-based survey; it allows us to analyze the health status of Asian immigrants at a national level. However, the CCHS is also a cross-sectional survey and it does not allow us to assess changes in health status over time in Asian immigrants. Another limitation in the present study is that sample sizes on certain Asian subgroups in the CCHS are limited and it is not possible to analyze the health status of each Asian immigrant subgroup. Asian immigrant subgroups may have differences in health status in terms of different health-related risk factors such as demographic characteristics, socioeconomic status and lifestyles. For example, a community-based study finds that Japanese and multiple-race Asian-Americans were more likely to have smoked than other Asian-Americans. Filipino-Americans were more likely to report diabetes than other Asian-Americans.[126] Another limitation is that all data are based on self-reported information and misclassification errors may occur such as income, smoking, physical activity and heavy drinking measures. Finally, this study did not assess cohort effects on changes in health status because recent immigrant arrivals may have differences in health status from earlier immigrant arrivals.

In summary, Asian immigrants as a whole are healthier than non-immigrants in terms of chronic conditions, exclusive of self-perceived health. The findings show that the health status of Asian immigrants worsens with increasing length of residence in

Canada, including all examined health status indicators: self-perceived health, chronic conditions and specific chronic conditions. Socioeconomic status and lifestyles explained the few differences in health status between Asian immigrants and non-immigrants. Considering the diversity of Asian immigrants, additional research is needed to examine health status and determinants of health status in Asian immigrant subgroups. Further research would help develop more effective public health interventions aimed at reducing existing health disparities between specific Asian immigrant groups and non-immigrants.

CHAPTER 4: BREAST CANCER SCREENING AMONG ASIAN IMMIGRANT WOMEN IN CANADA

4.1 Introduction

The Asian immigrant population is the fastest-growing ethnic group and one of the largest visible minorities in Canada.[127] Asian immigrants, however, are a heterogeneous population, consisting of a variety of ethnicities, with origins in West-Central Asian, Middle East Asian, Eastern Asian, South-East Asian and Southern Asian.

Breast cancer is the most common cancer in Canadian women and is the second leading cause of death from cancer among Canadian women.[72] In age specific mortality, breast cancer is the first leading cause of cancer-related death in young women aged 20-49, the second leading cause in women aged 50-69 and the third leading cause in women aged over 70. In 2007, an estimated 22,300 new cases of breast cancer would be diagnosed and 5,300 women would die from breast cancer in Canada.[73] The breast cancer incidence rate is higher in North America than in Asian countries.[74] However, one study shows that the longer Asian immigrant women reside in North America, the more breast cancer risk they have.[75] The study suggests that Western lifestyles and environment may impact on breast caner risk in Asian immigrant women.[75] The increasing risk of breast cancer was also observed in Asian-Canadian women. According to a recent study, the breast cancer incidence rate in female Iranian immigrant in Canada was four times greater than the corresponding rate in Iran.[76]

Breast cancer screening with mammography and a clinical breast exam can reduce breast cancer mortality up to 25% when women receive regular mammography screening with earlier diagnosis of breast cancer followed by early treatment.[81] As a result of widespread regular use of breast cancer screening and advances in adjuvant therapy, breast cancer mortality rates have fallen across Canada. The age-standardized female breast cancer mortality rates fell from 29.5 to 22.9 deaths per 100,000 between 1978 and 2007.[73] The benefit of mammography has been well described in a review paper by Vahabi. [128] In Canada, screening mammogram was recommended every 2 years in asymptomatic women aged 50-69 years.[18, 84]

Although breast cancer screening can reduce the rate of mortality in this disease, Asian immigrant women are at risk for this disease because they do not take advantage of mammography screening. Based on data from two national surveys (1994-95 and 1996-97 NPHS), Asian immigrant women were less likely to receive mammography screening than the non-immigrant women.[24, 27] A community-based study found that the use rates of mammogram in Chinese women in British Columbia were lower.[28]

Research has shown that several factors are the determinants of screening participation. Women who are older, do not have a regular physician, are recent immigrants, are single, are current smokers, and are physical inactive, are less likely to have mammography.[24, 27, 129, 130] Women with Asian backgrounds were less likely to have mammography screening than Canadian-born women.[24, 27] However, as far as we know, few studies have measured this screening behaviour among Asian immigrant women on a national level in Canada. Many studies have examined facilitators of and barriers to

breast cancer screening among Asian-American women. [87-94] In order to decrease breast cancer risk, it is necessary to examine the patterns of mammography use between Asian immigrant and non-immigrant women, along with relevant risk factors.

The objectives of the present study were threefold. First, it measured and compared the rates of mammography screening between Asian immigrant, non-immigrant and non-Asian immigrant women in Canada. Second, it assessed whether the determinants of breast cancer screening use in this population were different than those of non-immigrant and non-Asian immigrant women. Third, it examined the reasons why Asian, non-immigrant and non-Asian immigrant women, who have had mammograms, have failed to have one within the recommended two-year period.

4.2 Methods

Data Source

The cross-sectional Canadian Community Health Survey (CCHS), conducted by Statistics Canada collected a very broad spectrum of health information on more than 135,000 Canadians every second year. The CCHS 2.1 conducted in 2003 provides individual-level information on various health determinants, health status, health care utilization, and socioeconomic and demographic attributes for 126 health regions across Canada. It is weighted to represent approximately 98% of the Canadian population aged 12 and older. In order to remove the barrier of language, the survey was conducted in a wide range of language competencies. The survey response rate was 80.7%.[127]

Dependent Variables

Self-reported mammography screening was used as an outcome variable. We explored it using two different approaches: ever having had a mammogram and having had a mammogram recently. Women aged 35 years or older were asked "Have you ever had a mammogram?" Women were considered screened if they responded "Yes". Among "ever" users, women were asked "When was the last time?" The choices included the following: a) less than 6 months ago; b) 6 months to less than 1 year ago; c) 1 year to less than 2 years ago; d) 2 years to less than 5 years ago; and e) 5 or more years ago. The ever had a mammogram variable was defined as yes vs. no. Recently having had a mammogram variable was ≤ 2 years had vs. >3 years had/never had. However, only women aged 50-69 were included this study, based on the screening guidelines.[18, 84]

Independent Variables

The main independent variable was immigrant status. Immigrant status was categorized as 'non-immigrant', 'non-Asian immigrant' and 'Asian immigrant'. Immigrant was anyone who was born outside of Canada and was not born a Canadian citizen. Asian immigrant was identified by culture/racial question "People living in Canada come from many different cultural and racial backgrounds. Are you …?"

Other independent variables included demographics, socioeconomic status, health status, health care access, and lifestyle. The demographic variables included age, marital

status (married/common-law, widowed/separated/divorced/single), and ability to converse in English or French.

The socioeconomic variables included the highest level of education attained (less than secondary school graduation, secondary school graduation, some postsecondary/postsecondary school graduation) and household income. Based on Statistics Canada's definition in CCHS 2.1 source, household size and household income were taken into account. While Statistics Canada classifies household income into 5 levels, due to sample size and the high proportion of "not stated", household income categories here were combined into 3-level categories: less than middle income/middle income, upper middle income, and not stated. The health status was identified by number of chronic diseases (0-2, 3+) which respondents had. Health care access was defined by the number of physician contacts within the last 12 months before survey (0, 1-3, 4+), The lifestyle variables included smoking status (non-smoker, current smoker), type of drinker (former drinker/never drank, occasional drinker/regular drinker), and physical activity (inactive, moderate/active). Non-smoker was defined as former smoker/never smoked. Current smoker was defined as occasional smoker/daily smoker. Occasional drinker was defined as "frequency of drinking alcohol is less than once a month". Regular drinker was defined as "frequency of drinking alcohol is more than once a month".

Statistical Analyses

Explanatory analysis was performed to compare the crude rates of screening between the Asian immigrant and the rest of the corresponding non-immigrant Canadian women. Analyses were weighted to represent the target population. Additionally, one series of multivariate logistic regression model analyses was conducted to examine whether Asian immigrant women as a whole had less odds of reporting a mammogram than non-immigrant women after adjusting for demographics, socioeconomics, health status, health care access and lifestyle. This series was run separately for the outcomes "ever having had a mammogram" and "having had a mammogram within the last 2 years" before the survey. Furthermore, stratified multivariate logistic regression was used to predict the odds of ever having had a mammogram and the odds of having had a mammogram within the last 2 years by immigrant status, and to explore whether different risk factors exist between Asian immigrant and non-immigrant women. In order to take into account the unequal probabilities of selection, the rescaled weights were used to produce descriptive estimates. This was achieved by dividing the original weight by the mean original weights.

The bootstrap re-sampling method was performed to estimate coefficients of variation, p-values and significance tests. Statistical significance was measured at the 95% confidence interval level. The statistical analyses were performed using SAS software package version 9.1 (SAS Institute Inc., Cary NC) through Statistics Canada remote access service.

4.3 Results

In this study, the number of respondents aged between 50 and 69 years was 17,397 non-immigrant women, 2,630 non-Asian immigrant women and 508 Asian immigrant women in Canada (Table 6). The social demographics differed substantially between the three groups based on immigrant status. Asian immigrant women were younger than non-immigrant women, and 28% of them were non-English/French speakers. Although Asian immigrants had a high proportion of 0-2 chronic diseases compared with non-immigrant women, they had a high proportion of 4 or more physician contacts compared with non-immigrant women. Few Asian immigrant women were smokers and more than half of them were non-drinkers. Nevertheless, the three groups had similar patterns of marital status, educational attainment and physical activities. More than 70% of respondents in the three groups were married or living common-law. More than half of respondents had post secondary/ secondary education and more than half of respondents were physically inactive in all three groups (Table 6).

Respecting the receipt of mammograms, Asian immigrant women had significantly lower rates of ever having had a mammogram than non-immigrant women (Table 7). Only 59.7% of Asian immigrant women have had a mammogram within the last 2 years before the survey. This is significantly lower than the corresponding rate in non-immigrant women (72.0%). There were no significantly different rates of mammogram use between non-Asian immigrant women and non-immigrant women.

Table 6 Characteristics of study population in using mammogram, women aged 50-69 years, by immigrant status

Characteristics	Non-immigrant (%)* (n=17,397)	Non-Asian immigrant (%)* (n=2,630)	Asian immigrant (%)* (n=508)
Age			
50-59	61.6	56.3	66.2
60-69	38.4	43.8	33.8
Marital Status			
All others	28.5	26.4	23.8
Married/Common-law	71.5	73.6	76.2
Education			
Less than secondary /secondary	46.8	45.4	49.5
Some post-secondary/ post secondary	53.2	54.6	50.5
Household income			
Less than middle income/ middle income	26.8	25.4	37.1
Upper middle income	58.5	57.2	41.0
Not stated	14.7	17.4	21.9
Ability to Speak English/French			
No	0.3	7.3	28.1
Yes	99.7	92.7	71.9
No. of chronic diseases			
0-2	54.7	54.8	65.0
3+	45.3	45.2	35.0
No. of physician contacts within last 12 months			
0	14.2	10.9	10.8
1-3	49.8	49.7	43.2
4+	36.0	39.4	46.0

Table 6 --Continued

Characteristics	Non-immigrant (%) (n=17,397)	Non-Asian immigrant (%) (n=2,630)	Asian immigrant (%) (n=508)
Smoking status			
Non smoker	78.1	86.3	97.3
Current smoker	21.9	13.7	2.7
Physical activity			
Inactive	53.6	53.3	56.7
Moderate/ Active	46.4	46.7	43.3
Type of drinker			
Non-drinker	22.2	27.8	65.6
Occasional/ Regular drinker	77.8	72.2	34.4

Data source: The Canadian Community Health Survey, cycle 2.1 (2003)
*All percentages are probability weighted.

Table 7 Rates of Self-reported Mammogram, Women Aged 50-69, by Immigrant Status

	Non-immigrant (%)† (n=17,397)	Non-Asian immigrant (%) (n=2,630)	Asian immigrant (%) (n=508)
Ever had mammogram	89.0	85.5	71.1*
Had mammogram within last 2 years	72.0	69.3	59.7*

†Reference group.
*Significantly different from non-immigrant ($p<0.05$), using Bootvar 3.0 (Statistics Canada)

Among Asian women who had had a mammogram within the last 2 years before the survey, 64.3% of them reported that the reason for having had it was routine screening (Table 8). This is significantly higher than the rate for non-immigrant women. This result suggests that those Asian immigrant women who have ever had a mammogram may have a higher lever of compliance with screening guideline. Few of the immigrant women reported the reason "family history of breast cancer". There were few differences between immigrant women and non-immigrant women in reasons for not having had a mammogram within the last two years. The most common reason for not having had a recent mammogram was that respondents did not think it was necessary (Table 9). The next common reasons were respondents had not gotten around to it and their doctor did not think it was necessary.

Table 8 Reasons for having had mammogram within the last 2 years, women Aged 50-69, by immigrant status

	Non-immigrant (%)† (n=15,329)	Non-Asian immigrant (%) (n=2,300)	Asian immigrant (%) (n=376)
-Family history of breast cancer§	10.3	5.9*	F
-Routine screening§	55.3	58.4	64.3*
-Age§	15.2	13.7	11.8[E]
-On hormone replacement therapy§	1.3	F	F
-Other‡§	14.3	15.5	11.8[E]

§Responses are not mutually exclusive.
†Reference group.
*Significantly different from non-immigrant ($p<0.05$), using Bootvar 3.0 (Statistics Canada)
‡Included previously detected lump, follow-up treatment, breast problem, and "other" (not specified)
E, Coefficient of variation between 16.6% and 33.3%. Estimates are considered marginal and are associated with high sampling variability.
F, Coefficient of variation greater than 33.3%, estimate suppressed.

Table 9 Reasons for not having had mammogram within last 2 years, women aged 50-69 years, by immigrant status

	Non-immigrant † (%) (n=17,397)	Non-Asian immigrant (%) (n=2,630)	Asian immigrant (%) (n=508)
Have not gotten around to it	29.9	25.4	26.4[E]
Respondent did not think it was necessary	44.8	45.1	50.8
Doctor did not think it was necessary	17.3	21.6	17.7[E]
Fear	8.2	6.9[E]	F
Other‡	8.2	8.2[E]	F

Data source: The Canadian Community Health Survey, cycle 2.1 (2003)
†Reference group.
‡Included personal/family responsibilities, not available when required, not available in the area, waiting time too long, transportation problems, language problem, cost, did not know where to go, unable to leave the house because of a health problem and "other" (not specified)
E, Coefficient of variation between 16.6% and 33.3%. Estimates are considered marginal and associated with high sampling variability.
F, Coefficient of variation greater than 33.3%, estimate suppressed.

Logistic regression analyses demonstrated significant differences between Asian immigrant women and non-immigrant women for ever having had mammogram, after adjustment for demographic, socioeconomic status, health status and lifestyle (Table 10). However, the significant difference in having had a mammogram within the last 2 years disappears between non-immigrant and Asian immigrant women while taking account of all other factors.

Table 10 Odds ratios for mammogram, women aged 50-69 years, by immigrant status

Immigrant status	Age-Adjusted odds ratio (95% confidence intervals)	Adjusted odds ratio‡ (95% confidence intervals)
	Ever had mammogram	
Non-immigrant †	1.00	1.00
Non-Asian immigrant	0.92(0.75-1.13)	0.88(0.70-1.10)
Asian immigrant	0.39(0.29-0.53)*	0.54(0.37-0.79)*
	Had mammogram within last 2 years	
Non-immigrant †	1.00	1.00
Non-Asian immigrant	0.97(0.84-1.13)	0.92(0.79-1.07)
Asian immigrant	0.69(0.53-0.90)*	0.86(0.62-1.19)

Data source: The Canadian Community Health Survey, cycle 2.1 (2003)
†Reference category.
‡ Adjusted for age, marital status, education, household income, ability to speak official languages, has a regular doctor, number of chronic diseases, type of smoker, physical activity, and type of drinker.
*Significantly different from reference category, $p<0.05$.

Stratified multivariate logistic regression analyses were performed separately for non-immigrant, non-Asian immigrant and Asian immigrant women to predict the odds of ever having had a mammogram and having had a recent mammogram (Table 11, 12). Non-immigrant women who were older, who were married or living common-law, who had a higher educational attainment, or who had a higher household income, were more likely to report ever having had a mammogram and recently having had a mammogram. Women who had one or more physician contacts within the 12-month period were similarly likely to report having these kinds of mammograms. Non-immigrant women who were current smokers were less likely to report ever having had a mammogram. Moreover, non-immigrant women who were more active or who were occasional/regular drinkers were more likely to have had a mammogram. None of the above factors were significantly associated with mammogram use in Asian immigrant and non-Asian immigrant women, with the exception of age and number of physician contacts for non-Asian immigrant women. Only official languages ability was an independent predictor for ever having had a mammogram and recently having had a mammogram in Asian immigrants. Immigrant women who can speak English or French were more likely to receive mammography screening than non-English or non-French speakers.

Table 11 Logistic regression for ever having had mammogram, women aged 50-69 years, by immigrant status

Characteristics	Odds Ratio (95% Confidence interval) ‡		
	Non-immigrant	Non-Asian immigrant	Asian immigrant
Age			
50-59	1.00	1.00	1.00
60-69	1.30(1.10-1.52)*	1.66(1.07-2.56)*	1.09(0.50-2.38)
Marital Status			
All others	1.00	1.00	1.00
Married/Common-law	1.20(1.02-1.42)*	0.96(0.63-1.46)	0.98(0.44-2.17)
Education			
Less than secondary /secondary	1.00	1.00	1.00
Some post-secondary/ post secondary	1.30(1.11-1.53)*	0.91(0.61-1.35)	1.04(0.49-2.19)
Household income			
Less than middle income/ middle income	1.00	1.00	1.00
Upper middle income	1.39(1.13-1.71)*	1.33(0.83-2.14)	1.50(0.63-3.55)
Not stated	1.08(0.85-1.39)	0.81(0.43-1.54)	1.69(0.62-4.66)
Ability to speak English/French			
No	-	1.00	1.00
Yes	-	3.36(1.45-7.78)*	3.54(1.72-7.31)*
No. of chronic diseases			
0-2	1.00	1.00	1.00
3+	1.58(1.34-1.86)*	1.51(0.97-2.35)	1.23(0.56-2.71)
No. of physician contacts within last 12 months			
0	0.34(0.28-0.41)*	0.18(0.11-0.30)*	0.54(0.19-1.52)
1-3	1.00	1.00	1.00
4+	1.13(0.94-1.37)	0.87(0.56-1.40)	1.57(0.73-3.37)

Table 11 -- Continued

Characteristics	Odds Ratio (95% Confidence intervals) ‡		
	Non-immigrant	Non-Asian immigrant	Asian immigrant
Smoking status			
Non smoker	1.00	1.00	-
Current smoker	0.60(0.50-0.72)*	0.73(0.47-1.15)	-
Physical activity			
Inactive	1.00	1.00	1.00
Moderate/ Active	1.15(0.99-1.34)	1.16(0.81-1.66)	1.09(0.55-2.14)
Type of drinker			
Non-drinker	1.00	1.00	1.00
Occasional/ Regular drinker	1.45(1.21-1.74)*	1.54(1.00-2.38)	1.85(0.85-4.03)

Data source: The Canadian Community Health Survey, cycle 2.1 (2003)
*Significantly different from reference category, $p<0.05$.
†Reference category.
‡Adjusted for age, marital status, education, household income, ability to speak official languages, has a regular doctor, number of chronic disease, type of smoker, physical activity, and type of drinker.

Table 12 Logistic regression for having had mammogram within the last 2 years, women aged 50-69 years, by immigrant status

Characteristics	Odds Ratio (95% Confidence interval) ‡		
	Non-immigrant	Non-Asian immigrant	Asian immigrant
Age			
50-59	1.00	1.00	1.00
60-69	1.16(1.05-1.30)*	1.54(1.15-2.06)*	0.89(0.47-1.65)
Marital Status			
All others	1.00	1.00	1.00
Married/Common-law	1.17(1.03-1.33)*	1.31(0.99-1.74)	1.12(0.60-2.1)
Education			
Less than secondary /secondary	1.00	1.00	1.00
Some post-secondary/ post secondary	1.13(1.01-1.26)*	1.08(0.80-1.45)	1.27(0.70-2.29)
Household income			
Less than middle income/ middle income	1.00	1.00	1.00
Upper middle income	1.32(1.15-1.51)*	1.45(1.03-2.04)*	1.57(0.76-3.22)
Not stated	1.23(1.02-1.47)*	1.44(0.89-2.33)	1.10(0.49-2.47)
Ability to speak English/French			
No	-	1.00	1.00
Yes	-	2.00(0.98-4.09)	2.85(1.37-5.96)*
No. of chronic diseases			
0-2	1.00	1.00	1.00
3+	1.09(0.97-1.22)	0.95(0.71-1.26)	1.64(0.84-3.18)
No. of physician contacts within last 12 months			
0	0.35(0.30-0.41)*	0.21(0.14-0.30)*	0.86(0.33-2.22)
1-3	1.00	1.00	1.00
4+	1.13(0.99-1.28)	0.99(0.72-1.26)	1.89(0.95-3.76)

Table 12 -- Continued

Characteristics	Odds Ratio (95% Confidence intervals) ‡		
	Non-immigrant	Non-Asian immigrant	Asian immigrant
Smoking status			
Non smoker	1.00	1.00	-
Current smoker	0.54(0.47-0.62)*	0.67(0.47-0.95)*	-
Physical activity			
Inactive	1.00	1.00	1.00
Moderate/ Active	1.24(1.10-1.39)*	1.11(0.84-1.47)	1.23(0.67-2.25)
Type of drinker			
Non-drinker	1.00	1.00	1.00
Occasional/ Regular drinker	1.39(1.23-1.57)*	1.61(1.17-2.23)*	1.38(0.72-2.66)

Data source: The Canadian Community Health Survey, cycle 2.1 (2003)
*Significantly different from reference category, $p<0.05$.
†Reference category.
‡Adjusted for age, marital status, education, household income, ability to speak official languages, has a regular doctor, number of chronic disease, type of smoker, physical activity, and type of drinker.

4.4 Discussion

This study found that Asian immigrant women had significantly lower rates of mammogram use than non-immigrant women. A total of 71% of Asian immigrant women reported ever having had a mammogram. Among Asian immigrant women who had a mammogram, about 60% had a recent mammogram. After taking into account for the influence of age and adjustments for other demographic, socioeconomic status, health status, health care access and lifestyle factors, the significant differences in ever having had mammogram between Asian immigrant and non-immigrant women persisted. These results are similar to previous studies that showed that women with Asian background were less likely to receive mammograms.[24, 27] However, the difference in recent mammogram use between Asian immigrant and non-immigrant women disappeared after taking account for the influence of age and adjustments for other factors. This suggests that with appropriate social interventions, Asian immigrant women may be able to use regular mammograms as frequently as non-immigrant women.

The common reasons for not having had a recent mammogram were "respondent did not think it was necessary" and "respondent has not gotten around it". These results suggest that women without a recent mammogram had low perceived needs for screening and they may not be aware of breast cancer risk and the benefits of screening. Research shows that Asian women's modesty concerning sexuality contributes to a lack of attention to breast health, thus they were reluctant to receive breast screening.[29, 131] Other studies have shown that the knowledge of , attitudes toward and beliefs about breast

cancer risk and the screening were barriers to mammogram use among Asian immigrant women.[29, 30, 95, 132-134]

Our findings have shown that older woman aged 60-69 was more likely to report ever having had and recently having had mammograms than woman aged 50-59, with the exception of Asian immigrant women. This is inconsistent with previous studies that among women aged 50-69 old age was risk factor of not having had a mammogram.[24, 27] Results from the CCHS 2.1 released by Statistics Canada have shown this change. Of women aged 60-69, 53% have had a recent routine mammogram compared to 47% of women aged 50-59.[135] This result suggests that older women may be aware of mammogram guidelines in recent years. However, age was not a risk factor to receiving a mammogram among Asian immigrant women.

Although marital status, education, and household income were not significantly related to mammogram use in Asian immigrant women, they were significantly associated with mammogram use in non-immigrants as shown in a previous report.[27] Consistent with previous studies,[92, 136, 137] a significant association was observed between ability to speak English or French and mammogram use among Asian immigrants after controlling other potential confounding factors. Asian immigrant women who can speak one of the official languages were more likely to receive mammograms. Nevertheless, only 72% of Asian immigrant women can speak one of the official languages. If people can not speak English or French fluently, the low level of language ability may be a barrier for them in obtaining important health information and effectively communicating with a physician. Therefore, intervention strategies to promote screening will be more

effective if information about breast cancer risk and screening is provided in their languages. [138]

Previous studies have shown that women without barriers to health care access were more likely than those with such barriers to have had a mammogram and had a recent mammogram.[24, 92, 136] This relationship was observed in our study among non-immigrant and non-Asian immigrant women. The physician contacts were not significantly associated with mammogram use in Asian immigrant women. However, Asian immigrant women were more likely to see a physician than non-immigrant and non-Asian immigrant women. This might relate to the fact that mammography screening is not done by the physician, but at another centre where women might experience barriers that don't exist when see their physician. One study shows that South Asian women in Canada had a language barrier to mammography screening use, communicating with their health care provider.[29]

The strength of this study is that it is a national population-based study including a variety of Asian immigrant women. However, our study has several limitations. First, this study was conducted on self-reported data. This may result in over- or under-estimation of receipt of mammograms due to inaccurate recall. Second, Asian immigrants are a heterogeneous population. This study could not conduct analyses for specific Asian immigrant woman subgroups due to sample size limitation. Third, information on level of knowledge, attitudes and health beliefs about breast cancer risk and mammography screening are not available in the CCHS 2.1. Therefore, we could not assess the effects of these factors on screening behavior. Finally, we cannot assess the effect of length of

residence in Canada on breast cancer screening behavior because of sample size limitation. In our study, 80% of Asian immigrant women aged 50-69 have stayed in Canada more than 10 years. However, research found that length of residence was positively associated with breast cancer screening.[87, 94]

In summary, our results indicate that the rates of mammogram use are persistently low in Asian immigrant women. These women's official language ability and physicians' recommendation play important roles in screening behavior among Asian immigrant women. Physician recommendation has a strong impact on encouraging Asian immigrant women to receive mammography screening. Both Asian immigrant women and their health providers need to make efforts to increase screening rates. Providing a culturally and linguistically sensitive education program about breast cancer risk and mammography screening is needed to prompt the mammogram use among Asian immigrant women. Finally, further study is necessary to focus on specific Asian immigrant woman subgroups. Moreover, it is essential to continue exploring the knowledge, attitudes and health beliefs about breast cancer risk and screening in specific groups, in order to make tailored interventions to the targeted groups.

CHAPTER 5: CERVICAL CANCER SCREENING AMONG ASIAN IMMIGRANT WOMEN IN CANADA

5.1 Introduction

The Asian immigrant population is the fastest-growing ethnic group and one of the largest visible minority in Canada.[127] Cervical cancer is the 11th most frequently diagnosed cancer among Canadian women and the 13th most common cancer-related cause of death. In 2007, an estimated 1,350 new cases of cervical cancer will be diagnosed and 390 cervical cancer-related deaths will occur in women in Canada.[73] Moreover, cervical cancer is the most common cancer in some Asian countries.[74, 99] The variation in cervical cancer incidence rates may be due to differences in receipt of Pap smear screening and other sexually transmitted infections.[74]

Cervical cancer is preventable cancer, and Pap smear screening can reduce the incidence of and mortality from cervical cancer through early detection. Guidelines of Pap smear screening have been developed for women and their physicians to follow. The Canadian Task Force on Preventive Health Care recommends annual screening with a Pap smear for woman who are sexually activity or age 18, or older, and every three years for women with two previous normal smears until age 69. [103] Although cervical cancer can be prevented by Pap smear screening,[73, 101, 102] Asian immigrant women do not take advantage of Pap smear screening, and are at risk for this disease.[21-23, 107] Variation in screening could explain part of the difference in survival rates.[104]

Research has shown that there are some barriers for women who have not been screened. Older age, low socioeconomic status, non-English-speaking, being born outside Canada, recent immigrant status, single status, are negatively associated with Pap smear use.[22, 23, 25, 104-106] Only few studies have measured screening rates and risk factors for non-participation of Pap smear screening among certain Asian immigrant groups in Canada.[21, 32, 107] However, all these studies have various limitations. Gupta's study is based on small samples of South Asian women.[32] Hislop's study was conducted eight years ago and is a community-based study in Chinese women, so findings from this study cannot be generalized to represent the current status of Asian immigrant women.[107] McDonald's study is very recent, based on national data, and is a largely descriptive study.[21] However, McDonald's study aggregated Asian immigrant women into a single immigrant population and it did not assess barriers associated with Pap smear use among Asian immigrant women. Because cervical cancer screening should be available to all women at risk, and Asian immigrant women are rare low rates of Pap smear use, more research is needed to address this preventive health screening behaviour among Asian immigrant women, and to understand why they do not have them or have them irregularly. A better understanding of barriers to screening for Asian immigrant women is crucial to assist public policy and decision makers develop appropriate strategies that encourage regular screening, thus increasing the overall level of this population coverage.

The objectives of the present study were threefold. First, it examined whether Pap smear screening is being adequately utilized by Asian immigrant women. Second, it assessed whether the determinants of Pap smear screening use in this population are

different than those of non-immigrant women and non-Asian immigrant women. Third, it examined whether there are differences in the reasons for not having Pap smears within the last three years between Asian immigrant women, non-immigrant women, and non-Asian immigrant women in order to gain better understanding of their screening behaviour.

5.2 Methods

Data Source

The cross-sectional Canadian Community Health Survey (CCHS), conducted by Statistics Canada collected a very broad spectrum of health information on more than 135,000 Canadians every second year. The CCHS 2.1 conducted in 2003 provides individual-level information on various health determinants, health status, health care utilization, and socioeconomic and demographic attributes for 126 health regions across Canada. It is weighted to represent approximately 98% of the Canadians population aged 12 and older. In order to remove the barrier of language, the survey was conducted in a wide range of language competencies.

The survey response rate was 80.7%.[114] Based on the CCHS 2.1 questionnaire,[26] an Asian immigrant is defined as anyone who was born outside of Canada and was not born a Canadian citizen, and whose racial origin is Asian. Asian immigrants included Korean, Filipino, Japanese, Chinese, South Asian (East Indian, Pakistani or Sri Lankan), South East Asian (Cambodian or Indonesian), Laotian, Vietnamese, Arab, and West Asian (Afghan or Iranian).

Dependent Variables

Self-reported screening history was used as an outcome variable. We explored it in two different approaches: ever having had a Pap smear and having had a Pap smear recently. For cervical cancer screening, women age 18 years and older were asked "Have you ever had a Pap smear test?" Women were considered screened if they responded "Yes", and then asked "When was the last time?" The choices included: a) less than 6 months ago; b) 6 months to less than 1 year ago; c) 1 year to less than 3 years ago; d) 3 years to less than 5 years ago; and e) 5 or more years ago. The 'ever having had a Pap smear' variable was coded/defined as 'ever had' vs. 'never had'. The 'having had a Pap smear within the last 3 years' variable was '≤3 years had' vs. '>3 years had/never had'. Based on guidelines of the Canadian Task Force, every three years for women aged 18 and over up to the age of 69 is a commonly accepted screening interval.[103]

Independent Variables

Immigrant status was categorized as 'non-immigrant', 'non-Asian immigrant' and 'Asian immigrant'. Immigrants were those who were born outside of Canada, and were not born Canadian citizens. Asian immigrants were identified by the culture/racial question "People living in Canada come from many different cultural and racial backgrounds. Are you …?"

Other independent variables included demographic, socioeconomic status, health status, health care source, and lifestyle. The demographic variables included age, marital

status (married/common-law, widowed/separated/ divorced/single), ability to speak English/French (yes, no), and length of residence (recent immigrant: residence in Canada less than 10 years, long term immigrant: residence in Canada equal or more than 10 years). The length of residence was obtained from the number of years since emigrating to Canada. The 10 years cut-point on length of residence was based on previous research.[139]

The socioeconomic variables included highest level of education (less than secondary school graduation, secondary school graduation, some postsecondary/postsecondary school graduation), and household income. Based on Statistics Canada's definition in CCHS 2.1, household size and household income were taken into account. While Statistics Canada classifies household income into 5 levels, due to sample size and a high proportion of 'not stated', household income categories here were also combined into 5-level categories: lowest/lower-middle income, middle income, upper middle income, highest income, and not stated. The health status was identified by the number of chronic diseases (0, 1, 2, 3+) respondents had. Health care source was defined if respondents reported having a regular doctor (yes, no). The lifestyle variables included smoking status (non-smoker (former smoker/never smoked), current smoker (occasional smoker/daily smoker), type of drinker (former drinker/never drunk, occasional drinker (frequency of drinking alcohol is less than once a month), regular drinker (frequency of drinking alcohol is more than once a month) and physical activity (inactive, moderate, active).

Statistical Analyses

Explanatory analysis was performed to compare rates of Pap smear screening use between Asian immigrant and the rest of the corresponding non-immigrant Canadian women. Two series of multivariate logistic regression model analyses were conducted to examine whether Asian immigrant women as a whole, or stratified Asian immigrant women by length of residence in Canada, had lower odds of reporting a Pap smear than non-immigrant, after adjusting for demographic, socioeconomic, health status and lifestyle. Each series was run separately for the outcomes as 'ever having had a Pap smear' and 'having had a Pap smear within the last 3 years'. Furthermore, stratified multivariate logistic regression was used to predict the odds of ever having had a Pap smear, and the odds of having had a Pap smear within the last 3 years by immigrant status; and to explore whether different risk factors exist between Asian immigrant and non-immigrant women. In order to take into account the unequal probabilities of selection, the rescaled weights were used to produce descriptive estimates. This was achieved by dividing the original weight by the mean original weights.

The bootstrap re-sampling method was performed to estimate coefficients of variation, p-values and significance tests. Statistical significance was measured at the 95% confidence interval level. The statistical analyses were performed using SAS software package version 9.1 (SAS Institute Inc., Cary NC) through the Statistics Canada remote access service.

5.3 Results

In this study, the number of respondents aged 18 years and older was 55,654 non-immigrant women, 6,830 non-Asian immigrant women and 2,120 Asian immigrant women in Canada (Table 13). The social demographics differed substantially among the three groups on the basis of immigrant status. Asian immigrant women were younger, and had a higher level of education attainment, lower household income, and lower burden of combined chronic conditions. Non-immigrant women and non-Asian immigrant women were older and had higher household income and higher burden of combined chronic conditions. Asian immigrant women had lower rates of ability to speak English or French than non-immigrant women. Fewer Asian immigrant women were current smoker, but more Asian immigrant women were physical inactive. However, non-immigrant women and non-Asian immigrant women had high proportion of being current smoker and physical activity.

Table 13 Characteristics of study population in using Pap smear, women aged 18 years and older, by immigrant status

Characteristics	Non-immigrant (%)* (n=55,654)	Non-Asian immigrant (%)* (n=6,830)	Asian immigrant (%)* (n=2,120)	Recent Asian immigrant (%)* (n=800)	Long-term Asian immigrant (%)* (n=1,320)
Age					
18-29	22.0	10.6	21.9	35.2	12.8
30-39	18.4	16.7	25.9	31.3	22.2
40-49	21.3	19.7	24.0	20.4	26.6
50-59	16.4	20.0	14.7	8.4	19.0
60+	22.0	33.0	13.5	4.8	19.4
Marital Status					
All others	38.9	33.3	31.7	28.7	33.7
Married/Common-law	61.1	66.7	68.3	71.3	66.3
Education					
Less than secondary	19.4	22.1	17.5	16.2	18.4
Secondary	20.8	19.4	21.1	17.6	23.5
Post-secondary	59.8	58.5	61.4	66.2	56.1
Household income					
Lowest income/Lower middle income	9.0	9.7	15.4	23.5	9.8
Middle income	17.5	20.8	21.6	22.6	20.9
Upper middle income	30.3	28.5	25.4	22.3	27.5
Highest income	29.9	25.3	19.1	9.4	25.7
Not stated	13.3	15.8	18.6	22.2	16.1
Ability to Speak English/French					
No	0.3	6.1	19.7	21.7	18.3
Yes	99.7	93.9	80.3	78.3	81.7

Table 13 --Continued

Characteristics	Non-immigrant (%) (n=55,654)	Non-Asian immigrant (%) (n=6,830)	Asian immigrant (%) (n=2,120)	Recent Asian immigrant (%) (n=800)	Long-term Asian immigrant (%) (n=1,320)
Has a regular doctor					
No	10.1	8.2	9.0	15.4	4.7
Yes	89.9	91.8	91.0	84.6	95.3
No. of chronic diseases					
0	23.4	24.0	40.6	54.4	31.2
1	23.8	22.7	26.2	25.9	26.5
2	18.6	17.3	13.9	10.0	16.6
3+	34.3	36.0	19.3	9.8	25.8
Smoking status					
Non smoker	75.2	85.4	92.8	93.0	92.7
Current smoker	24.8	14.6	7.2	7.0	7.3
Physical activity					
Inactive	52.3	54.8	62.5	67.0	59.4
Moderate	25.9	25.0	21.7	19.2	23.3
Active	21.8	20.3	15.9	13.8	17.3
Type of drinker					
Non-drinker	18.6	28.6	57.2	61.1	54.6
Occasional drinker	22.8	21.3	19.3	19.5	19.2
Regular drinker	58.7	50.1	23.5	19.4	26.3

Data source: The Canadian Community Health Survey, cycle 2.1 (2003)
*All percentages are probability weighted.

Asian immigrant women had significantly lower rates of ever having had a Pap smear, and of having had a Pap smear within the last 3 years, than non-immigrant women (Table 14). Eighty-eight percent of non-immigrant women, 83% of non-Asian immigrant women, and 60% of Asian immigrant women reported ever having had Pap smear screening. Seventy-two percent of non-immigrant women, 64% of non-Asian immigrant women and 52% of Asian immigrant women reported having had a Pap smear screening within the last 3 years. Furthermore, after taking into account the length of residence, both recent and long-term Asian immigrant women had significantly lower rates of ever and recent Pap smear use than non-immigrant women.

Table 14 Rates of self-reported Pap smear screening, women aged 18 years and older, by immigrant status

	Non-immigrant (n=55,654)	Non-Asian immigrant (n=6,830)	Asian immigrant (n=2,120)	Recent Asian immigrant (n=800)	Long-term Asian immigrant (n=1,320)
Ever had Pap smear	88.3	82.5*	60.2*	57.3*	78.7*
Had Pap smear within last 3 years	71.5	64.3*	52.2*	48.4*	56.7*

*Significantly different from non-immigrant ($p<0.05$), using Bootvar 3.0 (Statistics Canada)

Logistic regression analyses demonstrated significant differences between Asian immigrant women and non-immigrant women for cervical cancer screening, after adjustment for demographic, socioeconomic status, health status and lifestyle (Table 15). Furthermore, while taking account of length of residence in Canada for Asian immigrant women, the low rates of ever having had a Pap smear and having had a Pap smear within last 3 years persisted. Both recent and long-term Asian immigrant women were less likely to report cervical cancer screening than non-immigrant women. Non-Asian immigrant women also reported low rate of ever and recent Pap smear than non-immigrant women in age-adjusted models and addition of other factors models.

Table 15 Odds ratios for Pap smear screening, women aged 18 years and older, by immigrant status

Immigrant status	Ever had Pap smear		Had Pap smear within last 3 years	
	Age-Adjusted OR (95% CI)	Adjusted OR‡ (95% CI)	Age-Adjusted OR (95% CI)	Adjusted OR‡ (95% CI)
Non-immigrant †	1.00	1.00	1.00	1.00
Non-Asian immigrant	0.69(0.61-0.79)*	0.69(0.60-0.80)*	0.92(0.84-1.00)	0.90(0.82-0.99)*
Asian immigrant	0.22(0.19-0.26)*	0.28(0.24-0.33)*	0.43(0.37-0.49)*	0.50(0.43-0.57)*
Recent Asian immigrant(<10yr)	0.14(0.11-0.17)*	0.18(0.14-0.23)*	0.23(0.19-0.28)*	0.30(0.24-0.37)*
Long-term Asian immigrant (≥10yr)	0.33(0.27-0.40)*	0.38(0.31-0.47)*	0.59(0.49-0.71)*	0.69(0.56-0.83)*

Data source: The Canadian Community Health Survey, cycle 2.1 (2003)
†Reference category.
‡ Adjusted for age, marital status, education, household income, ability to speak official languages, has a regular doctor, number of chronic diseases, type of smoker, physical activity, and type of drinker.
*Significantly different from reference category, $p<0.05$.
Abbreviations: OR, odds ratio; CI, confidence interval.

Stratified multivariate logistic regression analyses were performed separately for non-immigrant, non-Asian immigrant and Asian immigrant women to examine whether Asian immigrant had difference risk factors for low rates of cervical cancer screening from non-immigrant women (Table 16, 17). In general, the factors we have examined in this study affect both immigrants and non-immigrants in similar manners for having ever been screened (Table 16). Married/common-law, high level of education attainment, having a regular doctor and health status were associated significantly and independently with high rates of cervical cancer screening use in all three groups. However, Table 17 shows that age affects immigrants and non-immigrants differently. Non-immigrant women aged 50+ were less likely to report having had a Pap smear within last 3 years than younger women aged 18-29. Asian immigrant women aged 30-59 were more likely to report having had a Pap smear within last 3 years than younger women aged 18-29. The ability to speak English or French was not independent predictors for ever and recent Pap smear screening in Asian immigrant women, although it was significantly associated with higher rates of Pap smear screening use in non-immigrant women.

Table 16 Logistic regression for ever having had Pap smear, women aged 18 years and older, by immigrant status

Characteristics	Odds Ratio (95% Confidence interval) ‡		
	Non-immigrant	Non-Asian immigrant	Asian immigrant
Age			
18-29†	1.00	1.00	1.00
30-39	3.35(2.75-4.07)*	1.85(1.17-2.92)*	2.50(1.67-3.75)*
40-49	4.13(3.43-4.97)*	2.52(1.46-4.34)*	3.47(2.22-5.44)*
50-59	3.73(3.13-4.45)*	3.82(2.41-6.05)*	3.99(2.25-7.08)*
60+	2.10(1.83-2.40)*	3.29(2.25-4.82)*	3.81(2.07-7.00)*
Marital Status			
All others †	1.00	1.00	1.00
Married/Common-law	3.04(2.73-3.39)*	1.54(1.15-2.05)*	3.22(2.33-4.45)*
Household Income			
Lowest/lower-middle income	1.00	1.00	1.00
Middle income	0.93(0.79-1.09)	1.40(0.96-2.03)	0.97(0.61-1.55)
Upper middle income	1.09(0.91-1.30)	1.85(1.19-2.87)*	1.01(0.62-1.65)
Highest income	1.07(0.87-1.31)	3.00(1.79-5.03)*	1.06(0.64-1.77)
Not Stated	0.79(0.67-0.93)	1.26(0.81-1.98)	0.76(0.47-1.22)
Education			
Less than secondary †	1.00	1.00	1.00
Secondary	1.42(1.23-1.65)*	1.69(1.13-2.54)*	1.89(1.15-3.12)*
Post-secondary	2.14(1.88-2.43)*	1.77(1.26-2.49)*	2.33(1.41-3.85)*
Ability to Speak English/French			
No †	-	1.00	1.00
Yes	-	1.30(0.73-2.31)	1.18(0.75-1.88)
Has a regular doctor			
No †	1.00	1.00	1.00
Yes	1.85(1.57-2.18)*	1.39(0.93-2.09)	2.37(1.53-3.66)*
No. of chronic diseases			
0 †	1.00	1.00	1.00
1	1.19(1.02-1.39)*	1.68(1.10-2.55)*	1.66(1.17-2.37)*
2	1.68(1.44-1.96)*	1.36(0.85-2.19)	2.63(1.55-4.47)*
3+	2.19(1.89-2.55)*	2.37(1.58-3.57)*	2.43(1.46-4.04)*

Table 16 -- Continued

Characteristics	Odds Ratio (95% Confidence intervals) ‡		
	Non-immigrant	Non-Asian immigrant	Asian immigrant
Smoking status			
Non smoker †	1.00	1.00	1.00
Current smoker	1.64(1.45-1.86)*	2.24(1.56-3.23)*	1.71(0.86-3.43)
Physical activity			
Inactive †	1.00	1.00	1.00
Moderate	1.11(0.97-1.27)	1.07(0.73-1.58)	1.00(0.69-1.45)
Active	1.08(0.94-1.24)	0.97(0.70-1.34)	0.94(0.63-1.39)
Type of drinker			
Non-drinker †	1.00	1.00	1.00
Occasional drinker	1.29(1.13-1.46)*	1.27(0.91-1.77)	1.58(1.05-2.40)*
Regular drinker	1.77(1.56-2.02)*	1.73(1.25-2.39)*	2.02(1.38-2.95)*

Data source: The Canadian Community Health Survey, cycle 2.1 (2003)
*Significantly different from reference category, $p<0.05$.
†Reference category.
‡Adjusted for age, marital status, education, household income, ability to speak official languages, has a regular doctor, number of chronic disease, type of smoker, physical activity, and type of drinker.

Table 17 Logistic regression for having had Pap smear within last 3 years, women aged 18 years and older, by immigrant status

Characteristics	Odds Ratio (95% Confidence interval) ‡		
	Non-immigrant	Non-Asian immigrant	Asian immigrant
Age			
18-29†	1.00	1.00	1.00
30-39	1.37(1.21-1.56)*	1.43(0.95-2.14)	1.88(1.28-2.78)*
40-49	0.97(0.86-1.09)	1.33(0.87-2.03)	2.58(1.68-3.95)*
50-59	0.72(0.64-0.81)*	0.97(0.67-1.39)	2.39(1.42-4.03)*
60+	0.30(0.27-0.33)*	0.44(0.32-0.62)*	1.50(0.88-2.54)
Marital Status			
All others †	1.00	1.00	1.00
Married/Common-law	1.85(1.72-1.98)*	1.45(1.20-1.74)*	3.09(2.27-4.20)*
Household Income			
Lowest/lower-middle income	1.00	1.00	1.00
Middle income	0.92(0.82-1.03)	1.37(0.99-1.89)	1.24(0.79-1.98)
Upper middle income	1.07(0.95-1.20)	1.57(1.14-2.17)*	1.34(0.85-2.11)
Highest income	1.14(1.00-1.31)	1.93(1.34-2.77)*	1.18(0.71-1.98)
Not Stated	0.85(0.75-0.96)*	1.41(1.00-1.98)	1.03(0.65-1.63)
Education			
Less than secondary †	1.00	1.00	1.00
Secondary	1.31(1.19-1.45)*	1.09(0.84-1.42)	1.58(0.99-2.51)
Post-secondary	1.72(1.58-1.87)*	1.54(1.23-1.94)*	2.05(1.30-3.25)*
Ability to Speak English/French			
No †	-	1.00	1.00
Yes	-	1.25(0.77-2.01)	1.08(0.71-1.63)
Has a regular doctor			
No †	1.00	1.00	1.00
Yes	2.49(2.21-2.81)*	1.75(1.27-2.42)*	3.01(1.94-4.66)*
No. of chronic diseases			
0 †	1.00	1.00	1.00
1	1.17(1.06-1.31)*	1.54(1.12-2.11)*	1.47(1.04-2.08)*
2	1.36(1.22-1.52)*	1.26(0.92-1.73)	1.81(1.15-2.85)*
3+	1.29(1.16-1.42)*	1.38(1.03-1.85)*	2.09(1.29-3.39)*

Table 17 -- Continued

Characteristics	Odds Ratio (95% Confidence intervals) ‡		
	Non-immigrant	Non-Asian immigrant	Asian immigrant
Smoking status			
Non smoker †	1.00	1.00	1.00
Current smoker	1.00(0.92-1.08)	1.11(0.87-1.42)	1.50(0.83-2.71)
Physical activity			
Inactive †	1.00	1.00	1.00
Moderate	1.19(1.10-1.30)*	1.25(1.00-1.56)*	0.86(0.61-1.21)
Active	1.19(1.09-1.30)*	1.26(1.01-1.57)*	0.82(0.56-1.21)
Type of drinker			
Non-drinker †	1.00	1.00	1.00
Occasional drinker	1.12(1.02-1.23)*	1.22(0.95-1.58)	1.44(0.99-2.11)
Regular drinker	1.46(1.35-1.59)*	1.49(1.20-1.85)*	1.80(1.25-2.61)*

Data source: The Canadian Community Health Survey, cycle 2.1 (2003)
*Significantly different from reference category, $p<0.05$.
†Reference category.
‡Adjusted for age, marital status, education, household income, ability to speak official languages, has a regular doctor, number of chronic disease, type of smoker, physical activity, and type of drinker.

Table 18 shows the reasons for not having Pap smear within last 3 years across the three groups. Among women not having Pap smear within last 3 years, Asian immigrant women were more likely than non-immigrant women to report that they did not get around to Pap smear. Non-immigrant women were less likely than non-Asian immigrant and Asian immigrant women to report that the reason for not having Pap smear within last 3 years was "respondent did not think it was necessary". There were not significant differences among three groups reporting the reason of "doctor did not think it was necessary". Few Asian immigrant women reported "Have had a hysterectomy" as a reason for not having recent Pap smear and the proportion was significantly lower than in non-immigrant women.

Table 18 Top reasons for not having Pap smear within last 3 years, women aged 18 years and older, by immigrant status

	Non-immigrant †	Non-Asian immigrant	Asian immigrant
-Have not gotten around to it	19.5	19.3	28.5*
- Respondent did not think it was necessary	38.4	42.1*	45.4*
- Doctor did not think it was necessary	17.5	18.7	18.7
- Did not know where to go / uninformed	2.4	2.0E	5.3E
- Fear	2.3	F	F
- Have had a hysterectomy	19.3	15.3*	3.3*E
- Hate / dislike having one done	3.8	F	F
- Other	1.4	F	F

Data source: The Canadian Community Health Survey, cycle 2.1 (2003)
†Reference group.
*Significantly different from non-immigrant ($p<0.05$), using Bootvar 3.0 (Statistics Canada)
E, Coefficient of variation between 16.6% and 33.3%. Estimates are considered marginal and are associated with high sampling variability.
F, Coefficient of variation greater than 33.3%, estimate suppressed.

5.4 Discussion

In this study, Asian immigrant women have lower rates of cervical cancer screening use than non-immigrant women. These findings are similar to previous studies.[21, 25, 32, 105] Even after many years in Canada, long-term Asian immigrant women still had lower rates of Pap smear use than non-immigrant women.[21] For recent Asian immigrant women, these findings may reflect that they were unfamiliar with the Canadian health care system. This study also found that lack of necessity and lack of time for Pap smear are more common reasons for not having had a recent Pap smear in Asian immigrants than in non-immigrants.

The significant differences in ever and recent Pap smear use between Asian immigrant and non-immigrant women persisted, even after taking into account the influence of age and adjustments for other demographic factors, socioeconomic status, health status and lifestyle factors. These results are similar to previous studies that women with Asian backgrounds were less likely to have a Pap smear than non-immigrants.[22, 23, 31, 107, 130] Our findings suggest that demographic and socioeconomic factors may not contribute to the major differences in the use of Pap smear between non-immigrant and Asian immigrant women, and other unexamined factors may explain the differences, such as knowledge about cervical cancer and screening.

This study found Asian immigrant women aged 18-29 and 60+ are more likely to be at risk for not having cervical cancer screening than other age groups. For younger women, several studies suggest that cultural barriers to screening may play an important role, such as openness around sexuality and prevention orientation.[32, 140] Younger women

from Eastern cultures may have a lack of sexual knowledge. However, we did not have sexual activities information for these young women. A study conducted among female university students found that Asian Canadian women had a significantly low level of sexual knowledge compared with European-Canadian women.[141] For older women, this study suggests that the lack of need to have a Pap smear may be a major barrier to screening, so that they are not aware of any risk of the disease. These findings reflect a need for education about sexual health, cervical cancer risk and knowledge of cervical cancer screening for younger and older Asian immigrant women.

Although household income was not independently associated with Pap smear use in all three groups, education was related to Pap smear use as previous report.[22, 32] In addition, type of smoker and physical activity were not significantly associated with Pap smear use in Asian immigrant women after adjustment for other factors. In this study, few of Asian immigrant women were current smoker (7%). Our findings suggest that lifestyle characteristics maybe not important barriers to Pap smear use in Asian immigrant women.

Consistent with previous studies,[31, 107] we found that ability to speak English or French was not significantly associated with Pap smear use for Asian immigrant and non-Asian immigrant women, after adjustment for other potential confounding factors. Moreover, a recent study has shown that Asian-American women who were fluent in English had low rates of Pap smear screening.[142] Therefore, language ability may not be a main barrier to Pap smear use for Asian immigrant women.

We found similar factors influencing immigrant and non-immigrant women to have a Pap smear. However, lack of necessity and lack of time are particularly important barriers for Asian immigrant women. This result suggests that many Asian immigrant women are not aware of this preventive health service, and they may have a low level of knowledge about cervical cancer and the benefits of screening. While it is well known that the level of knowledge about cervical cancer and screening, and availability of time, are associated with Pap smear use,[31, 32, 143-145] Gupta found that the length of residence in Canada is not strongly associated with level of knowledge relevant to screening.[32] This argument is supported by our findings that long-term Asian immigrant women were less likely to have a Pap smear than non-immigrant women. Therefore, improving the knowledge of cervical cancer and the necessity of screening among Asian immigrant women, may increase the rate of Pap smear use in this population.[146, 147]

In addition, several studies suggest that patient-provider interaction regarding cervical cancer screening and prevention may be a barrier to Pap smear screening use for Asian immigrant women.[44, 132, 148-150] We found that 18.7% of Asian immigrant women who did not have a Pap smear reported that their doctors did not think a Pap smear was necessary for them, and this finding is consistent with previous research.[143] However, other studies indicate that physicians' recommendations regarding screening play an important role in Pap smear screening in immigrant women.[31, 151] Furthermore, several studies have shown that the gender of the physician was a barrier to Pap smear use. Asian women prefer a female physician when having a Pap smear.[44, 143, 152] Asian women with female physicians are more likely to report having a Pap smear screening.[20, 31, 87, 153, 154]

These findings indicate the need for culturally sensitive Pap smear services and tailored intervention to improve Pap smear use for Asian immigrant women.

The strength of this study is that it is a national population-based study including a variety of Asian immigrant women. Results from this study can be generalized to Asian immigrant women across Canada. This study also examined the reasons for not having had a recent Pap smear on a national level. The present study has several limitations. First, the study relied on the use of self-reported data, which may result in over- or under-estimation of receipt of Pap smear due to inaccurate recall. Second, Asian immigrants are a heterogeneous population, and analyses for specific Asian immigrant subgroups could not be conducted due to sample size limitation. Finally, the information on level of knowledge about risk factor of cervical cancer and the value of screening are not available in the CCHS 2.1. Therefore, we could not assess the effects of these factors on screening behavior. For example, a Canadian study has shown that Chinese immigrant women with a high knowledge of cervical cancer and screening were more likely to receive Pap smear.[144]

In summary, our results indicate that Pap smear screening use is less common in Asian immigrant women than in non-Asian immigrant and non-immigrant women, without considering their length of residence in Canada. Lack of necessity and lack of time are major barriers to screening for many Asian immigrant women. Tailored education programs on the risk factors of cervical cancer, and the value of screening, is necessary for Asian immigrant women, especially for recent, younger and older women. Moreover, it is essential to continue exploring knowledge of cervical cancer and

screening, and health beliefs in specific groups, in order to make tailored interventions to increase screening rates in Asian immigrant women.

CHAPTER 6: CONCLUSION

6.1 General health status and preventive health services

This study compared the health status of Asian immigrants, and their use of selected preventive health services for women, with that of non-Asian immigrants and non-immigrants. The selected indicators of health status used in the study were self-perceived health and chronic conditions. The results were not consistent for the two types of health indicators. While Asian immigrants reported fewer chronic health conditions than non-immigrants, they tended to rate their health as worse than non-immigrants. Non-Asian immigrants had patterns similar to non-immigrants in terms of the chronic conditions, but, just like the Asian immigrants, they had lower self-perceived health than non-immigrants.

Despite the presumed equal accessibility, results from this study suggest that Asian immigrant women had significantly lower utilization rates of mammography and Pap smear screening services than non-immigrant women. In terms of immigrant and non-immigrant women, the discrepancies between the two services tended to be smaller, particularly in terms of mammography testing.

Both the health status and health utilization for Asian immigrants seems to be influenced by the length of residence in Canada. Long-term Asian immigrants lost their initial health advantage and had poorer health status relative to recent Asian immigrants. The change in health status, over time, in Asian immigrants, cannot be fully accounted for by age and other confounding factors. Despite the increasing rates of usage of

mammography and Pap smear testing, with the length of residence in Canada for Asian immigrant women, the usage rates were still lower than that of non-immigrant women. Given the currently noticeable lower utilization rates, Asian immigrant women had unnecessarily higher preventable risks of breast and cervical cancer than non-immigrant women.

Also explored in this study were potential factors that may explain differences in health status, mammography and Pap smear use among the non-immigrants and Asian immigrants as well as non-Asian immigrants. As expected, many of the differences in health status among the three groups could be explained by age, because, in general, Asian immigrants were younger than, and non-Asian immigrants were older than non-immigrant Canadians. However, differences for most health conditions among the three groups still persist after controlling for age.

The impact of age on health utilization seemed to be different between Asian immigrants and the other two groups. For example, although increasing age was significantly associated with a higher utilization rate of mammograms for both non-immigrant and non-Asian immigrant women, there were no statistical differences across age groups in Asian immigrant women. The patterns of recent Pap smear use vary by age among Asian immigrant and non-immigrant women. There were no differences in recent Pap smear use between age groups in non-Asian immigrant women. Younger and older Asian immigrant women aged 18-29 and 60+, respectively, were less likely to report having had a recent Pap smear than other corresponding age groups. Non-immigrant

women aged 30-39 were more likely to report having had a recent Pap smear than the corresponding younger women aged 18-29.

In addition to age, the current study also attempted to assess the roles of demographics and socioeconomic status or lifestyle factors in explaining the observed differences in health status among the three groups and concluded, at the most, these factors were only partially responsible for the observed differences. Thus, findings from this study warrants that further research incorporates the factors that have not been included in the current study, such as cultural factors, immigration experience and even genetic factors. Consistent with the existing literature, this study suggests that marital status, level of education, and household income were statistically associated with both mammography and Pap smear screening behaviours, and the directions of these associations were consistent in all three groups of women. Specifically, women who are married, or common-law, were more likely to receive mammography and Pap smear testing than women who are single, widowed, separated, or divorced. Similarly, women with higher education or income were more likely to be screened for breast and cervical cancers regardless of immigration status.

Language barriers to mammography and Pap smear use are unique for immigrants, particularly for Asian immigrants. The results suggest that some 28% reported that language was a barrier for them receiving mammography or Pap smear screening services, while the corresponding number was only 10% for non-Asian immigrant women.

With respect to health conditions and accessing health care, Asian immigrant women had fewer chronic conditions and were more likely to visit a physician than non-immigrant women. Non-Asian immigrant and non-immigrant women were similar in terms of reporting chronic conditions and accessing health care (i.e. physician contacts and having a regular doctor). Both immigrant and non-immigrant women who had more chronic conditions and visited a physician more often were more likely to receive screening than corresponding women.

The overall contribution of lifestyle factors is small in explaining the differences in health status between immigrants and non-immigrants. This is attributable to the fact that there are mixed patterns in health behaviours in Asian immigrants compared to non-immigrants. However, physical activity and alcohol consumption are associated with high rates of mammography and Pap smear use in both immigrant and non-immigrant women. Smoking status is only associated with mammography use. This points to the potential role of enhancing health behaviours in both immigrant and non-immigrant populations, particularly increased physical activity and smoking cessation, in improving the health status and promoting preventive health care utilization.

This study further suggests that cultural factors may also impact mammogram and Pap smear use. Despite similar determinants of mammogram and Pap smear use observed in the study for immigrant and non-immigrant women, perceived lack of necessity and lack of time are more important barriers to the screening for Asian immigrant women than for non-immigrant women. These results suggest that knowledge of, attitudes

towards and health beliefs concerning preventive health screening may influence the screening behaviours in Asian immigrant women.

6.2 Implications of the study

This study has a number of strengths and makes several scientific contributions to the immigrants' health literature. First, built on existing literature, this study provides the most recent and comprehensive health profiles of Asian immigrants in Canada. As a national representative sample was used in the CCHS 2.1, the results are expected to be reasonably reliable and have be broadly applicable. Thus, findings of this study can be an important source of information in Asian immigrants' health for health researchers and health policy makers. Second, to my knowledge this is the first study that assessed Asian immigrants' health in relation to other Canadians from two perspectives: self-perceived health and physically experienced health (chronic health conditions). This work is the first demonstration of a possible three-way interaction among ethnic groups, self-perceived health and physically experienced health. Consequently, it can be postulated that "cultural differences" may play an important role for this study. With respect to what is meant by culture and how culture influences people's health perception, future studies are warranted in delineating those complex concepts and relationships. Third, this thesis has proven a previously anecdotal observation that language is an important barrier preventing immigrants receiving breast cancer and cervical cancer screening services. This barrier was more pronounced in Asian immigrants and is mitigated with time. It is clear that identifying effective interventions enhancing breast and cervical cancer

screening rates in Asian women is an important public health research question in future studies.

In addition to scientific contributions, the results of this thesis also have implications for health practice and policy. The unique cultural, language and health needs of Asian immigrants must be addressed in both health promotion and provision. Given the current low rates of mammography and Pap smear use in Asian immigrant women, targeted efforts are required to increase use rates of preventive health screening for this specific population. This is particularly important for cervical cancer screening as Asian immigrant women are at higher risk of this cancer. There is a great need to develop culturally and linguistically sensitive education programs about the risk factors related to breast and cervical cancer, and about the importance of preventive health screening for Asian immigrant women, especially for recent Asian immigrant women.

6.3 Limitations of the study

This study has several limitations. First, as this study was based on secondary data analyses, inevitably it was limited to analyzing data that were available in the CCHS. For example, data on family history for breast cancer were not collected and thus we could not assess the impact of family history on breast cancer screening behaviors. Presumably, women whose first degree relatives were diagnosed with breast cancer were more likely to be screened. However, it is believed that possible confounding effects resulted from cancer family history are likely to be non-differential between immigrants and non-immigrants, which may slightly attenuate the observed association. Second, because a

multi-level stratified clustered sampling scheme was used in the CCHS and Asian immigrants tend to reside in large urban cities, consequently the sample size for this population was disproportionably small. Thus, this study was not powered to capture the underlying differences in health among different groups of Asian immigrants, which is potentially important because culture and socio-demographic characteristics may differ among these subgroups. Third, a cross-sectional study can only be used to assess the health status of a population at a particular point in time. In order to gain better insight into the factors related to health in Asian immigrants, future research should consider other methodologies to assess health, such as qualitative studies and longitudinal studies. Longitudinal studies are necessary to assess changes in health status and the associated factors in a population over time. Fourth, all data are based on self-reported information and misclassification errors may occur such as income, smoking, physical activity and heavy drinking measures. The use of self-reported data may result in over- or under-estimation of receipt of mammogram and Pap smear due to inaccurate recall. Finally, due to time constraints this study only considered two preventive health services in Asian immigrant women. Hence more comprehensive assessment of health utilization in this population is warranted in future studies.

REFERENCES

1. Statistics Canada. Analysis series, Canada's ethnocultural portrait: The changing mosaic. 2001 Available at: http://www12.statcan.ca/english/census01/Products/Analytic/companion/etoimm/canada.cfm. Accessed November 12, 2007.

2. CJPH-King PA. Justice beyond Belmont. In: Childress JF ME, Shapiro HT (Eds.). *Belmont Revisited: Ethical Principles for Research with Human Subjects.* Washington, DC: Georgetown University Press, 2005.

3. Statistics Canada. Population Projections for Canada, Provinces and Territories, 2000-2026 (Catalogue 91-520). Ottawa: Statistics Canada, 2001.

4. Beiser M. The health of immigrants and refugees in Canada. *Canadian Journal of Public Health.* 2005;96(Supplement 2):S30-S44.

5. Gushulak BD, Williams LS. National immigration health policy: existing policy, changing needs, and future directions. *Can J Public Health.* 2004;95(3):I27-9.

6. Citizenship and Immigration Canada. Statistics/Reference. Facts and Figures: Immigration Overview Permanent and Temporary Residents. 2006 Available at: http://www.cic.gc.ca/english/resources/statistics/menu-fact.asp#2006. Accessed November 28, 2007.

7. Chen J, Ng E, Wilkins R. The health of Canada's immigrants in 1994–95. *Health Reports.* 1996;7(4):33-45.

8. Chen J, Wilkins R, Ng E. Health expectancy by immigrant status, 1986 and 1991. *Health Rep.* 1996;8(3):29-38(Eng); 31-41(Fre).

9. Dunn JR, Dyck I. Social determinants of health in Canada's immigrant population: results from the National Population Health Survey. *Soc Sci Med.* 2000;51(11):1573-93.

10. Frisbie WP, Cho Y, Hummer RA. Immigration and the health of Asian and Pacific Islander adults in the United States. *Am J Epidemiol.* 2001;153(4):372-80.

11. Newbold KB. Self-rated health within the Canadian immigrant population: risk and the healthy immigrant effect. *Soc Sci Med.* 2005;60(6):1359-70.

12. Newbold KB, Danforth J. Health status and Canada's immigrant population. *Soc Sci Med.* 2003;57(10):1981-95.

13. Perez CE. Health status and health behaviour among immigrants. *Health Reports.* 2002;13(Suppl):89-100.

14. McDonald JT, Kennedy S. Insights into the 'healthy immigrant effect': health status and health service use of immigrants to Canada. *Soc Sci Med.* 2004;59(8):1613-27.

15. Ali JS, McDermott S, Gravel RG. Recent research on immigrant health from statistics Canada's population surveys. *Can J Public Health.* 2004;95(3):I9-13.

16. Ali J. Mental health of Canada's immigrants. *Health Reports.* 2002;13(suppl):101-11.

17. Ng E, Wilkins R, Gendron F, et al. Dynamics of immigrants' health in Canada: evidence from the National Population Health Survey. Healthy today, healthy tomorrow? Findings from the National Population Health. Statistics Canada: Catalogue no. 82-618-MWE2005002, 2005.

18. Health Canada. Report from the Evaluation Indicators Working Group: Guidelines for Monitoring Breast Cancer Screening Program Performance. Ottawa: Minister of Public Works and Government Services Canada, 2002.

19. Laroche M. Health status and health services utilization of Canada's immigrant and non-immigrant populations. *Canadian Public Policy.* 2000;26(2):51-75.

20. Tu SP, Jackson SL, Yasui Y, et al. Cancer preventive screening: a cross-border comparison of United States and Canadian Chinese women. *Prev Med.* 2005;41(1):36-46.

21. McDonald JT, Kennedy S. Cervical cancer screening by immigrant and minority women in Canada. *J Immigr Minor Health.* 2007;9(4):323-34.

22. Maxwell CJ, Bancej CM, Snider J, et al. Factors important in promoting cervical cancer screening among Canadian women: findings from the 1996-97 National Population Health Survey (NPHS). *Can J Public Health.* 2001;92(2):127-33.

23. Lee J, Parsons GF, Gentleman JF. Falling short of Pap test guidelines. *Health Rep.* 1998;10(1):9-19(ENG); 9-21(FRE).

24. Maxwell CJ, Bancej CM, Snider J. Predictors of mammography use among Canadian women aged 50-69: findings from the 1996/97 National Population Health Survey. *CMAJ.* 2001;164(3):329-34.

25. Goel V. Factors associated with cervical cancer screening: results from the Ontario Health Survey. *Can J Public Health.* 1994;85(2):125-7.

26. Statistics Canada. Canadian Community Health Survey cycle 2.1 Questionnaire. 2003.

27. Gentleman JF, Lee J. Who doesn't get a mammogram? *Health Reports.* Summer 1997;9(1):19-28.

28. Jackson SL, Hislop TG, Teh C, et al. Screening mammography among Chinese Canadian women. *Can J Public Health.* 2003;94(4):275-80.

29. Bottorff JL, Johnson JL, Bhagat R, et al. Beliefs related to breast health practices: the perceptions of South Asian women living in Canada. *Soc Sci Med.* 1998;47(12):2075-85.

30. Choudhry UK, Srivastava R, Fitch MI. Breast cancer detection practices of south Asian women: knowledge, attitudes, and beliefs. *Oncol Nurs Forum.* 1998;25(10):1693-701.

31. Hislop TG, Deschamps M, Teh C, et al. Facilitators and barriers to cervical cancer screening among Chinese Canadian women. *Can J Public Health.* 2003;94(1):68-73.

32. Gupta A, Kumar A, Stewart DE. Cervical cancer screening among South Asian women in Canada: the role of education and acculturation. *Health Care Women Int.* 2002;23(2):123-34.

33. Stephen EH, Foote K, Hendershot GE, et al. Health of the foreign-born population: United States, 1989-90. *Adv Data.* 1994;241:1-12.

34. Newbold KB. Chronic Conditions and the Healthy Immigrant Effect: Evidence from Canadian Immigrants. *Journal of Ethnic and Migration Studies.* 2006;32(5):765-84.

35. Dey AN, Lucas JW. Physical and mental health characteristics of U.S.- and foreign-born adults: United States, 1998-2003. *Advance Data.* 2006(369):1-19.

36. Sheth T, Nair C, Nargundkar M, et al. Cardiovascular and cancer mortality among Canadians of European, south Asian and Chinese origin from 1979 to 1993: an analysis of 1.2 million deaths. *CMAJ.* 1999;161(2):132-8.

37. Wang PP, Elsbett-Koeppen R, Geng G, et al. Arthritis prevalence and place of birth: findings from the 1994 Canadian National Population Health Survey. *Am J Epidemiol.* 2000;152(5):442-5.

38. Newbold KB, Filice JK. Health status of older immigrants to Canada. *Can J Aging.* 2006;25(3):305-19.

39. Newbold KB. Health status and health care utilization of the foreign-born in Canada: a longitudinal analysis, 1994/95-2000/01. *Journal of Health Research Services and Policy.* 2005;10(2):77-83.

40. Hyman I. Immigration and Health: Health Canada, 2001.

41. Schoenborn C. Marital StatusandHealth:UnitedStates,1999–2002. *Adv Data.* 2004;351:1-33.

42. Joung IM, Stronks K, van de Mheen H, et al. Health behaviours explain part of the differences in self reported health associated with partner/marital status in The Netherlands. *J Epidemiol Community Health.* 1995;49(5):482-8.

43. Seeman M, Seeman TE. Health behavior and personal autonomy: a longitudinal study of the sense of control in illness. *J Health Soc Behav.* 1983;24(2):144-60.

44. Maticka-Tyndale E, Shirpak KR, Chinichian M. Providing for the sexual health needs of Canadian immigrants: the experience of immigrants from Iran. *Can J Public Health.* 2007;98(3):183-6.

45. Stump TE, Clark DO, Johnson RJ, et al. The structure of health status among Hispanic, African American, and white older adults. *J Gerontol B Psychol Sci Soc Sci.* 1997;52 Spec No:49-60.

46. Idler EL, Benyamini Y. Self-rated health and mortality: a review of twenty-seven community studies. *J Health Soc Behav.* 1997;38(1):21-37.

47. Idler EL, Kasl SV. Self-ratings of health: do they also predict change in functional ability? *J Gerontol B Psychol Sci Soc Sci.* 1995;50(6):S344-53.

48. Lamb KL, Roberts K, Brodie DA. Self-perceived health among sports participants and non-sports participants. *Soc Sci Med.* 1990;31(9):963-9.

49. Jonnalagadda SS, Diwan S. Health behaviors, chronic disease prevalence and self-rated health of older Asian Indian immigrants in the U.S. *J Immigr Health.* 2005;7(2):75-83.

50. Nair C, Nargundkar M, Johansen H, et al. Canadian cardiovascular disease mortality: first generation immigrants versus Canadian born. *Health Rep.* 1990;2(3):203-28.

51. Angel JL, Buckley CJ, Sakamoto A. Duration or disadvantage? Exploring nativity, ethnicity, and health in midlife. *J Gerontol B Psychol Sci Soc Sci.* 2001;56(5):S275-84.

52. Li PS. Earning Disparities between Immigrants and Native-born Canadians. *Canadian Review of Sociology & Anthropology.* 2000;37(3):289-311.

53. Statistics Canada. Immigrant women. Women in Canada, A gender-based statistical report. 2006 5th edition:[Available at: www.unece.org/gender/publications/Canada/WomenCanada2006.pdf. Accessed December 16, 2007.

54. Annual smoking-attributable mortality, years of potential life lost, and productivity losses--United States, 1997-2001. *MMWR Morb Mortal Wkly Rep.* 2005;54(25):625-8.

55. Ferrucci L, Izmirlian G, Leveille S, et al. Smoking, physical activity, and active life expectancy. *Am J Epidemiol.* 1999;149(7):645-53.

56. US Department of Health and Human Services. Reducing the health consequences of smoking: 25 years of progress. A report of the surgeon general. Rockville, Maryland: US Department of Health and Human Services., 1989. Report No.: DHHS Publication No. (CDC) 89-8411.

57. Chen J. Age at diagnosis of smoking-related disease. *Health Reports.* 2003;14(2):9-19.

58. Mackay J, Eriksen M. Health Risks, Part One: Prevalence and Health. *The Tobacco Atlas*: World Health Organization, 2002. p. 32-33.

59. Shields M. Smoking-prevalence, bans and exposure to second-hand smoke. *Health Rep.* 2007;18(3):67-85.

60. Singh GK, Siahpush M. Ethnic-immigrant differentials in health behaviors, morbidity, and cause-specific mortality in the United States: an analysis of two national data bases. *Hum Biol.* 2002;74(1):83-109.

61. Warburton DE, Nicol CW, Bredin SS. Health benefits of physical activity: the evidence. *CMAJ.* 2006;174(6):801-9.

62. US Department of Health and Human Services. Physical Activity and Health: A Report of the Surgeon General. 1996 Available at: http://www.cdc.gov/nccdphp/sgr/pdf/sgraag.pdf. Accessed November 23, 2007.

63. Gilmour H. Physically active Canadians. *Health Rep.* 2007;18(3):45-65.

64. Bryan SN, Tremblay MS, Perez CE, et al. Physical activity and ethnicity: evidence from the Canadian Community Health Survey. *Can J Public Health.* 2006;97(4):271-76.

65. Tremblay MS, Bryan SN, Perez CE, et al. Physical Activity and Immigrant Status. *Canadian Journal of Public Health.* 2006;97(4):277-82.

66. Poikolainen K, Vartiainen E, Korhonen HJ. Alcohol intake and subjective health. *Am J Epidemiol.* 1996;144(4):346-50.

67. Poikolainen K. Alcohol and overall health outcomes. *Ann Med.* 1996;28(5):381-4.

68. Gordon T, Doyle JT. Drinking and mortality. The Albany Study. *Am J Epidemiol.* 1987;125(2):263-70.

69. Wilkin K. Moderate alcohol consumption and heart disease. *Health Reports.* 2002;14(1):9-24.

70. Klein-Geltink JE, Choi BC, Fry RN. Multiple exposures to smoking, alcohol, physical inactivity and overweight: Prevalences according to the Canadian Community Health Survey Cycle 1.1. *Chronic Diseases in Canada.* 2006;27(1):25-33.

71. Matuk LC. Alcohol use by newcomers. *American Journal of Health Behavior.* 1996;20(2):42-9.

72. Canadian Cancer Society/National Cancer Institute of Canada. Canadian Cancer Statistics 2006. Toronto, Canada, 2006.

73. Canadian Cancer Society/National Cancer Institute of Canada. Canadian Cancer Statistics 2007. Toronto, Canada, 2007.

74. Canadian Cancer Society/National Cancer Institute of Canada. Canadian Cancer Statistics 2004. Toronto, Canada, 2004.

75. Ziegler RG, Hoover RN, Pike MC, et al. Migration patterns and breast cancer risk in Asian-American women. *J Natl Cancer Inst.* 1993;85(22):1819-27.

76. Yavari P, Hislop TG, Bajdik C, et al. Comparison of cancer incidence in Iran and Iranian immigrants to British Columbia, Canada. *Asian Pac J Cancer Prev.* 2006;7(1):86-90.

77. Kliewer EV, Smith KR. Breast cancer mortality among immigrants in Australia and Canada. *J Natl Cancer Inst.* 1995;87(15):1154-61.

78. Olivotto IA, Mates D, Kan L, et al. Prognosis, treatment, and recurrence of breast cancer for women attending or not attending the Screening Mammography Program of British Columbia. *Breast Cancer Res Treat.* 1999;54(1):73-81.

79. Joensuu H, Lehtimaki T, Holli K, et al. Risk for distant recurrence of breast cancer detected by mammography screening or other methods. *Jama.* 2004;292(9):1064-73.

80. Hebert-Croteau N, Brisson J, Latreille J, et al. Compliance with consensus recommendations for systemic therapy is associated with improved survival of women with node-negative breast cancer. *J Clin Oncol.* 2004;22(18):3685-93.

81. IARC Working Group on the Evaluation of Cancer-Preventive Strategies. Breast cancer screening. IARC, Lyon, France, 2002.

82. U.S. Preventive Service Task Force. Screening for breast cancer: recommendations and rationale. *Ann Intern Med.* 2002;137(5 Part 1):344-6.

83. Armstrong K, Moye E, Williams S, et al. Screening mammography in women 40 to 49 years of age: a systematic review for the American College of Physicians. *Ann Intern Med.* 2007;146(7):516-26.

84. Centre for Chronic Disease Prevention and Control of the Public Health Agency of Canada. Progress Report on Cancer Control in Canada, 2004 Cat. No.H39-4/50-2004E. ISBN 0-622-37735-7 [http://www.phac-aspc.gc.ca/publicat/prccc-relccc/index.html].

85. Health Canada. Organized Breast Cancer Screening Programs in Canada 1997 and 1998 Report. 2000 Available at: http://www.phac-aspc.gc.ca/publicat/obcsp-podcs98/pdf/obcsp98_e.pdf. Accessed December 1, 2007.

86. Statistics Canada. Prevention and detection of disease. 2006 Available at: http://cansim2.statcan.ca/cgi-win/cnsmcgi.pgm?LANG=E&RegTkt=&C2Sub=&C2DB=PRD&ROOTDIR=CII/&ResultTemplate=CII/CII_FLst&SrchVer=2&ChunkSize=50&CIITables=2969. Accessed December 1, 2007.

87. McPhee SJ, Stewart S, Brock KC, et al. Factors associated with breast and cervical cancer screening practices among Vietnamese American women. *Cancer Detect Prev.* 1997;21(6):510-21.

88. Kandula NR, Wen M, Jacobs EA, et al. Low rates of colorectal, cervical, and breast cancer screening in Asian Americans compared with non-Hispanic whites: Cultural influences or access to care? *Cancer.* 2006;107(1):184-92.

89. Kagawa-Singer M, Park Tanjasiri S, Lee SW, et al. Breast and cervical cancer control among Pacific Islander and Southeast Asian Women: participatory action research strategies for baseline data collection in California. *J Cancer Educ.* 2006;21(1 Suppl):S53-60.

90. Islam N, Kwon SC, Senie R, et al. Breast and cervical cancer screening among South Asian women in New York City. *J Immigr Minor Health.* 2006;8(3):211-21.

91. Yu MY, Wu TY, Mood DW. Cultural affiliation and mammography screening of Chinese women in an urban county of Michigan. *J Transcult Nurs.* 2005;16(2):107-16.

92. Yu MY, Wu TY. Factors influencing mammography screening of Chinese American women. *J Obstet Gynecol Neonatal Nurs.* 2005;34(3):386-94.

93. Lee EE, Fogg LF, Sadler GR. Factors of breast cancer screening among Korean immigrants in the United States. *J Immigr Minor Health.* 2006;8(3):223-33.

94. Wu TY, Guthrie BJ, Bancroft JM. An integrative review on breast cancer screening practice and correlates among Chinese, Korean, Filipino, and Asian Indian American women. *Health Care Women Int.* 2005;26(3):225-46.

95. Lee-Lin F, Menon U, Pett M, et al. Breast cancer beliefs and mammography screening practices among Chinese American immigrants. *J Obstet Gynecol Neonatal Nurs.* 2007;36(3):212-21.

96. Lee-Lin F, Menon U. Breast and cervical cancer screening practices and inventions among Chinese, Japanese, and Vietnamese Americans. *Oncol Nurs Forum.* 2005;32(5):995-1003.

97. Coleman MP, Esteve J, Damiecki P, et al. Trends in cancer incidence and mortality. (IARC Scientific Publication No. 121) Lyon: International Agency for Research on Cancer, 1993.

98. Parkin DM, Muir CS, Whelan SL, et al. Cancer incidence in five continents. Volume VII (IARC Scientific Publication No. 143) Lyon: International Agency for Research, 1997.

99. International Agency for Research on Cancer. Cancer incidence in five continents. volume VIII. Lyon: IARC, 2002.

100. Canadian Cancer Society. Causes of cervical cancer. 2007 Available at: http://www.cancer.ca/ccs/internet/standard/0,3182,3172_10175_275935_langId-en,00.html. Accessed December 5, 2007.

101. Liu S, Semenciw R, Probert A, et al. Cervical cancer in Canada: changing patterns in incidence and mortality. *Int J Gynecol Cancer.* 2001;11(1):24-31.

102. Miller AB, Anderson G, Brisson J, et al. Report of a National Workshop on Screening for Cancer of the Cervix. *Cmaj.* 1991;145(10):1301-25.

103. Canadian Task Force on the Periodic Health Examination. The Canadian guide to clinical preventive health care. Ottawa: Supply and Services Canada; Health Canada Cat H21-1117/1994E 1994.

104. Hislop GT, Bajdik CD, Regier MD, et al. Ethnic differences in survival for female cancers of the breast, cervix and colorectum in british columbia, Canada. *Asian Pac J Cancer Prev.* 2007;8(2):209-14.

105. Lofters A, Glazier RH, Agha MM, et al. Inadequacy of cervical cancer screening among urban recent immigrants: a population-based study of physician and laboratory claims in Toronto, Canada. *Prev Med.* 2007;44(6):536-42.

106. Swan J, Breen N, Coates RJ, et al. Progress in cancer screening practices in the United States: results from the 2000 National Health Interview Survey. *Cancer.* 2003;97(6):1528-40.

107. Hislop GT, Teh C, Lai A, et al. Cervical cancer screening in BC Chinese women. *BC Medical Journal.* 2000;42(10):456-60.

108. Citizenship and Immigration Canada. Statistics/Reference. Facts and Figures: Immigration Overview Permanent and Temporary Residents. 2005 Available at: http://www.cic.gc.ca/english/pub/index-2.html#statistics. Accessed August 8, 2006.

109. Statistics Canada. Immigration and Citizenship. 2001 Census Available at: http://www12.statcan.ca/english/census01/Products/standard/themes/DataProducts.cfm?S=1&T=43&ALEVEL=2&FREE=0. Accessed August 29, 2006.

110. Luo W, Birkett NJ, Ugnat AM, et al. Cancer incidence patterns among Chinese immigrant populations in Alberta. *J Immigr Health.* 2004;6(1):41-8.

111. Health Canada. Towards a Healthy Future: Second Report on the Health of Canadians. Ottawa, ON: Health Canada, 1999.

112. Health Canada. *Chronic Diseases in Canada.* 2002;23(4):124.

113. McDonald JT. The Health Behaviours of Immigrants and Native-Born People in Canada. Atlantic Metropolis Centre ~ Working Paper Series Working Paper No 01-06 2006 Available at: http://www.atlantic.metropolis.net/WorkingPapers/McDonald-WP1.pdf. Accessed

114. Statistics Canada. Canadian Community Health Survey (CCHS), cycle 2.1. 2003 Available at: www.statcan.ca/english/concepts/hs/. Accessed Dec., 2006.

115. Mossey J, Shapiro E. Self-rated health: a predictor of mortality among the elderly. *American Journal of Plublic Health.* 1982;72:800-8.

116. Saravanabhavan RC, Marshall CA. The older Native American Indian with disabilities: Implications for providers of health care and human services. *Journal of Multicultural Counseling and Development.* 1994;22:182-94.

117. Kaplan G, Comacho T. Self-evaluated health and mortality: A nine-year follow up of the human population laboratory component. *American Journal of Epidemiology.* 1993;117:292-305.

118. Hoeymans N, Feskens EJ, Kromhout D, et al. Ageing and the relationship between functional status and self-rated health in elderly men. *Soc Sci Med.* 1997;45(10):1527-36.

119. Miilunpalo S, Vuori I, Oja P, et al. Self-rated health status as a health measure: the predictive value of self-reported health status on the use of physician services and on mortality in the working-age population. *J Clin Epidemiol.* 1997;50(5):517-28.

120. Yves B. Canadian Community Health Survey – Methodological Overview. *Health Reports.* 2002;13(3):9-14.

121. Wu Z, Penning MJ, Schimmele CM. Immigrant status and unmet health care needs. *Can J Public Health.* 2005;96(5):369-73.

122. Cott CA, Gignac MA, Badley EM. Determinants of self rated health for Canadians with chronic disease and disability. *J Epidemiol Community Health.* 1999;53(11):731-6.

123. Shields M, Shooshtari S. Determinants of self-perceived health. *Health Reports.* 2001;13(1):35-52.

124. Health Canada. Obesity. 2006 Available at: http://www.hc-sc.gc.ca/iyh-vsv/life-vie/obes_e.html#he. Accessed November 2, 2007.

125. Tremblay MS, Perez CE, Ardern CI, et al. Obesity, overweight and ethnicity. *Health Reports.* 2005;16(4):23-34.

126. Gomez SL, Kelsey JL, Glaser SL, et al. Immigration and acculturation in relation to health and health-related risk factors among specific Asian subgroups in a health maintenance organization. *Am J Public Health.* 2004;94(11):1977-84.

127. Statistics Canada. Immigrant population by place of birth and period of immigration (2001 Census). Available at: http://www40.statcan.ca/l01/cst01/demo24a.htm. Accessed September 2, 2007.

128. Vahabi M. Breast cancer screening methods: a review of the evidence. *Health Care Women Int.* 2003;24(9):773-93.

129. Barrett K, Legg J. Demographic and health factors associated with mammography utilization. *Am J Health Promot.* 2005;19(6):401-5.

130. Goel MS, Wee CC, McCarthy EP, et al. Racial and ethnic disparities in cancer screening: the importance of foreign birth as a barrier to care. *J Gen Intern Med.* 2003;18(12):1028-35.

131. Mo B. Modesty, sexuality, and breast health in Chinese-American women. *West J Med.* 1992;157(3):260-4.

132. Donnelly TT. The health-care practices of Vietnamese-Canadian women: cultural influences on breast and cervical cancer screening. *Can J Nurs Res.* 2006;38(1):82-101.

133. Han Y, Williams RD, Harrison RA. Breast cancer screening knowledge, attitudes, and practices among Korean American women. *Oncol Nurs Forum.* 2000;27(10):1585-91.

134. Lee EE, Tripp-Reimer T, Miller AM, et al. Korean American women's beliefs about breast and cervical cancer and associated symbolic meanings. *Oncol Nurs Forum.* 2007;34(3):713-20.

135. Statistics Canada. Screening Mammography: Women 50 to 69, 2003. Accessibility: Disease Prevention and Detection Health Indicators 2004 Available at: http://www.statcan.ca/english/freepub/82-221-XIE/2006001/tables/3sysper/access.htm. Accessed September 28, 2007.

136. Miedema BB, Tatemichi S. Breast and cervical cancer screening for women between 50 and 69 years of age: what prompts women to screen? *Womens Health Issues.* 2003;13(5):180-4.

137. Jacobs EA, Karavolos K, Rathouz PJ, et al. Limited English proficiency and breast and cervical cancer screening in a multiethnic population. *Am J Public Health.* 2005;95(8):1410-6.

138. Ahmad F, Cameron JI, Stewart DE. A tailored intervention to promote breast cancer screening among South Asian immigrant women. *Soc Sci Med.* 2005;60(3):575-86.

139. Quan H, Fong A, De Coster C, et al. Variation in health services utilization among ethnic populations. *CMAJ.* 2006;174(6):787-91.

140. Tang TS, Solomon LJ, Yeh CJ, et al. The role of cultural variables in breast self-examination and cervical cancer screening behavior in young Asian women living in the United States. *J Behav Med.* 1999;22(5):419-36.

141. Brotto LA, Chik HM, Ryder AG, et al. Acculturation and sexual function in Asian women. *Arch Sex Behav.* 2005;34(6):613-26.

142. Ponce NA, Chawla N, Babey SH, et al. Is there a language divide in pap test use? *Med Care.* 2006;44(11):998-1004.

143. Oelke ND, Vollman AR. "Inside and outside": Sikh women's perspectives on cervical cancer screening. *Can J Nurs Res.* 2007;39(1):174-89.

144. Hislop TG, Teh C, Lai A, et al. Pap screening and knowledge of risk factors for cervical cancer in Chinese women in British Columbia, Canada. *Ethn Health.* 2004;9(3):267-81.

145. Pearlman DN, Clark MA, Rakowski W, et al. Screening for breast and cervical cancers: the importance of knowledge and perceived cancer survivability. *Women Health.* 1999;28(4):93-112.

146. Black ME, Frisina A, Hack T, et al. Improving early detection of breast and cervical cancer in Chinese and Vietnamese immigrant women. *Oncol Nurs Forum.* 2006;33(5):873-6.

147. Taylor VM, Hislop TG, Jackson JC, et al. A randomized controlled trial of interventions to promote cervical cancer screening among Chinese women in North America. *J Natl Cancer Inst.* 2002;94(9):670-7.

148. Glanz K, Croyle RT, Chollette VY, et al. Cancer-related health disparities in women. *Am J Public Health.* 2003;93(2):292-8.

149. Saha S, Arbelaez JJ, Cooper LA. Patient-physician relationships and racial disparities in the quality of health care. *Am J Public Health.* 2003;93(10):1713-9.

150. Johnson RL, Saha S, Arbelaez JJ, et al. Racial and ethnic differences in patient perceptions of bias and cultural competence in health care. *J Gen Intern Med.* 2004;19(2):101-10.

151. Taylor VM, Jackson JC, Tu SP, et al. Cervical cancer screening among Chinese Americans. *Cancer Detect Prev.* 2002;26(2):139-45.

152. Ahmad F, Gupta H, Rawlins J, et al. Preferences for gender of family physician among Canadian European-descent and South-Asian immigrant women. *Fam Pract.* 2002;19(2):146-53.

153. Kagawa-Singer M, Pourat N. Asian American and Pacific Islander breast and cervical carcinoma screening rates and healthy people 2000 objectives. *Cancer.* 2000;89(3):696-705.

154. Bottorff JL, Balneaves LG, Sent L, et al. Cervical cancer screening in ethnocultural groups: case studies in women-centered care. *Women Health.* 2001;33(3-4):29-46.

APPENDIX

Questionnaire of the Canadian Community Health Survey Cycle 2.1 , Statistics Canada (Relevant part only)

CHRONIC CONDITIONS

CCC_BEG Set HasSkinCancer = No

CCC_C011 [redacted] If (do CCC block = 2), go to CCC_END.
Otherwise, go to CCC_QINT011.

CCC_QINT011 **Now I'd like to ask about certain chronic health conditions which [you/FNAME] may have. We are interested in "long-term conditions" which are expected to last or have already lasted 6 months or more and that have been diagnosed by a health professional.**
INTERVIEWER: Press <Enter> to continue.

CCC_Q011 [redacted] **[Do/Does] [you/FNAME] have:**
... food allergies?

1 Yes
2 No
DK
R (Go to CCC_END)

CCC_Q021 [redacted] **([Do/Does] [you/FNAME] have:)**
... any other allergies?

1 Yes
2 No
DK, R

CCC_Q031 [redacted] **([Do/Does] [you/FNAME] have:)**
... asthma?

1 Yes
2 No (Go to CCC_Q041)
DK, R (Go to CCC_Q041)

CCC_Q035
CCC_Q03

[Have/Has] [you/FNAME] had any asthma symptoms or asthma attacks in the past 12 months?

1 Yes
2 No
DK, R

CCC_Q036
CCC_Q0

In the past 12 months, [have/has] [you/he/she] taken any medicine for asthma such as inhalers, nebulizers, pills, liquids or injections?

1 Yes
2 No
DK, R

CCC_Q041
CCC_Q0

[Do/Does] [you/FNAME] have fibromyalgia?

1 Yes
2 No
DK, R

CCC_Q051
CCCC_051

Remember, we're interested in conditions diagnosed by a health professional.

[Do/Does] [you/FNAME] have arthritis or rheumatism, excluding fibromyalgia?

1 Yes
2 No (Go to CCC_Q061)
DK, R (Go to CCC_Q061)

CCC_Q05A

What kind of arthritis [do/does] [you/he/she] have?

1 Rheumatoid arthritis
2 Osteoarthritis
3 Other - Specify
DK, R

CCC_C05AS If CCC_Q05A <> 3, go to CCC_Q061.
Otherwise, go to CCC_Q05AS.

CCC_Q05AS INTERVIEWER: Specify.

_____
(80 spaces)
DK, R

CCC_Q061
CCCC_061

(Remember, we're interested in conditions diagnosed by a health professional.)

[Do/Does] [you/FNAME] have back problems, excluding fibromyalgia and arthritis?

1 Yes
2 No
DK, R

CCC_Q071

([Do/Does] [you/FNAME] have:)
... high blood pressure?

1 Yes
2 No
DK, R

CCC_Q081
CCCC_081

(Remember, we're interested in conditions diagnosed by a health professional.)

([Do/Does] [you/FNAME] have:)
... migraine headaches?

1 Yes
2 No
DK, R

CCC_Q091A
[redacted]

(Remember, we're interested in conditions diagnosed by a health professional.)

([Do/Does] [you/FNAME] have:)
... chronic bronchitis?

1 Yes
2 No
DK, R

CCC_C091B

If age < 30, go to CCC_Q101.
Otherwise, go to CCC_091B.

CCC_Q091B
[redacted]

([Do/Does] [you/FNAME] have:)
... emphysema or chronic obstructive pulmonary disease (COPD)?

1 Yes
2 No
DK, R

CCC_Q101
[redacted]

([Do/Does] [you/FNAME] have:)
... diabetes?

1 Yes
2 No (Go to CCC_Q111)
DK, R (Go to CCC_Q111)

CCC_Q102
[redacted]

How old [were/was] [you/he/she] when this was first diagnosed?
INTERVIEWER: Maximum is [current age].

|_|_|_| Age in years
(MIN: 0) (MAX: current age)
DK, R (Go to CCC_Q10C)

CCC_C10A

If age < 15 or sex = male or CCC_Q102 < 15, go to CCC_Q10C.
Otherwise, go to CCC_10A.

CCC_Q10A
[redacted]

[Were/Was] [you/she] pregnant when [you/she] [were/was] first diagnosed with diabetes?

1 Yes
2 No (Go to CCC_Q10C)
DK, R (Go to CCC_Q10C)

CCC_Q10B
[redacted]

Other than during pregnancy, has a health professional ever told [you/her] that [you/she] [have/has] diabetes?

1 Yes
2 No (Go to CCC_Q111)
DK, R (Go to CCC_Q111)

CCC_Q10C
When [you/he/she] [were/was] first diagnosed with diabetes, how long was it before [you/he/she] [were/was] started on insulin?

1 Less than 1 month
2 1 month to less than 2 months
3 2 months to less than 6 months
4 6 months to less than 1 year
5 1 year or more
6 Never (Go to CCC_Q111)
DK, R

CCC_Q105
[Do/Does] [you/FNAME] currently take insulin for [your/his/her] diabetes?

1 Yes
2 No
DK, R

Note: (If CCC_Q10C = 6, CCC_Q105 will be filled with "No" during processing)

CCC_Q111
[Do/Does] [you/FNAME] have epilepsy?

1 Yes
2 No
DK, R

CCC_Q121
([Do/Does] [you/FNAME] have:)
... heart disease?

1 Yes
2 No (Go to CCC_Q131)
DK, R (Go to CCC_Q131)

CCC_Q12A
[Have/Has] [you/he/she] ever had a heart attack (damage to the heart muscle)?

1 Yes
2 No
DK, R

CCC_Q12J
[Do/Does] [you/he/she] currently have angina (chest pain, chest tightness)?

1 Yes
2 No
DK, R

CCC_Q12K
[Do/Does] [you/he/she] currently have congestive heart failure (inadequate heart beat, fluid build-up in the lungs or legs)?

1 Yes
2 No
DK, R

CCC_Q131 **[Do/Does] [you/FNAME] have cancer?**

1 Yes
2 No (Go to CCC_Q141)
DK, R (Go to CCC_Q141)

CCC_C133 If sex = male, go to CCC_Q133B.
Otherwise, go to CCC_Q133A.

Note: Responses from male and female respondents were added together to create the new variable CCCC_13A to CCCC_13F, in processing.

CCC_Q133A **What type of cancer [do/does] [you/she] have?**
INTERVIEWER: Mark all that apply.

1 Breast
2 Colorectal
3 Skin - Melanoma
4 Skin - Non-melanoma
5 Other
DK, R

Go to CCC_D133

CCC_Q133B **What type of cancer [do/does] [you/he] have?**
INTERVIEWER: Mark all that apply.

1 Prostate
2 Colorectal
3 Skin - Melanoma
4 Skin - Non-melanoma
5 Other
DK, R

CCC_D133 If CCC_Q133A = 3 or 4 or CCC_Q133B = 3 or 4, then HasSkinCancer = Yes.
Otherwise, HasSkinCancer = No.

CCC_Q141 **(Remember, we're interested in conditions diagnosed by a health professional.)**

[Do/Does] [you/FNAME] have intestinal or stomach ulcers?

1 Yes
2 No
DK, R

CCC_Q151 **[Do/Does] [you/FNAME] suffer from the effects of a stroke?**

1 Yes
2 No
DK, R

CCC_Q161
CCC_161

([Do/Does] [you/FNAME] suffer:)
... from urinary incontinence?

1 Yes
2 No
DK, R

CCC_Q171
CCC_171

[Do/Does] [you/FNAME] have a bowel disorder such as Crohn's Disease or colitis?

1 Yes
2 No
DK, R

CCC_C181

If age < 18, go to CCC_Q211.
Otherwise, go to CCC_Q181.

CCC_Q181
CCC_181

(Remember, we're interested in conditions diagnosed by a health professional.)

([Do/Does] [you/FNAME] have:)
... Alzheimer's Disease or any other dementia?

1 Yes
2 No
DK, R

CCC_Q191
CCC_191

([Do/Does] [you/FNAME] have:)
... cataracts?

1 Yes
2 No
DK, R

CCC_Q201
CCCC_201

([Do/Does] [you/FNAME] have:)
... glaucoma?

1 Yes
2 No
DK, R

CCC_Q211
CCCC_211

([Do/Does] [you/FNAME] have:)
... a thyroid condition?

1 Yes
2 No
DK, R

CCC_Q251
CCCC_251

Remember, we're interested in conditions diagnosed by a health professional.

[Do/Does] [you/FNAME] have chronic fatigue syndrome?

1 Yes
2 No
DK, R

MAMMOGRAPHY

MAM_C1
MAMCFDQ
If (do MAM block = 2), go to MAM_END.
Otherwise, go to MAM_C030.

MAM_C030
If proxy interview or male, go to MAM_END.
Otherwise, go to MAM_C030A.

MAM_C030A
If (female and age < 35), go to MAM_C037.
Otherwise, go to MAM_Q030.

MAM_Q030
MAMC_030
(Now Mammography)
Have you ever had a mammogram, that is, a breast x-ray?

1 Yes
2 No (Go to MAM_C036)
DK, R (Go to MAM_END)

MAM_Q031
Why did you have it?
INTERVIEWER: Mark all that apply.
If respondent says "doctor recommended it", probe for reason.

MAMC_31A	1	Family history of breast cancer
MAMC_31B	2	Part of regular check-up / routine screening
MAMC_31C	3	Age
MAMC_31D	4	Previously detected lump
MAMC_31E	5	Follow-up of breast cancer treatment
MAMC_31F	6	On hormone replacement therapy
MAMC_31G	7	Breast problem
MAMC_31H	8	Other - Specify
		DK, R

MAM_C031S
If MAM_Q031 <> 8, go to MAM_Q032.
Otherwise, go to MAM_Q031S.

MAM_Q031S
INTERVIEWER: Specify.

_____
(80 spaces)
DK, R

MAM_Q032
MAMC_032
When was the last time?
INTERVIEWER: Read categories to respondent.

1	**Less than 6 months ago**	(Go to MAM_C037)
2	**6 months to less than 1 year ago**	(Go to MAM_C037)
3	**1 year to less than 2 years ago**	(Go to MAM_C037)
4	**2 years to less than 5 years ago**	
5	**5 or more years ago**	
	DK, R	(Go to MAM_C037)

MAM_C036 If age < 50 or age > 69, go to MAM_C037.
Otherwise, go to MAM_Q036.

MAM_Q036 **What are the reasons you have not had one in the past 2 years?**
INTERVIEWER: Mark all that apply.

1 Have not gotten around to it
2 Respondent - did not think it was necessary
3 Doctor - did not think it was necessary
4 Personal or family responsibilities
5 Not available - at time required
6 Not available - at all in the area
7 Waiting time was too long
8 Transportation - problems
9 Language - problem
10 Cost
11 Did not know where to go / uninformed
12 Fear (e.g., painful, embarrassing, find something wrong)
13 Unable to leave the house because of a health problem
14 Other – Specify
DK, R

MAM_C036S If MAM_Q036 <> 14, go to MAM_C037.
Otherwise, go to MAM_Q036S.

MAM_Q036S INTERVIEWER: Specify.

_____
(80 spaces)
DK, R

MAM_C037 If age < 15 or > 49, go to MAM_C038.
Otherwise, go to MAM_Q037.

MAM_Q037 **It is important to know when analyzing health whether or not the person is pregnant. Are you pregnant?**

1 Yes (Go to MAM_END) (MAM_Q038 will be filled with "No" during processing)
2 No
DK, R

MAM_C038 If age < 18, go to MAM_END.
Otherwise, go to MAM_Q038.

MAM_Q038 **Have you had a hysterectomy? (in other words, has your uterus been removed)?**

1 Yes
2 No
DK, R

MAM_END

PAP SMEAR TEST

PAP_C1 — If (do PAP block = 2), go to PAP_END.
PAPCFDO — Otherwise, go to PAP_C020.

PAP_C020 — If proxy interview or male or age < 18, go to PAP_END.
Otherwise, go to PAP_Q020.

PAP_Q020 — **(Now PAP tests)**
PAPC_020 — **Have you ever had a PAP smear test?**

1	Yes	
2	No	(Go to PAP_Q026)
	DK, R	(Go to PAP_END)

PAP_Q022 — **When was the last time?**
PAPC_022 — INTERVIEWER: Read categories to respondent.

1	**Less than 6 months ago**	(Go to PAP_END)
2	**6 months to less than 1 year ago**	(Go to PAP_END)
3	**1 year to less than 3 years ago**	(Go to PAP_END)
4	**3 years to less than 5 years ago**	
5	**5 or more years ago**	
	DK, R	(Go to PAP_END)

PAP_Q026 — **What are the reasons that you have not had a PAP smear test in the past 3 years?**
INTERVIEWER: Mark all that apply.

PAPC_26A	1	Have not gotten around to it
PAPC_26B	2	Respondent - did not think it was necessary
PAPC_26C	3	Doctor - did not think it was necessary
PAPC_26D	4	Personal or family responsibilities
PAPC_26E	5	Not available - at time required
PAPC_26F	6	Not available - at all in the area
PAPC_26G	7	Waiting time was too long
PAPC_26H	8	Transportation - problems
PAPC_26I	9	Language - problem
PAPC_26J	10	Cost
PAPC_26K	11	Did not know where to go / uninformed
PAPC_26L	12	Fear (e.g., painful, embarrassing, find something wrong)
PAPC_26M	13	Have had a hysterectomy
PAPC_26N	14	Hate / dislike having one done
PAPC_26P	15	Unable to leave the house because of a health problem
PAPC_26O	16	Other - Specify
		DK, R

PAP_C026S — If PAP_Q026 <> 16, go to PAP_END.
Otherwise, go to PAP_Q026S.

PAP_Q026S — INTERVIEWER: Specify.

_____
(80 spaces)
DK, R

PAP_END