Evaluating Predictive Factors for Engaging in Positive Breast Health Behaviours:

A Quantitative Study among Iranian Immigrant Women in Montreal

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ABSTRACT

Introduction: Breast cancer is the most common cancer in women worldwide; however, Iranian breast cancer patients are relatively younger than their counterparts in developed countries. This is important for Canada for two reasons. First, Iran is one of the ten most common countries of birth among immigrants with women making up over half of that population. Second, immigrant women in general are often marginalized and isolated due to inadequate language skills, lack of knowledge of services offered to immigrants, difficulties integrating, not knowing how to access breast cancer screening and about positive breast health behaviour, as well as religious and cultural barriers. Of the limited empirical evidence on breast cancer screening among newly landed immigrants, few studies have evaluated behaviours and beliefs pertaining to breast cancer and breast health behaviour including breast cancer screening practices in Iranian women.

Objectives: To evaluate self-reported engagement in positive breast health behaviours (breast self-examination, clinical breast exam, or mammography) among Iranian immigrant women. The specific aims are to further determine what are the self-identified barriers and facilitators for engaging in breast health behaviour and to determine what factors are associated with an increased likelihood of engaging in breast health behaviour in this population.

Methods: Several conceptual frameworks were incorporated to guide the study data collection tools for this thesis including Andersen's Behavioral Model of Health Service Use, Champion's Health Belief Model, and Berry's Acculturation Model. This was a cross-sectional study conducted in Montreal area from August 2017 until February 2018. A self-administered questionnaire was distributed to 450 Iranian immigrant women residing in Montreal with snowball sampling. The inclusion criteria for the participants were: a) women between the ages of 20-80 years who lived in Montreal, b) with no history of breast cancer, and c) able to read and speak English, French, and/or Persian. Using SPSS, data were analyzed through descriptive univariate frequencies, bivariate cross tabulation and multivariate logistic regression. Logistic regression was used to identify predictors of women engaging in breast health behaviour. I conducted the method of backward stepwise regression to establish the final logistic regression model ($p>0.20$ for removal from model). The logistic regression results were reported as odds ratios (ORs) and 95% confidence intervals.

Results: In general, screening rates for breast cancer among the 403 participants in the current study were higher than those reported for Canadian women nationally. The majority of women heard about breast cancer (86%), and 91% engaged in at least one positive breast health behaviour. Among predictors, only age, breast self-examination self-efficacy, having history of breast problems, and receiving doctor's recommendation had strong association with positive breast health behaviour [adjusted OR (95% Confidence Interval(CI)]. Acculturation and religiosity were not significantly correlated to positive breast health behaviour.

Conclusion: These findings are inconsistent with previous studies on immigrant women living in developed countries. Eliminating barriers, promoting motivators, and increasing perceived self-efficacy; as well as persuading physicians to provide recommendations for mammography are important to promote breast cancer screening among Iranian immigrant women.

RÉSUMÉ

Introduction: Le cancer du sein est le cancer le plus courant chez les femmes à travers le monde. Les patientes iraniennes atteintes d'un cancer du sein sont relativement plus jeunes que leurs homologues des pays développés et cela a des implications directes pour le Canada parce que d'une part, l'Iran est l'un des dix pays de naissance les plus communs parmi les immigrants et les femmes représentent plus de la moitié de cette population. D'autre part, les femmes immigrantes en général sont souvent marginalisées et isolées en raison de compétences linguistiques inadéquates, d'un manque de connaissance des services offerts aux immigrants, de difficultés d'intégration, du manque d'accès au dépistage du cancer du sein, ainsi que des barrières religieuses et culturelles. Parmi les données empiriques limitées sur le dépistage du cancer du sein chez les immigrantes nouvellement admises, peu d'études ont évalué les croyances concernant le cancer du sein et les comportements de santé reliés, y compris les pratiques de dépistage chez les femmes iraniennes.

Objectifs: Décrire les comportements positifs en matière de santé du sein (auto-examen des seins, examen clinique/mammographie) chez les immigrantes iraniennes. Nous comptons également identifier les obstacles et les facilitateurs des comportements de santé du sein et évaluer les déterminants des comportements de santé du sein dans cette population.

Méthodes: Plusieurs cadres conceptuels nous ont guidés pour cette thèse, notamment le modèle comportemental d'utilisation des services de santé d'Andersen, de croyance en santé de Champion et d'acculturation de Berry. Il s'agit d'une étude transversale menée dans la région de Montréal d'août 2017 à février 2018 par échantillonnage en boule de neige à l'aide d'un questionnaire auto-administré. Les critères d'inclusion étaient: a) être d'origine iranienne et âgée entre 20 et 80 ans vivant à Montréal, b) sans antécédents de cancer du sein, et c) avoir la capacité de lire et de parler en anglais, français et/ou persan. Les analyses descriptives uni variées et bi variés ainsi que les régressions logistiques multivariées ont été réalisées à l'aide de SPSS 24 ®. Par la méthode de régression logistique pas à pas vers l'arrière nous avons tenté d'identifier les prédicteurs des comportements des femmes en matière de santé du sein

Résultats: Le questionnaire a été distribué auprès de 450 femmes et 403 y ont répondu. En général, le taux de dépistage du cancer du sein parmi ces 403 iraniennes était plus élevé que celui des femmes canadiennes à l'échelle nationale. La majorité des femmes avaient entendu parler du cancer du sein (86%) et 91% avaient déjà eu au moins un comportement positif en matière de santé du sein. Parmi les facteurs prédictifs, seul l'âge (OR=1.071; 95%CI=1.010-1.136), et le fait de croire à l'efficacité de l'auto-évaluation des seins (OR=1.123; 95%CI=1.059-1.191) étaient étroitement liés au comportement positif en matière de santé du sein. Bien que significatif dans le modèle univarié, les antécédents de problèmes mammaires ou la recommandation du médecin ont perdu leur signification dans les analyses multivariées. L'acculturation et la religiosité n'avaient pas d'impact sur le comportement positif en matière de santé du sein.

Conclusion: Avec 91% de comportement positif en matière de santé des seins, les iraniennes de Montréal se distinguent nettement du reste de la population canadienne. Ces résultats sont en porte-à-faux avec les études antérieures sur les immigrantes vivant dans les pays industrialisés. Éliminer les obstacles, promouvoir les facteurs de motivation et accroître l'auto-efficacité perçue; en plus de

persuader les médecins de fournir des recommandations pour la mammographie, sont des facteurs importants pour promouvoir le dépistage du cancer du sein chez les immigrantes iraniennes.

TABLE OF CONTENTS

List Of Abbreviations

BSE - Breast Self-Examination

CBE -Clinical Breast Examination

BCS- Breast Cancer Screening

BHB-Breast Health Behaviour

HBM-Health Belief Model

CSSS-Centres Intégrés de Santé et de Services Sociaux

PQDCS-Programme Québécois de Dépistage du Cancer du Sein

CTFPHC-Canadian Task Force on Preventive Health Care

PHAC-Public Health Agency of Canada

NCI-National Cancer Institute

RCT-Randomized Clinical Trial

OB/GYN-Obstetric and Gynecologist

BMI-Body Mass Index

NCP-Nurse Care Practitioner

US-United States

WHO-World Health Organization

BHQ- Breast Health Questionnaire

CBO-Community-Based Organization

AO- Acculturation orientation

Definition Of Terms

The following terms are defined for the purpose of this study:

1. *self-efficacy (self-confidence):* The belief leading to execute a behaviour that will then result in a desirable outcome (1, 2).

2. *Perceived risk (susceptibility)*: perceived beliefs of personal threat or harm related to breast cancer. Perceived personal vulnerability to or subjective risk of a health condition. Perceived personal harm of the condition (3).

3. *Perceived benefits (seriousness):* Perceived positive attributes of an action(4).

4. *Perceived barriers:* Perceived emotional, physical, or structural concerns related to mammography behaviour. Perceived negative aspects related to an action (3).

5. *Health motivation:* Health motivation is a multidimensional subsystem which involves the processes of choice, need for competency, and self-determination in one's health (4, 5).

6. *Acculturation:* The process which involves an attempt to re-establish a new life and cultural context in another one(6).

7. *Iranian:* The Iranian people are a diverse Indo-European ethno-linguistic group that comprise the speakers of Iranian languages (7). For purposes of this study, the term Iranian defined as a woman who identifies herself as of Persian, Azerbaijani, Gilaki, Mazendarani, lur, kurd, Turkmen, Baluch, Turk, and Talysh origin.

List of Figures & Boxes

Box 1: Summary of recommendations by Canadian Task Force on Preventive Health Care for clinicians and policy-makers

Box 2- Constructs/key concepts of Champion's Health Belief Model

Figure 1- Gelberg-Andersen's Model of Health Service Utilization

Figure 2- Berry's Model of Acculturation

Figure 3- Integrated Conceptual Framework

Figure 4- Positive BHB in Iran and in Canada

Figure 5- Ratio of Having Mammography in Canada and Length of Stay in Canada

Figure 6- Ratio of Having Mammography in Iran and Length of Stay in Canada

List of Tables

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12

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Preface

This traditional thesis is a product of the research I performed under the guidance of my thesis committee members. I received substantive input and feedback on the thesis from my thesis committee members: Dr. Gillian Bartlett, Dr. Ellen Rosenberg, Dr. Amalia M. Issa, Dr. Brenda MacGibbon, Dr. Tamara Ellen Carver, and Miss. Vasiliki Rahimzadeh. Input on the methodological aspects of the dissertation was also provided by Dr. Gillian Bartlett.

Chapter 1. Background

Breast cancer is the most common cancer among women both in developed and developing countries, and represents ten percent of all new diagnosed female cancers worldwide every year (8). It is also the main cause of cancer-related mortality among women after lung cancer. About 55% of the global burden of disease is currently experienced in developed countries, but incidence rates are rapidly rising in developing countries (9). Specifically, breast cancer is the most common cancer and the 2nd leading cause of death from malignancies among Canadian women. Statistics Canada estimates that 25% of all new cancer cases (approximately 26,300 women) will be diagnosed with breast cancer in 2017(10).

Interestingly, patterns in both the incidence and prevalence of breast cancer in Iran (24.2 and 37.7 per 100,000, respectively)(11) parallel those in Canada. It remains the third main cause of female death in Iran, with a mortality rate of 14.2 per 100,000 women in Tehran based on data from 2012, and one of the most common malignancies among Iranian women. Iranian breast cancer patients are relatively younger than their counterparts in other developed countries (12) (13). A retrospective study in Tehran looking at breast cancer patients' records during 10 years of referrals to surgical wards in teaching hospitals reported that 37% of cases had advanced disease. The mean age of breast cancer patients was 47.1, from which 2.3% were aged 25 years or less (12). While the main reasons for this observed trend are not entirely clear, women with a family history of breast cancer; menarche at a younger age; unmarried marital status; first full-term pregnancy after the age 30; and more than 5 full-term pregnancies were at a greater risk of developing breast cancer (14). Almost 23% of breast cancer cases were observed among Iranian women before age 40, 70% of whom died within a short time due to advanced disease at presentation (15). A minimum of 1-year survival rate was estimated in a study among 11,671 Iranian women (16). In addition, 68% of Iranian

women with advanced-stage breast cancer postponed their first visit to a healthcare professional up to 1 to 3 months because of several factors including lack of knowledge on necessity of physician's visit, fear, negligence, lack of access to a physician, and poverty (17).

These factors are important for Canada since Iran was among the five leading source countries for immigrants to Canada in 2001(5.3%)(18). According to various sources, in 2010, there were an estimated four to five million Iranian living abroad, mostly in North America, Europe, Persian Gulf States, Turkey, Azerbaijan, Australia and the broader Middle East, who mostly emigrated after the Iranian Revolution in 1979, from which almost 300,000 are residing in Canada(19). According to National Household Survey (NHS) 2011, Iranian residents accounts for 40,000 in Quebec. In addition, women account for 51% of Canadian immigrants (20) and according to the 2016 census profile of the Metropolitan area, around 23,405 Iranians reside in Montreal of which 49.7% are women (21). Evidence illustrates that most women, particularly underserved minorities, are at greatest risk of premature death associated with late diagnosis (22).

Since Quebec established its population-based screening program in 1998, over 160,000 Montrealers have benefited from the Programme québécois de dépistage du cancer du sein (PQDCS). Despite this, the rate of participation in screening programs among women in Montreal remain below the program's target. According to the most recent report from the Public health Agency of Montreal, the rate of participation in the screening program must be at least 70% in order to reduce breast cancer mortality by 25% (23). The 2006 census report however, found that the participation rate to be only 43% among the 213,595 women aged 50-69. Furthermore, it was estimated that 35% (24) of women never participated in the PQDCS from 1998-2008.

Differential access to screening and healthcare disparities among vulnerable and underserved populations, including recent immigrants remained a formidable challenge to improving breast

cancer patient outcomes(25). Socially and clinically vulnerable populations for the purposes of this thesis include racial and ethnic minorities; newly landed immigrants; children and adolescents; patients living with mental or physical disability; elder patients with diminished cognitive capacities; and impoverished and homeless persons (26). Underserved populations are also often underrepresented in research, further complicating health systems interventions to improve preventive breast cancer services among these groups (27). Among factors influencing cancer screening behaviours there are cultural barriers and attitudes that have been identified as leading themes in research with ethnic minorities. Culture is a dominant, inclusive, and versatile construct that impacts beliefs, attitudes, behaviour, and health(28).

Of the limited empirical evidence on breast cancer screening among newly landed immigrant (29), few studies have evaluated behaviours and beliefs pertaining to breast cancer in Iranian women. The most common evidence for non-adherence were a lack of knowledge and the belief that screening is not necessary (30). To date, much of the research on beliefs related to breast health practices for immigrants have been conducted on South Asian women living in Canada. South Asians are sociocultural different to the Iranian population, and hence not necessarily comparable in terms of their culture and religious variations (31). Iranian people have their own official unique language which shapes their culture. Participation in screening programs and adherence to recommended screening behaviours is reported to be low in Iranian women and is likely a contributing factor in the mortality rates among breast cancer patients in this population (32). Indeed, one of 4 Iranian women with breast cancer was diagnosed late (15). More research is needed to understand how to best measure health beliefs in culturally diverse populations and how the Iranian immigrant's acculturation orientation relates to the specific health behaviours such as breast cancer screening. This information may help improve screening, early detection and treatment of breast

cancer among newly immigrant Iranian women. Specifically, screening programs would benefit from research that helps inform culturally sensitive screening programs and policies among this population. The objectives of this study are to better understand the barriers and facilitators to engaging in breast screening for newly immigrated Iranian women.

Chapter 2. Literature Review

2.1. Importance and Impact of Prevention and Early Detection in Breast Cancer

In 1999, there were 18700 new cases of breast cancer and 5400 deaths from this disease in Canada (33) comparing to 22700 new cases and 5400 deaths in 2009 which is indicative of the positive role of screening. Early detection may reduce breast cancer mortality among women at average risk (34). Based on an estimation for the 5000 deaths due to breast cancer in 2014, representing almost 13.8% of all female cancer deaths, there is a decline in age-standardized mortality rates for female breast cancer in Canada since the mid-1980s. This indicates a relative reduction of 43% in death rates from 1986 to 2014 (35). This reduction is envisioned to be the direct result of increased participation in breast cancer screening particularly mammography (34). Declining mortality rates in the United States, United Kingdom and Australia are comparable (36).

In general, breast cancer is the most common malignancy among women in both developed and developing countries with a low incidence rate of <30 per 100000 and high incidence rate of >80 per 100000 respectively. This trend is changing in developed countries due to early detection (6-23 per 100000) (37). In recent decades, mortality and serious sequelae following breast cancer (38, 39) have considerably reduced owing to the performance of screening programs and early diagnosis (40). In Iran and other developing countries, however, changes toward modernized lifestyles such as changes in diet and delayed first childbirth, lower parity, and shorter periods of breastfeeding, which are important risk factors for breast cancer has led to an increased incidence as well as later diagnoses (more than 80%). Iranian women in particular have an increasing trend in breast cancer incidence while women's practices for breast screening measures are low (less than 15%)(41).

2.2. Recommendations on Breast Cancer Screening

For the purposes of this thesis, screening is defined as any medical test performed on an asymptomatic population in order to detect disease before symptoms appear (42). A "screening program" refers to screening activities organized by the healthcare system to facilitate early detection, diagnosis and treatment of disease. As such, the underlying goal of breast cancer screening is the detection of disease at an early stage, facilitate treatment, improve prognosis, and reduce mortality. Breast cancer is known to have a detectable asymptomatic phase, wherein breast tumors can be detected before the clinical phase in which symptoms present. Indeed, establishing population-based screening programs including periodical mammography, clinical breast examination and breast self-examination as early detection methods are significantly affected the reduction of deaths from breast cancer (43).

The Canadian Task Force on Preventive Health Care (CTFPHC) provides guidelines to standardize clinical practice and promote primary care involvement in breast cancer screening and breast health. These guidelines were developed based on several randomized controlled trials, which revealed that mammography reduces death rate among women aged 50-69 but has no significant benefit for women aged 40-49. The guidelines outline three breast health behaviours that increase screening: clinical breast examination (CBE), breast self-examination (BSE), and mammography. Although a small percentage of breast cancers can remain undetected, mammography is nevertheless recognized as the current best method for early detection, and the only screening modality to reduce mortality. Two additional modalities—CBE and BSE—are together necessary but not sufficient alone for reducing breast cancer mortality (44). Before the introduction of advanced imaging technologies such as mammography, BSE was the primary method for detecting solid tumors. Consequently, this method was and is advocated by various bodies and organizations to improve

early detection. Some cohort studies suggest a decrease in mortality rate among women practicing breast self-examination, however, implied biases in these types of studies make it difficult to fully endorse BSE. Only 7.6% of women with breast tumors who were practicing regular BSE actually detected the tumor through breast self-examination. The estimated sensitivity of BSE is between 26% and 89% and the specificity between 66% and 81% (45). In addition, there are some data indicating that BSE greatly increases the number of benign lumps detected, resulting in increased anxiety, physician visits, and unnecessary biopsies (46). At this time there is not sufficient evidence to either include or exclude programs teaching BSE to women, thus, this recommendation have remained unchanged since 1986 (Canadian Task Force on Preventive Health Care- 2011) (47).

Breast cancer screening programs are under provincial control in Canada, and targeted populations can vary with different age ranges being considered. Beyond sex, other risk factors such as age, family history, life style factors, reproductive factors, hormones, and density of breast tissue influence the risk profile of women and eligibility for screening (48). Excess estrogen associated with dense breasts among premenopausal women, makes the 40-49 age group very important (49). Based on the latest recommendations released by the Canadian Task Force on Preventive Health Care on screening for breast cancer in average-risk women aged 40-74, there is a reduction (83%) in mortality rate associated with screening mammography among this age group. This reduction is relatively higher for women aged 50-69 (86%) than among similar women aged 40-49 (82%), however, over diagnosis and unnecessary biopsy may be greater for younger women (50). The reduction of risk ratio of death associated with mammography following breast cancer among women aged 70-74 years is not statistically significant (Box 1) (47). There is no evidence that other screening measures such as magnetic resonance imaging, clinical breast examination or breast self-examination reduces the risk of mortality (47). Patients' values and preferences as well as pros and

cons associated with mammography are recommended to be considered when professionals are deciding whether to recommend screening for a specific woman who does not meet the population-based criteria (51). One limitation with this is that the National Cancer Institute (NCI) guidelines have noted that the underutilization of screening mammography among minorities may be attributed to low rates of physician referrals (52).

Reports from RCTs illustrate a decrease of 20-35% of mortality rate among women aged 50-69 years (53). Consequently, broadly recommending mammography for average-risk women is expected to reduce mortality through early diagnosis that is associated with long-term survival and increased quality of life in women (54). The level of adherence to mammography influences the effectiveness in detecting BC at an early stage (55).

Although mammography is the main screening test considered, this does not negate the application of BSE and CBE. On the other hand, these two later means of detection are difficult to apply in a rigorous and controlled manner to a whole population. The clinical examination of the breasts by a healthcare provider, as the only screening test, has not been evaluated in terms of effectiveness in reducing breast cancer mortality (56). In the studies which evaluate the effectiveness of screening tests, it's been repeatedly associated with mammography. It was therefore not possible to identify the relative contribution of clinical breast examination to the reduction of mortality and there is as yet no direct evidence that BSE alone results in a decrease in mortality. Therefore, this exam is not recommended as a regular screening method but may be used as a follow-up to a mammogram. This practice, however, may increase breast health awareness among women as well as healthcare providers. As a result, it may encourage a woman to see her healthcare professionals more often and may reduce the cancer stage at presentation. This procedure will be more valuable where there are not enough resources for mammography or there is no national or even regional

program. On the other hand, the available data suggest that women who receive mammography may not benefit from CBE. Also, CBE needs trained staff and cultural barriers may exist in some regions national (57).

Box 1: Summary of recommendations by Canadian Task Force on

Preventive Health Care for clinicians and policy-makers

Recommendations are presented for the use of mammography, magnetic resonance imaging (MRI), breast self-examination and clinical breast examination to screen for breast cancer (see Box 1). These recommendations apply only to women at average risk of breast cancer aged 40 –74 years.

They do not apply to women at higher risk because of personal history of breast cancer, history of breast cancer in first-degree relatives, known mutations of the BRCA1/BRCA2 genes or previous exposure of the chest wall to radiation. No recommendations are made for women aged 75 years and older, given the lack of data available for this group.

Mammography
• For women aged 40–49 years, we recommend not routinely screening with mammography. (Weak recommendation; moderate-quality evidence)
• For women aged 50–69 years, we recommend routinely screening with mammography every two to three years. (Weak recommendation; moderate-quality evidence)
• For women aged 70–74 years, we recommend routinely screening with mammography every two to three years. (Weak recommendation; low quality evidence)

Magnetic resonance imaging
• We recommend not routinely screening with MRI scans. (Weak recommendation; no evidence)

Clinical breast examination
• We recommend not routinely performing clinical breast examinations alone or in conjunction with mammography to screen for breast cancer. (Weak recommendation; low-quality evidence)

Breast self-examination
• We recommend not advising women to routinely practice breast self-

Several studies have confirmed the validity of CBE as a screening test. The results are varied as the sensitivity ranges from 47% to 83% and the specificity from 88% to 97%. In addition, some studies, where the CBE was associated with mammography, demonstrated some percentages of breast cancer which were identified by palpation and not being detected by mammography. Here again, the results differ from 3-45%. For instance, the study conducted in 1960 by the Health Insurance Plan (HIP) using less sophisticated mammographic equipment reports 45% of detected tumors by clinical examination alone while the reports from Breast Cancer Detection Demonstration Project (BCDDP) conducted in 1970 represent a proportion of a 9% detection by palpation. Canadian National Breast Screening Study (NBCC) noted a 13% of detection by CBE alone while, the Edinburgh study reported a 3% of detection in 1990. It therefore seems that the percentage of detected cases by CBE alone has decreased as mammography technology improved(58).

A simple, inexpensive alternative to early detection of breast cancer is breast self-examination (BSE) that can be accomplished in conjunction with clinical breast exam and/or mammography. BSE usually refers to a standardize technique of self-examining breasts in a particular way which involves following a specific pattern on a monthly basis. A complete BSE can take up to 15 minutes and includes visual inspection and palpation. Breast Self-Examination program generally involves one or more training sessions, either individually or public, operated by an instructor using printed educational materials (57). Its efficacy, however, is under investigation (54).

Although BSE is promoted as a method of breast cancer screening, there is not enough evidence to support the idea that it reduces mortality rates, however, breast awareness is still important. Based on few RCTs, BSE did not reduce mortality, so it was not recommended as a substitute for mammography in breast cancer screening. There is not enough evidence, however, concerning the mortality rate in countries with limited resources. BSE may be influential on

awareness and motivating women to see a health care provider, thus reducing the cancer stage at diagnosis. There is also a cultural challenge to perform BSE in some parts of the word, since, some women do not touch their breasts (57). BSE recommendations has been downgraded by some organizations such as Canadian Task Force on Preventive Health care (59). Thomas et al in 2002 revealed that teaching of BSE did not cause a reduction in mortality from breast cancer, but it resulted in more breast biopsies and benign lesions diagnosis (60). Despite this, it may be a premature conclusion that BSE is non-efficient, considering the fact that most women still detect their own breast cancer(59). A study report of a trial on teaching BSE that has been done by Thomas et al. (2002) found 81.9% of tumors were discovered through self-examination. Moreover, performance of BSE may result in early detection of primary tumors when they are smaller which, in turn, may lead to more conservative surgery (61). Therefore, breast awareness is being suggested as a reasonable health practice specifically for younger women who do not receive mammograms. Currently, different policies and recommendations reflect a conflicting evidence on the efficacy of BSE (62). The US Preventive Health Services Task Force is a good example of this conflict: BSE is neither recommended nor discouraged, whereas the American Cancer Society continues to promote the practice (48). In UK women are encouraged to use BSE for breast awareness. Breast self-examination is a patient-centered, inexpensive, and non-invasive diagnostic test which is still promoted in Iran and has been resulted in earlier diagnosis and more effective treatment (63). A comparison of recommendations for screening for breast cancer is provided in Table 2 (47). Moreover, women are more comfortable with this form of screening than other forms (64). Finally, women who perform BSE on a regular basis are more inclined to seek medical help such as mammography and clinical breast exam(65).

Despite the fact that BSE has some benefits, the rate of application is low (66). Research conducted among different ethnic groups in US showed a range of 29% to 63% in monthly BSE rates (67, 68). Similar results were reported that only 17% of Iranian women conducting regular BSE which was mainly addressed their lack of knowledge and education regarding BSE (32). Variables such as demographic characteristics, education, knowledge, and belief regarding the necessity of regular BSE influence the engagement in this screening practice (69). National Health Interview Survey assessed screening patterns among women aged 40 and older and found that 90% of women had ever received a CBE (70). In addition, various reports show a decline in adherence to mammography in the past decade (71).

2.3. Factors Impacting Engagment in Screening

Mammography utilization in women aged 40 and older in 2000 was 70.1%. This number dropped to 68.3% in 2005 with only a slight change in 2008 (68.5%). Diverse factors such as social, economic, cultural, geographical, psychosocial and environmental have been associated with mammography and other screening guidelines adherence and women's utilization (72). Various predictors that play a role in adherence to screening guidelines and women's utilization of mammography have been documented. These include levels of perceived risk; perceived benefits; self-efficacy and health motivation as well as other predisposing, enabling, need-related and psychosocial factors that include immigration status, religiosity, acculturation, and family characteristics.

2.3.1. Predisposing Factors

For the predisposing factors, age, among the demographic characteristics is still considered the most important risk factor (73). The starting age for breast cancer screening is one of the most controversial and debated points (48) due to the fact that there is no worldwide consensus on age

borders for the definition of "young" age breast cancer. The cut-off point of young age differs between 30 and 45 (74). Previous studies to evaluate factors associated with adherence to recommendations have described younger women more likely to participate in screening programs (75). Women aged 65 years or older was reported to believe that the procedure of mammography could not find a cancer that she or her doctor could not find, and she valued this procedure less than a younger woman (75).

Findings from previous studies indicating that marital status produced statistically significant correlation with breast cancer screening (76). Women who were either single or never been married were less likely to have accomplished a mammography screening during the past two years compared to other groups. This lower screening rate suggests that spousal/partner support, may be an important component in influencing women's screening behaviour (77).

In addition, race is a social concept nevertheless, labels used to describe race- such as "black", Middle Eastern", or "Asian"- are often applied to describe genetic categories and physical traits(78). Furthermore, the concept of racialization or ethnicization refers to the processes of attributing an ethnic group to be designated as a particular identity, to be determined as different and subject to unequal treatment accordingly (78, 79). The term racialization clarifies that race is beyond the biological fact, but is rather formed through social interactions, norms and practices, and potentially exposes individuals to racism (79). Ethnicity defined as a unique pattern of beliefs and perceptions toward the meaning of "health" and "illness", may influence how patients interpret and respond to their symptoms and seek health services (80) (81). Health service use varies by immigration category, region of birth, length of stay in Canada, and type of health services. Overall, recent immigrants access 5%-24% fewer physician visits and represent 36%-54% fewer hospital

discharges than Canadian counterparts and are thereby considered "under users" of the healthcare system (82-84).

Nearly 56% of immigrants to Canada fall into the category of economic class who tend to be highly educated. In fact, the proportion of men and women holding a university degree is significantly higher among recent immigrants (24% and 19%, respectively) than among the Canadian-born population (13% and 12%, respectively)(85). A higher education level inculcates health self-responsibility, hence, it positively affects the screening practices (86). Despite the high education which usually is predictive of increase screening participation, in 2004, one in five recent immigrants of working age were living in poverty, twice that of non-immigrant Canadians(87). They might be highly educated in their home countries, but they are sometimes considered to have low literacy or to be illiterate because of difficulty in communicating in one of the official languages in Canada or, in this case, Montreal (French or English). Therefore, they often face a lack of access to proper healthcare and appropriate jobs and live in low-income neighborhoods (88).

Although Canada's immigration policies favor highly educated and skillful immigrants, studies show that recent immigrants experience more barriers integrating into the labor market (89). Lack of Canadian experience, difficulties transferring their educational and professional credentials to meet Canadian competencies, discrimination, and language barriers together contribute to these integration challenges. Economic distress, unemployment or underemployment, and unmet expectations expose immigrants to depression(90). Members of a visible minority are commonly working in low income jobs and earn lower wages for the same jobs as compared to non-minorities(91). Determinants of health such as gender, poverty, social support, discrimination, and meaningful employment opportunities significantly affect equitable access to available health

services, and immigrants who report experiencing these, and other barriers are more likely to experience emotional distress (92).

Despite a growing body of evidence linking spirituality and religiosity to health and well-being (93) (94), considerably less is known about the role of religious beliefs in breast cancer screening or treatment decisions (95). Religiosity, religious involvement religiousness, and spirituality are terms that are often used interchangeably. Experts have not reached a consensus on the theoretical and operational definitions of these terms (20) (96). Rew and Wong indicated in the results of their systematic review with a nationwide sample that religiosity and spirituality have positive influence on adult health behaviours (97). Mammography was reported to be completed less likely among women who perceived religious discrimination in healthcare, and those with positive religious coping mechanisms. This findings contradicts studies among Chritians, in which positive religious coping significantly increased the number of individuals who undergo breast, cervical, and colon cancer screening (98). In this study, we are going to evaluate the effects of religious belief on cancer screening among Iranian women without cancer and their intention to either seek care immediately or to delay seeking care for a self-detected breast lump.

Since immigrants are a source of diversity in Canadian population and they are representative of different cultural and ethnic backgrounds, there is growing evidence of how socio-cultural barriers to healthcare affect utilization rates and population health outcomes. Despite this, a wide variety of elements such as language and cultural barriers, traditional beliefs and practices, discrimination, and perceptions of shame that might lead to the issue of access, have not been studied in Canada (93). This is important as evidence shows that immigrants' health declines over time as a result of language and cultural barriers and lack of access to healthcare services

among other reasons (99). If services provided by the health care system were more accessible, as well culturally and linguistically sensitive, this deterioration may be mitigated.

One of the most explored dimensions of the immigrant experience in multicultural research is acculturation (100) (101). Cultural barriers are commonly reported by immigrants more than non-immigrants while seeking assistance for health services. Immigrants do not perceive that existing health services are culturally or linguistically sensitive based on diverse communities' requirements. Cultural issues include basic knowledge about health obtained from country of origin, cultural beliefs about illness, acquaintance with the healthcare system in Canada and lack of cultural awareness among service providers within the institutions. There are other barriers identified by immigrants such as fear of speaking English or French, sense of lack of authority, feeling of being isolated and outsider, lack of familiarity with Canadian information resources, not being aware of how to seek services, and cultural differences. Above-mentioned barriers has been defined as "acculturation" that positively associated with higher rates of breast examination and mammography screening (102). A number of US-based studies have shown a positive association between increasing acculturation and cancer screening via mammography (103, 104). Among the different models, Berry's acculturation model is well positioned to address acculturation phenomena within the health system. Acculturation has been described as "the psychological adaptation of individuals from their cultures of origin to a new or host cultural environment." For immigrants in Montreal, whose language is not English or French, acculturation includes the choice of language to use for their daily life.

The influence of social determinants of health vary across this population by immigration status, sex, generation and ethno-linguistic group. Consequently, it is highly recommended to recognize health inequalities and to put into practice targeted health and social interventions focusing special needs of immigrants' sub-groups (105). Resettlement, adaptation, and even immigration itself

are stressful and has been associated with inevitable health outcomes notably tuberculosis, diabetes, and mental health problems (106). Longitudinal studies with immigrants demonstrate that available social supports, services, and opportunities will mitigate good health condition and successful settlement even among the most vulnerable migrants (85).

The length of stay in the host country may be a significant predictor for the adherence of migrants to the cancer screening programs (107). Being a recent immigrant is reported as a barrier to receiving cancer screening. Certainly, women who have spent more time in host countries may be more proficient in the host language and more likely to be integrated into screening programs, thus feel more confident approaching the healthcare system.

Overall, healthcare inquiries, knowledge of the unique patterns of health status, access to health and barriers to health service use by immigrants is limited in Canada (108). Consequently, there appears a critical gap in research-based knowledge regarding access to and use of health services from the point of view of disadvantaged and marginalized subpopulations. The main barrier to health care (or possibly preventive care) remains access to affordable and culturally appropriate care (109) (110). The ability of a society to construct a culturally appropriate environment for immigrants to overcome the barriers to access care reflect the determinants used by healthcare professionals such as health literacy or applying both official languages in rendering services(83).

Furthermore, the concept of "social capital" has been found to use for study of immigrant integration(111, 112). Social capital refers to the existing networks of social relationships that may facilitate access to resources and supports in order to function effectively. The latest research news has reported that social capital may affect health outcomes in a number of ways: improving access to health services by circulating health information, by providing tangible assistance such as money, transportation, and emotional support. However, insufficient data indicates the limited Canadian

research on how social capital influences the health disparities and outcomes of immigrants. Findings indicate that immigrants who are involved in friendship and organizational networks such as community organizations, religious and ethnic groups reported being healthy more than those who are not involved. Therefore, social capital plays an important role in maintaining immigrants' health during first years of settlement and research around this issue can be beneficial in apprising immigrant health policy(112).

Beyond the short-term perspective, the health immigrant paradox has documented how chronic diseases increase after years or even decades post-migration such as mental issues (113). Likewise, once settled at their host country, people keep travelling back and forth to their "home" country that may cause secondary exposure to infectious diseases (114). A combination of factors shaped the "healthy immigrant effect". One potential factor can be described by differences in health behaviours. Research reveals some changes among immigrants' positive health habits with respect to diet and physical activity over time. They gradually resemble to Canadian-born citizens and then develop chronic diseases. Acculturation of western norms, consumption of high-fat and processed foods, and adoption of risky behaviours, are frequently responsible for immigrants' health deterioration(115).

The findings of a study by McDermott S et al. in 2010 support this idea that immigrants are at lower risk for all site cancer than the Canadian-born (116). The possible explanation for this lower risk includes dietary patterns which consists of lower saturated fat and also lower prevalence of smoking(116). Migration, however, is an ongoing "natural experiment" in which immigrants are relocated from an environment to a quite different context with different risks and factors which has implications for their mental as well as physical health (116). Essentially, immigrants are admitted to the screening measures prior immigration, thus, they may be healthier. Thereupon, in any society,

there is a self-selection meaning that usually individuals with the best heath condition, courage, stamina, and resources decide to migrate (113). Also, at the state level, receiving countries can benefit from this positive selection and force a second layer within their immigrant admission policies(113). This impact is offset by qualitative research that has revealed that discrimination negatively affects health among immigrants in Canada. According to statistics Canada 2013, 60% of the foreign-born population experience discrimination or unfair health services because of their ethno-cultural background(117). Likewise, lack of access to healthcare has been suggested as a possible explanation for health deterioration in this group(118).

Health is not equivalent among all subgroups of immigrants. The health condition of immigrants is a product of a combination of factors such as environment, economy, genetic, and socio-cultural elements which shape the diversity of health quality among migrants. In the early 1990s, the Federal/Provincial/Territorial Committee on Population Health highlighted the interaction of a variety of determinants (income and social status, social support networks, education and literacy, employment/working conditions, social environments, physical environments, personal health practices and coping skills, healthy child development, biology and genetic endowment, health services, gender and culture) with health and they emphasized on that area of research (119). Recently, there is an increasingly focus on health disparities among underserved population groups and how it relates to social and economic determinants of health including participation in screening programs (120).

Increasing feminization of migration is a noticeable phenomenon comprising 50% of migrants in many countries and over 60% in those with large programs of domestic services(85).. Health literacy and the accessibility of culturally sensitive services are major determinants for immigrants which in their absence, inequalities will be enhanced. Evidence reveals that immigrants

were less likely to report their chronic diseases including cancer by 40%(OR=0.6) than Canadian-born. Health Canada has stated that "the overall goal of a population health approach is to maintain and improve the health of the entire population and to reduce inequalities in health between population groups"(121). According to Canada's Ethnic Diversity Survey, 20% of individuals reported experiencing discrimination "sometimes or often" in the past five years of which 32% were blacks comparing to 21% and 18% of South Asians and Chinese respectively(78). Perceived discrimination negatively impacts on mental and physical health through direct influences on psychological and physiological status which are directly linked to other determinant of health(122).

In addition to ethnicity, language ability, education and job skills are linked with good health as protective factors for some immigrants (123). Consequently, delayed employment due to delayed recognizing their credentials, hence, lack of adequate income can be the leading cause of poor health status. Exhausting migration experiences, associated with language deficiency can further increase the risk of transitioning to lower health status. Economically disadvantaged ethnic groups in large metropolitan areas disclose the racialization issue in this trend (124). Also, despite the idea of easy availability of health information, studies show that such information usually does not reach those people with language barriers or limited literacy (125). On the other hand, many new comers in Canada perceive the indicate a problem with the lack of access to preventive healthcare services and difficulties in adapting to a new health culture, specifically for immigrants with limited knowledge of English and French (126) (127). Comprehension and communication barriers are the outcomes of language capabilities. Many studies highlighted that some immigrant women, notably members of South Asian and Chinese groups experienced communication difficulties which exacerbated by non-appropriate translation and interpretation. Some other studies suggested that written materials in their own language were acknowledged by ethnic minorities. Other studies

suggested that written information in appropriate languages was more efficient to increase knowledge or service utilization (128).

Canada is a multicultural society. Language, culture and communication between healthcare providers and patients are extremely important. Giving special attention to the role that culture and religious beliefs play for preferences of each ethno-cultural group is of particular importance for high quality care. This include practices such as touching, the meaningful use of sounds, music, visual imagery, and art, as well as interconnecting cultural values and metaphors as expressions of being, thinking, believing, understanding, living, and doing (129). Inability to communicate with a healthcare provider leads to barrier to access the services as well as undermining trust in the quality services and decreasing the likelihood of appropriate follow-up and consequently might result in misdiagnosis and under treatment (24) (130). Immigrant women are often marginalized and isolated due to inadequate language skills, lack of knowledge of services offered to immigrants, difficulties integrating into Canadian society, not knowing how to access breast cancer screening and the required frequency according to Canadian policies, as well as religious and cultural barriers (131). Breast cancer accompanies threatening conditions such as physical deformities and mortality, disruption in marital status, family structure, and financial instability.

2.3.2. Enabling Factors

In the early years of settlement, immigrants are commonly struggling with poor health that is linked to poverty, financial insecurity and income inequality (132). A study that supports this idea revealed that women 65 and older with the household incomes of $25000 or more were almost twice as likely to obtain information about mammograms from the print media than women with household incomes of $10000 or less. The latter group were more likely to get their information through

television and radio(133).

Transportation is often indicated as a barrier to healthcare access. Transportation barriers lead to rescheduled or missed appointments, delayed service and care or medication use. These consequences may lead to poor management of access to healthcare services. Patients with a lower socioeconomic status have higher rates of transportation barriers. Few studies that reported low rates of transportation barriers did not include vulnerable populations, such as immigrants and ethnic minorities (134). Even in urban areas where screening facilities are within reach, women often experience difficulties with getting to screening appointments. Among all barriers into routine screening, child care, transportation and time off work are the most common (135). It is also found that car ownership is significantly associated with improved breast cancer screening, whereas, public transport usage is inversely associated with breast cancer screening. It is thus recommended to consider different transport modalities and age-specific conditions in analyzing the transportation effects on screening adherence (136).

Self-efficacy is one of the enabling factors among vulnerable domain that can affect individuals' health behaviours (137). Various studies have illustrated the importance of women's self-efficacy in maintaining their health through breast cancer screening adherence. Previous research has also disclosed a positive correlation between high self-efficacy and screening mammography behaviour (138). Women with higher self-efficacy are more likely to get a mammogram and perform breast self-examination (139).

2.3.3. Need-related Factors

An interesting finding within studies on the impact of the predictive factors on healthcare service utilization model is that problems in ADL & IADL are negatively related to the promotion of health service use. It was found that older people who have problems with ADL & IADL require

more assistance to be consistent with their medical appointments and tests. Existing data also indicates that age is positively related to having problems in ADL & IADL, meaning that older individuals are more likely to have limitations in service use (140).

Another important risk factor for the development of breast cancer, besides advanced age, is a family history of breast cancer (141). Over the past several decades, many empirical and statistical models have been developed to estimate the risk of developing breast cancer during life. Most of these models focus on family history of breast cancer alone, but some use other risk factors additionally. The Canadian Breast Cancer Foundation provides a tool which is determined by a body of research with conclusive evidence confirmed by different sources and studies (142).

Canadian Cancer Society reported age, family history, age at first full-term pregnancy, early menarche, late menopause, and breast density as predisposing factors for breast cancer. Modifiable risk factors consisted of postmenopausal obesity, postmenopausal hormones, alcohol consumption, and physical inactivity. High relative risk factors for breast cancer included female, over 65 years old, BRCA1/2, two or more first-degree relatives with breast cancer diagnosed at an early age, personal history of breast cancer, high breast tissue density, and biopsy-confirmed atypical hyperplasia. Mild/moderate relative risk factors comprise one first-degree relative with breast cancer, high-dose radiation to chest, and high postmenopausal bone density. Factors affecting circulating (<12 years), late menopause (>55 years), no full-term pregnancies, never breastfed a child, recent oral contraceptive use, recent and long-term use of hormone replacement therapy, and obesity(postmenopausal). Other factors related to relative risk are personal history of endometrium, ovary, or colon cancer; alcohol consumption; tall height; high socioeconomic status; and Jewish heritage (143).

2.3.4. Health Behaviours

Organizational constructs that promote use of mammography in a timely manner include health insurance coverage and having a usual source of care (144). Women who lacked access to a usual source of care are only about 50% as likely to report having had a mammogram. Having seen a physician within the last two years was positively associated with use of screening services. Moreover, service use connected with higher income and access to regular medical care(145). Screening is not often discussed by healthcare professionals among a group of women, even though they were as motivated as their peers to get a mammogram (52). More than 2/3 of physicians do not regularly recommend mammography, whereas, studies confirm the crucial role of physicians' recommendation (146). A growing body of literature indicates that underutilization of mammography is the direct product of the failure of physicians' recommendation. Stephen et al suggest that an explicit recommendation is helpful but not sufficient. Women need more encouragement in order to participate. Determining women's values and beliefs concerning mammography might be a solution (75). Negative attitudes toward clients' racial or ethnic group and social stereotypes – whether conscious or unconscious - shape behaviours during the clinical encounter and influence decisions made by healthcare providers (147) (148) (149).

2.3.5. Personal Health Practices

Knowledge of the relationships between high-risk and healthy patterns of individual lifestyle is integral to be able to modify habits responsible for the development of pathological problems. Breast cancer is one of the pathologies which is widely researched to identify the preventive measures.

Breast cancer risk increases with body mass index(BMI) elevation among postmenopausal women. It was assessed through a meta-analysis that there is a 3% increase in risk of breast cancer

per 1 kg/m^2 increase in BMI which is probably associated with an increase in the serum concentration of bioavailable estradiol. Estradiol will increase as a result of rising in production of estrogens by aromatase in the adipose tissue and a decrease in the serum concentration of sex hormone (150).

Physical exercise can reduce risk (20%) and mortality (50%) among breast cancer survivors by modifying the different risk factors responsible for the development of breast cancer as well as relapses. Various biological routes are hypothesized: reduction in body weight, reduction of circulating of sex hormones, modulation of immune system, decline in insulin resistance and leptin. Results of the observational studies support the advantages of moderate intensity physical activity (151).

Results from the analyzed data which were collected through the Canadian National Enhanced Cancer Surveillance System support the association of increased risk of breast cancer with both active and passive smoking, among premenopausal women in particular. There is a 20% increase in risk for postmenopausal breast cancer. Tobacco exposure in childhood as well as in adulthood is linked with the highest premenopausal risk estimate (152).

A massive body of evidence illustrates that alcohol intake will increase risk of breast cancer (153). McDonald et al. highlighted that moderate consumption of alcohol has been associated to an approximate 30-50% increased risk in breast cancer. In addition to the carcinogenic role of alcohol metabolites, it has been demonstrated to change estrogen levels, which may lead to alteration in breast density, influencing breast cancer risk (154).

2.3.6. Improving Access to Screening

Several tailored interventions have been developed to control the barriers into BCS and to promote mammography including tailored physician's letter and/or booklets, tailored telephone

counselling, providing printed educational materials, and educational programs(155). Adherence to such recommended screening behaviours is reported to be low in Iranian women and is likely a contributing factor in the incidence of breast cancer deaths in this population (32). Indeed, one out of 4 Iranian women with breast cancer had late detection (15). Education regarding the breast cancer screening is a right of all women and needs to be culturally appropriate and tailored to the targeted population to have a meaningful impact on awareness and by extension prevention (57). Along with public education, training is also recommended for healthcare professionals at the frontlines of women's healthcare, including family physicians, midwives, nurses, NCPs, or other traditional healers (156). These providers, in particular, benefit from fostering longitudinal patient relationships of trust that enable shared decision making around screening (57).

In response to these findings, the Canadian Breast Cancer Foundation launched new initiatives to facilitate access to provincial screening services, including opportunistic screening with a doctor's referral. Organized breast screening programs that target patient populations by risk are considered the best approach to improving patient outcomes and enable efficient follow-up in case of abnormalities. Access to organized provincial programs often have several barriers including unawareness regarding the best option, ineligibility for the program (women aged 40-49), and limited availability to ready access services in remote communities or barriers due to health beliefs and cultural practices.(157). Despite these efforts, the rate of cancer screening remains low among immigrants, leading to delayed detection and potentially increased risk of breast cancer-related deaths (158).

As Canada's demographics evolve dynamically, so do population-based cancer risks and the need to assess screening programs for sociocultural and clinical fit. There is, at present, no available

data to track cancer incidence for foreign-born population at the national level that ultimately inform the evolution of such screening programs (159).

2.4. Thesis Objectives

In alignment with the Canadian Breast Cancer Foundation, the objectives of this thesis are to evaluate self-reported positive breast health behaviours (BSE, CBE, mammography) among newly immigrated Iranian women. The specific aims are to further determine what are the self-identified barriers and facilitators for engaging in BHB and to determine what factors are associated with an increased likelihood of engaging in BHB in this population. The research questions guiding this study are:

1. What proportion of Iranian immigrant women in Montreal are practicing at least one positive breast health behaviour as recommended by the Canadian Breast Cancer Foundation (BSE, CBE, mammography)?

2. What is the association between predisposing, enabling, need-related and psychosocial factors with the likelihood of engaging in at least one positive breast health behaviours for Iranian immigrant women in Montreal?

The hypotheses for this thesis are that:

1. Iranian immigrant women in Canada will be engaged in less breast health behaviours as recommended by Canadian Task Force on Preventive Health Care than the Canadian average.

2. Higher levels of perceived risk; perceived benefits; self-efficacy and health motivation will be associated with higher levels of engaging in breast health behaviours and perceived barriers with lower levels of breast health behaviours.

3. This association will be impacted by other predisposing, enabling, need-related and psychosocial factors that include immigration status, religiosity, acculturation, and family characteristics.

Chapter 3. Conceptual Framework

Several conceptual frameworks were incorporated to guide the study data collection tools for this thesis. A conceptual framework is defined as " a framework of interconnected concepts that gives meaning and explanation to relevant events and supports new insights and problem solving"(160). To address the thesis objectives, the Health Belief Model was used to determine factors associated with breast cancer screening (4, 161); Andersen's Behavioural Model of health service use adapted for vulnerable populations for factors associated with health service usage by immigrant women (26, 162); and Berry's Acculturation Model to address the cultural integration issues interacting with engaging in breast health behaviours among immigrant women (6, 163, 164). In this study, my approach to theory integration involved extracting the most pertinent constructs from each concept group and combining these constructs into a single integrated model, concurrently incorporating relationships among extracted constructs from the three conceptual models.

First, I utilized a revised and expanded version of the Andersen Behavioural Model for Health Service Utilization to create the integrated conceptual framework. Patients' needs for healthcare utilization are met by professionals in the healthcare system which is supply-induced and therefore strongly dependent on the structures of the healthcare system as well as need-related factors and patients' social characteristics. For this reason, one of the most widely acknowledged models of health – the Behavioral Model of Health (BM) - was developed by US medical sociologist and health services researcher Ronald M. Andersen in 1968 (165) (166). The Behavioural Model is a multilevel model that incorporates both individual and contextual determinants of health services use, those that predispose, enable, or suggest need for individual

use of health services. A revised and expanded version of behavioural model was created by Gelberg-Andersen for vulnerable population because the factors that make them vulnerable might also influence their health care services usage and subsequently their health status(94, 165, 167). In this study, I applied the Andersen Behavioral Model for vulnerable to explain the utilization of breast cancer screening programs. This Model can be used as a guide to explore multi-level factors that may facilitate or hinder breast cancer screening, particularly among vulnerable populations and immigrants. Applying models of health services utilization to immigrant groups can be beneficial in identifying the specific challenges they may face in receiving required services (168). The model enabled me to assess three elements: individual willingness to utilize these services, factors influencing their use, and patient's need for healthcare services.

While Andersen model includes health beliefs (attitudes and views for health services) and values related to predisposing factors, it did not address psychosocial factors. Different psychosocial, demographic and structural factors may cause differences in participation rates for screening (169). Furthermore, to utilize health services, both community (healthcare facilities and staff) and individual enabling resources must be perceived as being available to the patient (income, health insurance, regular source of care, travel and waiting times) (170). A reflective model of health services use, therefore, must include general self-assessments, the patients' illness experience and motivations for seeking professional help(171). According to the constructs of the Health Belief Model (HBM) developed by Champion, before taking any action for disease prevention or health promotion, a person should consider their potential health issues to be severe, perceive the advantages of the healthcare intervention, believe in the effectiveness of the recommended intervention, overcome any barriers to carrying out the intervention and respond to healthcare providers' cue to move them to action (161). The Health Belief Model, developed and

refined by Victoria Champion (1993), measures the health belief (psychosocial) constructs that evaluate breast cancer screening behaviours (172). The Health Belief Model hypothesizes that women who perceive more positive benefits of mammography and screening will be more likely to undergo it.

The Health Belief Model was first presented in the 1950s by Hochbaum, Leventhal, Kegeles, and Rosenstock(173). The original model consists four concepts: (a) perceived personal vulnerability to or subjective risk of a health condition(susceptibility), (b) perceived personal harm of the condition(seriousness), (c) perceived positive attributes of an action(benefits), and (d) perceived negative aspects related to an action(barriers). Health motivation was a later construct which was added to the original HBM in 1987 by Champion and has been found to be positively related to breast cancer screening. The most recent concept added to the HBM is confidence (173), which is determined as the belief leading to execute a behaviour that will then result in a desirable outcome. Confidence was introduced by Bandura to the HBM as self-efficacy in 1997 to improve the power of this model to explain people's behaviour (1). The latest component was derived from the Social Cognitive Theory, in which the individual can successfully execute the required behaviour in order to produce an outcome (137). Champion validated the scales used in the model to assess perceived susceptibility, severity, benefits, and barriers to breast self-examination in 1984 (120). Champion revised these initial scales to be mammography-specific in 1999(3) and translated them into several languages for piloting among different ethnic and cultural groups including Persian for the Iranian population (174). I have included the Champion's Health Belief Model Scale to measure perceived susceptibility, perceived seriousness, perceived benefits, barriers, and health motivation as differences in the types of beliefs have been found among different racial and

ethnic groups (175). The key constructs of CHBM are explained in box 2. Relationships among health belief constructs are demonstrated in Figure 1 with arrows.

Figure 1- GELBERG-ANDERSEN'S MODEL OF HEALTH SERVICE UTILIZATION
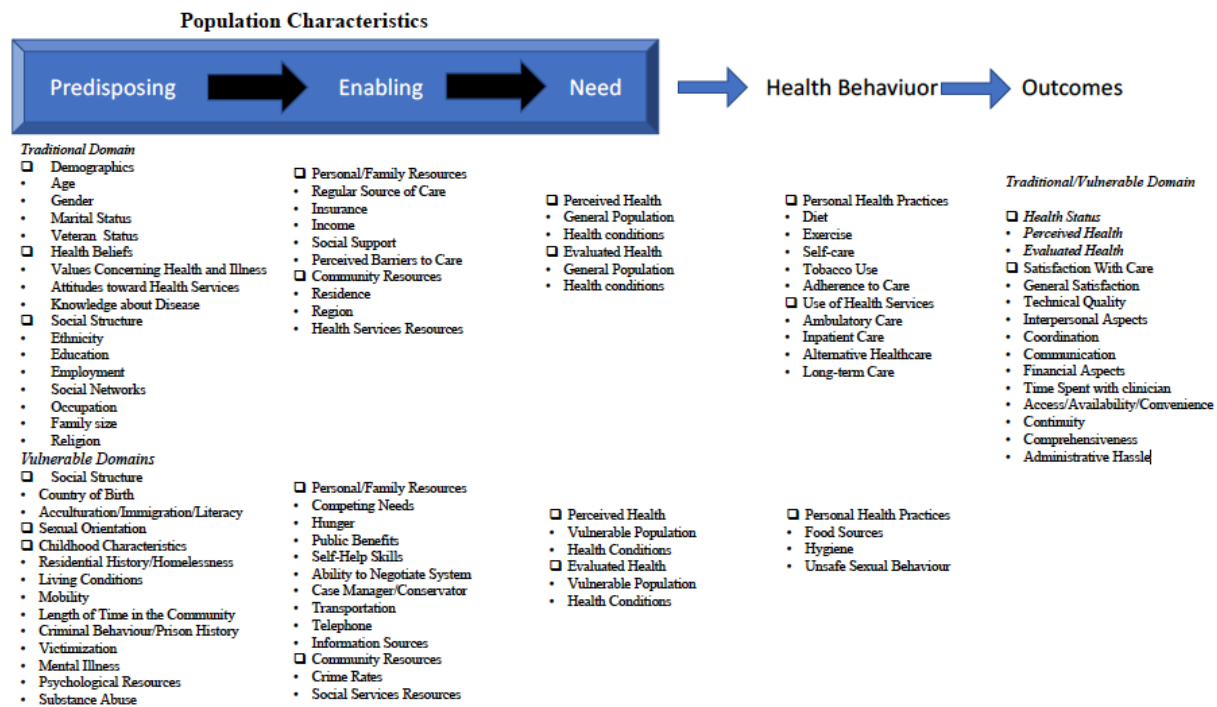
BOX 2- CONSTRUCTS/KEY CONCEPTS OF CHAMPION'S HEALTH BELIEF MODEL

Constructs/Key Concepts of HBM

- **Perceived Susceptibility.** Perceived susceptibility refers to beliefs about the possibility of catching a disease. A woman's belief about the possibility of getting breast cancer before having an interest in obtaining a mammogram, is an example of this concept.

- **Perceived Severity.** Feelings about the seriousness of catching a disease or from keeping it untreated include evaluations of medical, clinical, and social outcomes. The combination of severity and susceptibility has been called **perceived threat**.

- **Perceived Benefits.** Perceived threat is not enough for individuals to initiate the action unless they also perceive the action as potentially beneficial by reducing the threat.

- **Perceived Barriers.** Perceived Barriers act as obstacles to undertaking recommended behaviors, such as cost, pain and negative side-effects.

- **Health Motivation.** Health motivation produces the inner force which energizes and orients individuals to select such behaviors that can maintain and promote individuals' health and can prevent them from diseases.

- **Cues to action.** Cues to action are strategies to activate readiness to take the action. It promotes awareness, use appropriate reminder systems, and provide guidelines.

- **Self-Efficacy.** According to Bandura, self-efficacy is the confidence in one's ability to take action(1). Based on literature, self-efficacy is vital for initiation and maintenance of behavioral change.

In addition to health beliefs, significant connections between cultural context and personal behavioural development has been demonstrated within cross-cultural psychology. This process affecting immigrants involves an attempt to re-establish a new life and cultural context in another one is referred to as "acculturation". Given the social and individual variables in the society of origin, the host society, and existing phenomena both before and during the course of acculturation, the long-term psychological consequences of this process is also highly variable (177). Berry's model of acculturation focuses on how individuals who have developed in one cultural context manage to adapt to new contexts during the immigration process. As one most extensively identified theoretical models on immigrant adaptation, John Berry's conceptual model of four acculturation orientations which was established in 1980 (163, 177). The model categorizes a person's acculturation orientation (AO) into four classes when moving to a new host culture (Table 1) (Figure 2).

Over the years, numerous modifications have been applied on this model by Berry and others to establish the best acculturation measure. The unidimensional model looked at acculturation as a continuous process in which an immigrant starts off primarily part of her home culture and gradually loses aspects of culture of heritage and obtains aspects of the host culture through an acculturation process (178). This measure is limiting as it does not leave space for immigrant to maintain aspects of both cultures (179). Acculturation among the Iranian immigrants in my study was measured using the four dimensions version of Berry's Model of Acculturation. The validated questionnaire groups respondents into four strategies of acculturation: (1) assimilation (high host, low home) characterized by the individuals who wish to no longer maintain their cultural identity and seek daily interaction with the other culture; (2) separation

(low host, high home) characterized by the individuals' placement of value on holding on to their original culture, and at the same time they wish to avoid interaction with the other culture; (3) integration (high host, high home) characterized by the individuals' interest in both maintaining his/her own culture, while engaging in daily interaction with the other culture; and (4) marginalization (low host, low home) characterized by the individuals lack of interest in maintaining his own culture (often for reasons of enforced cultural loss) and at the same time, there is little interest in having interactions with the other culture (often for reasons of exclusion or discrimination). Individuals may maintain attitudes towards one of these ways of acculturating, so their actual behaviours may vary accordingly. These attitudes and behaviours encompass what we have referred to as acculturation strategies (6). The questions included in this validated instrument are listed in Appendix 1.

FIGURE 2- Berry's Model of Acculturation
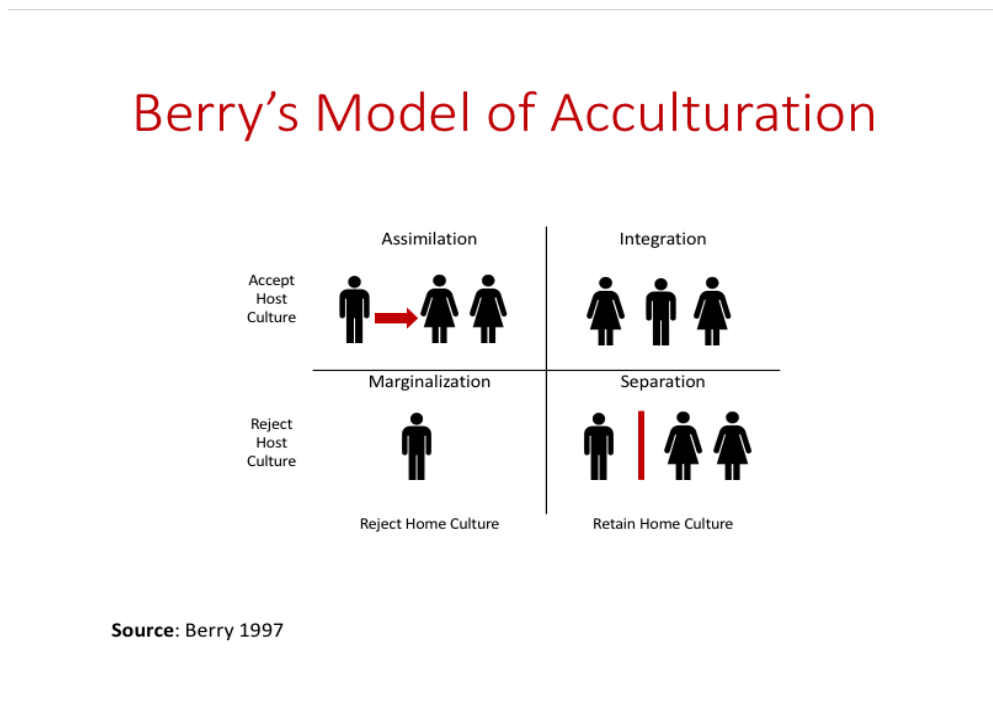
TABLE 1- Berry's Acculturation Model

Cultural Maintenance (Of Immigrant OR Host Culture)			
		High	Low
Contact and Participation (Of Immigrant OR Host Culture)	High	**Integration** Interest in maintaining one's original culture while also participating in daily and social activities of the dominant group and with other ethnic and cultural groups	**Assimilation** Individual does not wish to maintain his/her cultural identity and seeks daily interactions with other cultures
	Low	**Separation** Individuals place a high value on holding onto their original culture and avoid interaction with others	**Marginalization** Little possibility or interest in having relationships with others and little interest in or possibility of cultural maintenance (due primarily to experiences with discrimination or institutionalized, forced separation from others)

(Berry, 1998)

The use of these models (see Figure 3) to guide the questionnaire development is detailed in the methods section.

FIGURE 3- INTEGRATED CONCEPTUAL FRAMEWORK

FRAMEWORK MAPPING
Integrated Conceptual Framework
Adapted to BCS Among Immigrant Women
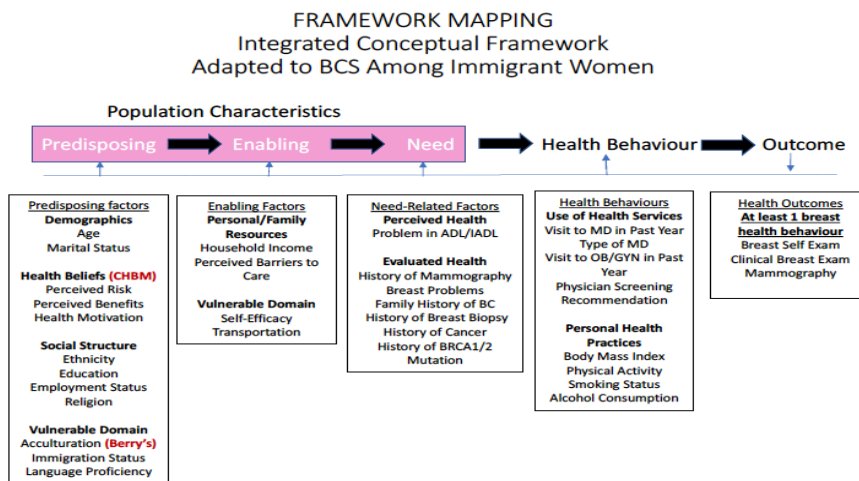
Chapter 4. Methods

4.1. Study Design, Participants & Recruitment

This was a cross-sectional study design using questionnaires. Four hundred fifty questionnaires were distributed to eligible participants over a 6-month period from August 2017 to February 2018 in Montreal, Quebec. Iranian immigrant women were included in the study if they: (1) resided in Montreal for at least one year; (2) were 20 years of age or older (due to the high proportion of advanced breast cancer reported in this population); (3) could communicate in Persian, English or French; (4) had no history of breast cancer; and (5) were able to provide informed consent. Women with history of breast cancer were excluded. Consecutive sampling was used until the desired number of subjects were recruited. I am an Iranian-trained research nurse, so I was present in the Iranian communities and screened all women who agreed to participate to ensure they met the eligibility criteria and to answer any question they may have had before signing the informed consent.

Montreal is home to 40,000 Iranians. There are 3 predominantly Iranian churches, 5 mosques, 5 schools, as well as myriad stores, restaurants, health providers, and more than 35 community-based organizations (CBOs). The Iranian community consists of different sub-communities based on different religions; Moslem, Zoroastrian, Baha'i, Jewish, Christian Iranian, and non-religious community. Women from each group were invited to participate in this study. The community supports 1 radio station, 2 daily television programs, and 5 Persian publications (e.g. Hafteh magazine). To achieve demographically broad participation, several advertisements were placed in two of the popular Iranian papers in Montreal to recruit eligible participants. The study was also featured in an interview broadcasted during a local Iranian television program. In

addition, recruitment announcements were emailed to members of four community centers, three

Persian schools, five women's groups, eight community-affiliated service organizations, and five

religious centers. Also, an article on the study was published in local newsletters and public

announcements, and social media. An invitation to participate in the study was also posted on a

popular Persian newsletter that was updated monthly from August 2017-Feb 2018.

To maximize recruitment, I attended regular meetings, seminars, and informal gatherings

for the Iranian-Montreal community to explain the project. Interested women were given a specific

day for completing the survey through an in-person visit. Several special events, such as Iranian

Women's Day, Mother's Day, the Persian Fall festival, Persian New Year celebrations, and

religious ceremonies and celebrations were held during the data collection period. The organizers

of these events invited me to attend these gatherings of the Iranian communities to facilitate

recruitment. Surveying a wide variety of groups within multiple settings, allowed for a diverse

sample. Each participant received a questionnaire package in the language of their choice (English

or Persian) including study information, informed consent, and returned the questionnaire to me

upon completion. Response time varied between 15 to 30 minutes. A complete list of locations

used for recruitment is included in the appendix 3.

4.2. Development of the Integrated Model: Measurements of Predictors and Outcomes

Based on the components of Andersen's Behavior Model of Health, the final instrument

(appendix 1 included a section on demographic and personal history information, as well as

separate scales for acculturation orientation (Berry's Model of Acculturation) (100), assessment

of risk factors, adherence to breast cancer screening (Breast Cancer Risk Questionnaire & Breast

Cancer Risk Assessment Tool), and health belief model (Persian version of Champion's Health

Belief Model Scale) . The important demographic and participant characteristics were identified in the literature review and quantitative validated instruments for measuring these variables were identified. Independent variables were classified as *predisposing factors, enabling factors, need-related factors, and health behaviours.* Predisposing factors included socio-demographics such as age, marital status, ethnicity, education, employment, income, and religiosity, and health beliefs, acculturation orientation, immigration background, and language proficiency. Enabling factors were income, BSE barriers, mammography barriers and BSE self-efficacy and access to transportation. Need-related factors consisted of perceived health (problems in Activities of Daily Living and Instrumental Activities of Daily Living), health history, cancer history, and presence BRCA 1& 2, health behaviours including health service use, screening recommendation by healthcare professionals, personal health characteristics such as weight and height (used to calculate body mass index. The BMI was calculated using the formula of BMI= (Weight in Kilograms)/ (Height in Centimeters) × (Height in Centimeters)), physical activity, smoking status, and alcohol consumption.

Based on the different policies for breast cancer screening in Iran and in Canada, an age-related screening variable composed to reflect the fact that the recommended ages for screening differ for between Canada and Iran. For this reason, age was categorized a binary variable of <50 years and 50 years or more for engagement in breast health behaviour in Canada and <40 years and ≥40 years for breast health behaviour in Iran (before immigration). However, age was kept as a continuous variable in the regression analyses. Education status was categorized into university and non-university groups. Marital status was reported as married/common law, divorced/widowed, or never married. Annual household income was reported as a binary variable above and below the poverty line for families in Canada (<30,000 and >=30,000) and employment

status was binary (with vs without employment). Length of stay in Canada categorized into 3 groups of ≤5 years, 6-10 years and more than 11 years. Variables to measure access to healthcare included usual healthcare provider which was categorized as no usual source of care vs having a source of care and the location of the usual source of care (clinic, hospital, private office, and no usual source of care).

Health beliefs were measured using the Persian version of CHBM validated by Hashemian (2015) and Taymoori (2009). A higher score means higher self-efficacy and a higher probability of getting a mammogram (30) (174). The five sub-sections of the questionnaire that were of primary interest included: Perceived Risk (Susceptibility); Perceived Benefits (Seriousness); Perceived Barriers; Self Efficacy (confidence) and Health Motivation. Each section was individually scored.

The modified CHBMS instrument includes 53 questions on ten subscales: perceived risk or susceptibility (three items), perceived benefits or seriousness (seven items), benefits of BSE (six items), barriers to BSE (nine items), self-efficacy on BSE practice (ten items), health motivation (seven items), benefits of mammography (six items), and barriers to mammography (five items). The scales were measured with an ordinal scale using a five-point Likert scale, with the following given responses: "strongly agree", "agree", "undecided", "disagree" and "strongly disagree", and which were respectively awarded the marks of five, four, three, two and one. For the barriers scales, five marks were given for "strongly disagree", four for "disagree", three for "undecided", two for "agree" and one mark for "strongly agree". All subscales were positively related to breast cancer screening practices, except for barriers which were negatively associated.

Berry's acculturation was a validated measure using 14 items using a four-point Likert scale, with the following given responses: "strongly agree", "slightly agree", "slightly disagree" and "strongly disagree", and which were respectively awarded the marks of four, three, two and one. the score was calculated using "Euclidian Distance Calculation" (see appendix 4 for an example of the Euclidian calculations). The wording for the instruments was adapted to refer to Iran as the host culture and Canada as the home culture. Acculturation orientation were calculated for each individual woman using Euclidean Distance that was previously proposed by Arends-Tóth and Van de Vijver (180), which provides a continuous score for each participant on each of four orientations. Each participant was then assigned to a single category based on which category she was closest in distance to.

All the permissions were obtained from the authors of the questionnaires and conceptual models for use in this study. Permission to use the original CHBMS was obtained from Victoria Champion. Berry gave the permission to apply the Berry's Model of Acculturation scale. Taymoori and Hashemian sent their permission to use the Persian version of CHMB.

The primary outcome was the percentage of women engaging in at least one breast health behaviour of the three recommended by Canadian Cancer Society and Canadian Breast Cancer Foundation. This was categorized as a dichotomous variable called breast health behaviour and was defined as engaging in at least on one of the three breast health behaviours: mammography, clinical breast examination, or breast self-examination. This could have occurred in Iran or in Canada. Women were asked, "Have you ever had a mammogram?", "Have you ever had a clinical breast examination?", and "Have you ever done a breast self-examination?" The respondents were given a definition of the procedures before being asked about how many of these recommendations they practiced in the questionnaire. These questions are included in Appendix 1.

4.3. Questionnaire Face Validity, Translation and Test-Retest Reliability

As some of the items came from other studies, face validity was assessed through expert opinion in order to ensure that the questionnaire measured the characteristics of interest (181) (182). In this study, 10 expert women in the fields of nursing, public health, medical anthropology, or epidemiology were assigned to read the questionnaire and provide their opinion about each question. Reviewers examined all of the questionnaire items for readability, comprehensiveness and clarity. Experts were specifically asked to judge each item as to its relevancy for an identified scale. Consensus of all experts was necessary for any modification. When wording changes were suggested for an item, I modified items after careful assessment of all suggestions. To ensure the cultural sensitivity of the instrument, the panel of experts was also asked to rate the items for wording, relevancy, importance, and cultural sensitivity. The clarity and length of the questionnaire also were considered. General impression and comments of the panel were also considered. Recommendations were taken into consideration in order to make modifications and deletions. Sangoseni et al. proposed a S-CVI (Scale Content Validity Indices) of ≥ 0.78 as a significant level for inclusion of an item into the study(182).The final questionnaire comprised items which received an agreement from the raters that were calculated in Likert scaling whether an item is 'favorable' (which is assign a score of +1) or 'unfavorable' (which is assign score of +0).

To address language barriers, questionnaires and other study documents (informational flyer and consent brochure) were translated to Persian. The focus was on cross-cultural and conceptual, rather than on linguistic/ literal equivalence. A well-established method to achieve this goal was to use forward/backward translation. For this reason, I covered the translation using natural and acceptable language for the audience (no word-for-word translation, simple, clear and concise question formulation, avoid if use of any jargon). As the next step, a bilingual (English

and target language) expert panel including 1 gynecologists, 2 health education professors, a psychologist, 1 epidemiologist, and 2 public nursing professors were assembled to identify and resolve the inadequate expressions/concepts of translation as well as any discrepancies. The third step was back-translation using the same approach as in the first step. Pre-testing was done on 10 women who have been drawn from the participants in the real study asking them to debrief using the Persian questionnaire. They were requested to identify problems and vagueness in the questions. Few comments were given, and they were eventually applied after consulting with the panel of experts. The answers were compared to the respondent's actual responses to the instrument for consistency. Finally, pre-test respondents were asked to choose existing alternative words or expressions, which conform better to their usual language. Minor translation adjustments were carried out until the two versions (English and Persian) were identical. The purpose was to make sure that the instrument is comprehensible for Iranian women and in the most appropriate terminology.

To assess test-retest reliability, 20 women from the target population were selected to complete the questionnaire on two separate occasions that were two weeks apart. The period of two weeks was considered long enough for participants to have forgotten their responses but not long enough for a real change to occur in their views and opinions on BCS(183). Participants were not informed of the second administration of the questionnaire on the first occasion. Pearson's correlation coefficient was calculated on the scores of the participants who completed the questionnaire twice. The overall reliability was high (r=0.90, p<0.001).

All survey responses were entered into Microsoft Excel 2010 encrypted with a password.

4.4. Sample size rationale and statistical analysis

Focus was given on the characterization of the study population using descriptive statistics and associated interval estimates. For the estimation of relative frequencies such as prevalence and proportions, a precision of at least $\pm 5\%$ is anticipated to allow for meaningful descriptive comparisons to reference populations and reported data in the literature. To achieve this estimate precision in our sample, a total of approximately 400 respondents was required (see sample size calculations below for median sample size estimates). Based on our experience in survey studies in comparable populations in Iran, we expected a response rate of approximately 90%, so that a total of 450 women have been recruited in the study.

Taking the most conservative route, that is, we assume that we are always doing two-sided tests rather than one-sided, that in the tables the sample sizes are not necessarily balanced between groups and for the binomials we are looking for a difference of 0.2 in the probabilities, we make the following calculations. The usual alpha or p-value was set at 0.05. Since I have 18 binomials, 3 multi-nominals and 8 continuous tests, that is 29 tests, I divided 0.05 by 29 for the p-value for each separate test. I have also included sample size calculations for an overall p-value of 0.10 (dividing 10 by 29).

I have set the power = 0. 80 for each test. The multinomial and normal variable tests in general require smaller sample sizes that the ones we obtain for the binomial. Thus, we have a conservative estimate of our sample size. More than 30 different scenarios were considered by varying the possible true probabilities whose difference equals 0.2 and by varying the differences in the ratio of the sample sizes expected between our two groupsin used in the binomial test. For p- values of 0.05/29 = 0.001724, the resulting sample sizes are as follows:

59

	MIN	MEDIAN	MAX
one-sided test	240	366	492
two-sided test	270	396	548

For p- values of   0.10/29 = 0.00345

	MIN	MEDIAN	MAX
one-sided test	218	324	440
two-sided test	244	366	492

More advanced statistical analyses explored associations between self-reported adherence for breast health behaviour with the different constructs of the Andersen model including predisposing, enabling, need-related and health beliefs. Corresponding measures for association (risk ratios) have been computed along with 95% confidence intervals using multivariate logistic regression. The predictor variables include predisposing factors, enabling factors, need related factors and health beliefs that have been modeled to predict the outcome of engaging in at least one breast health behaviour.

Data analysis included descriptive statistics, bivariate analyses and multivariate logistic regression. Descriptive statistics were used to describe Iranian women's breast cancer screening behaviours, demographic characteristics, socioeconomic characteristics, sociocultural status, level of acculturation, beliefs and behaviours of the participants about breast cancer screening. Then the participants were divided into two groups based on engaging or not engaging in at least one breast health behaviour. Differences between the two groups in each behaviour were assessed by t-test for continuous variables and by chi-square for categorical variables. Then univariate (unadjusted model) and multivariate (adjusted model) logistic regression analysis were conducted to assess the

predictive factors influencing breast health behaviours. Using backward stepwise regression, regression analysis was done to find the reduced model that best explains the data while avoiding multicollinearity problem. All variables with $\alpha<0.20$ in the simple or unadjusted model were included in the multivariable regression analyses. By backward stepwise regression method, at each step variable that did not make a statistically significant contribution to the model, were removed. The logistic regression results are reported as odds ratios (ORs) with 95% confidence intervals (CIs). Data analyses were completed using Statistical Package for Social Sciences(SPSS) version 24.0.

4.5. Ethics

Ethics approval was obtained from McGill IRB on August 31, 2017. There signed written informed consent was separated from participants' contact information and other information collected from during the study. An alphabetic code was created for each questionnaire and the key code was kept secured away from the data set.

For this thesis, it was necessary for me to be responsible for recruitment and discussion of the consent procedures. While I am a member of the Iranian community and myself an Iranian immigrant woman, the community is large enough that I do not personally know all the individuals who were recruited for this study. As this is a population that is typically excluded from health research, it would be difficult if not impossible, for a non-community member such as any other research team or thesis advisory committee member to establish the level of credibility and trust needed to conduct the recruitment. For these reasons, a conflict of interest was deemed unavoidable and somewhat minimal.

Chapter 5. Results

During the seven months of recruitment period (August 2017- February 2018), a total of 403 Iranian immigrant women with a mean age of 41 years (Range 20-76 years, IQR 35-44 years, SD= 9.5) residing in Montreal completed the survey. The overall response rate was 90%. Table 2 represents the characteristics of the participants. Over 78% were married, have a common law, or living with a partner and 9% were widowed, divorced, or separated.

Table 2- SocioDemographic Characteristics of Participants

N= 403			
	Number	Percentage	Mean
PREDISPOSING FACTORS			
Age group			
20-50	321	80%	
50+	82	20%	
Marital Status			
Married/Common law/Living with a partner	313	80%	
Divorced/Separated/Widowed	37	9%	
Never been married	42	11%	
SOCIAL STRUCTURE			
Ethnicity			
Persian	273	71%	
Other Ethnics	112	29%	
Education			
University	372	95%	
No university	21	5%	
Employment Status			
With employment	288	72%	
Without employment	111	28%	
Religiosity			
Yes	28	7%	
No	351	93%	

VULNERABLE DOMAIN		
Acculturation		
No Integration(Separation/Marginalization)	225	64%
Integration(Integration/Assimilation)	126	36%
Immigration Status		
Citizen	131	33%
Permanent resident	272	67%
Length of Stay in Canada		
5 years or less	273	68%
6-10 years	58	15%
11 years and over	70	17%
Language Proficiency		
No French, No English	20	5%
Speak French and/or English	370	95%
ENABLING FACTORS		
Income		
<30,000	181	52%
>= 30,000	166	48%
VULNERABLE DOMAIN		
Transportation		
Yes	5	3%
No	191	97%
NEED-RELATED FACTORS		
Problem in ADL		
Yes	2	1%
No	194	99%
Problem in IADL		
Yes	0	0%
No	196	100%
EVALUATED HEALTH		
Prior Experience of Breast Abnormality	105	27%
Cancer History	14	4%
Family History of Breast/Ovarian Cancer		
Yes	108	27%
No	271	68%
I don't know	17	4%
History of Breast Cancer in Mother	25	6%

History of Breast Cancer in Sister	8	2%
BRCA1/2 were Identified		
Yes	3	1%
No	203	52%
I don't know	188	48%

HEALTH BEHAVIOURS		
Primary Health Care Provider		
Having a Regular Primary Healthcare Provider	321	81%
Not Having a Regular Primary Healthcare Provider	76	19%
Source of Care		
Having a Regular Source of Care	342	86%
Not Having a Regular Source of Care	58	15%
Physician Screening Recommendation		
Physician Recommended Mammogram	129	34%
Physician not Recommended Mammogram	256	66%

PERSONAL HEALTH PRACTICES		
Physical Activity		
Do at Least 3 Times a Week Physical Activities	227	57%
<3 Times a Week Physical Activity	170	43%
Smoking Status		
Yes	56	16%
No	286	84%
Alcohol Consumption		
Yes	101	26%
No	282	74%

Ethnicity, education, employment status, and religiosity were examined under *social structure*. The 10 largest Iranian *ethnic groups* among immigrant women in Montreal were Persian (68%), Azerbaijani (9%), Gilaki (7%), Mazendarani (4%), Lur (3%), Kurd (3%), Turkmen (1%), Baluch (1%), Turk (<1%), Talysh (0.5%) and 3% were not identified or other, which were finally collapsed into Persian and other ethnic groups. Religiosity was probed using one question by

asking participants to recognize the potential role of their *religious beliefs* in guiding their decision making in health care choices, which was negative for 93% of cases.

5.1. Attitudes and Beliefs About Breast Cancer

The Iranian immigrant women's attitudes and beliefs regarding breast cancer and screening behaviours were assessed using questions from Champion's Health Belief Model Scale. *Perceived risk(susceptibility)* was assessed through three questions. Twenty one percent of women were not agreed to the statement: "It is likely that I will get breast cancer" and 78% were unsure. About getting breast cancer in the next few years, 71% are not sure if their chances are great. Only 2% feel that they will get breast cancer sometime during their life (Table 3).

Table 3- Perceived Risk for Breast Cancer among Iranian Women in Montreal

PERCIEVED RISK(Susceptibility)	Totally false	FALSE	Unsure	TRUE	Totally True	Missing
Q1: It is likely that I will get breast cancer.	66		244		1	92
Q2: My chances of getting breast cancer in the next few years are great.	81		198		1	123
Q3: I feel I will get breast cancer sometime during my life	69		187		6	141

Perceived severity of breast cancer was assessed with seven separate questions. In general, more than half of the respondents were inclined to respond the questions in this section. Forty six Percent agreed that the concept of breast cancer scared them and 34% were afraid to think about breast cancer. Only 14% of the women agreed with the statement that "breast cancer would change

my whole life", and 65% thought the problems with breast cancer would last a long time. About 11% of the women considered breast cancer as a threat to their relationship with their partner and more than 72% of the respondents are hesitant to accept this statement. Only 1% agreed, "if they developed breast cancer they would not live longer than five years", 49% disagreed with this statement and 50% were neutral. Responses to severity statements were not associated with ever performing BSE and ever having had a CBE. Women who perceived breast cancer as serious were more likely to have ever performed BSE and have ever had CBE. Responses to severity questions were not found to be associated with ever having had a mammogram.

Regarding *BSE benefits* only 26% feel satisfied when performing a BSE and 84% are not sure that when they complete monthly breast self-examination it will make them less worry about breast cancer. Only 38% believe that performing monthly breast self-examination will allow them to find lumps early and 45% recognized BSE as a means of decreasing chances of dying from breast cancer. Twenty four percent indicated that completing BSE each month will decrease requiring radical or disfiguring surgery if breast cancer occurs, whereas, 71% were unsure. Monthly BSE was recognized helpful among 33% of women to find the lump even before the doctor.

Perceived barriers to BSE were also evaluated. Except one person, the majority of the participants (87%) disagreed that BSE is embarrassing and 12% are unsure. About 69% of women are disagreed that BSE takes too much time, and 93% disagreed with the statement, "I don't have enough privacy to do breast examination". Half of the respondents are against the statement, "doing breast examination will make me worry about what is wrong with my breast". Forty six percent of women do not have any problem remembering the time of BSE. Only 30% disagreed that BSE is not necessary if they have a breast examination by a healthcare provider, and 25%

indicated that BSE is not necessary if they have a routine mammogram. Merely 4% are not able to perform BSE because of too lumpy breasts.

BSE self-efficacy was studied by requesting 10 questions. Only 9% of women do not know how to perform BSE. Ninety one percent of participants feel slightly to completely confident to perform BSE correctly, and 92% rated themselves as confident that they could find a breast lump by performing BSE. Over than 90% of women feel confident about finding a breast lump that is the size of rather greater than or even the same size of a filbert, however, 15% are not able to find a breast lump that is the size of a pea. Approximately, 90% of respondents are sure that they follow the right steps for performing BSE. Twenty eight percent are able to indicate abnormalities with their breasts when doing breast self-examination, and 70% when looking in the mirror. Sixty percent of respondents can use the correct part of their fingers when examining their breasts, while 17% are unsure.

Women responded to six questions regarding *mammography benefits*. Only 21% believed that having a mammogram is the best way to find a very small lump, while 78% were not certain, and 40% did not respond to this question. When receiving a recommendation for mammogram, 75% of women feel self-satisfied. Approximately 72% declared that if they get a mammogram and nothing is found, they don't worry as much about breast cancer. Sixty six percent of women said that having a mammogram will help them find breast lumps early, whereas 34% are not sure about this statement. Around 40% opiniated that having mammogram will decrease their chances of dying from breast cancer, and 78% are not sure that if a lump was found through a mammogram, their treatment for breast cancer may not be as bad.

With regard to *mammography barriers*, 41% reported that they will afraid to have a mammogram because of a probable diagnosis. Seventy two percent are not agreed with the

statement, "I am afraid to have a mammogram because I don't understand what will be done", and, 54% are against the statement, "I don't know how to go about getting a mammogram". Nearly 83% of women stated that having mammogram is not embarrassing, and only 23% found the procedure as time consuming. The procedure has been recognized as painful among 31% of respondents. Only 9% cannot remember the schedule of a mammogram, and 21% have other problems more important than getting a mammogram.

Motivation to engage in health-promoting behaviours was assessed with seven questions. The majority of women (84%) illustrated their motivation to "discover health problems early", and 92% to "importance of maintaining good health". Among the participants, 80% were eager to search for new information to improve their health and 77% indicated they follow a well-balanced diet. Having regular check-ups was important to 48% of the women, but only 57% mentioned they exercised at least 3 times a week. *Health motivation* was significantly associated with ever having performed a BSE (P< 0.001), ever having a CBE and a mammogram (P< 0.001). It is also associated to BHB (P<0.001).

In multivariate analyses, the association between age (P<0.01), breast self- examination self-efficacy (P<0.001), having positive breast problems (P<0.02), and receiving a recommendation for mammography from a family doctor (P<0.009) remained statistically significant for positive breast health behaviour among Iranian immigrant women in Montreal, but it became nonsignificant for all other indicators. The final regression model adjusted for all variables. Regression- adjusted model indicated that only age and BSE self-efficacy are significantly associated to positive Breast Health Behaviour.

5.2. Acculturation and Integration

Among the *predisposing factors* in *vulnerable domain,* acculturation, immigration status and language proficiency were considered. Acculturation orientation calculations revealed that most of participants in this sample leaned mainly toward separation category (n=205; 56%), followed by integration (n=120; 35%), then marginalization (n= 23; 7%), and finally, assimilation (n=6; 2%). Table 4 displays selected characteristics of women with four modes of acculturation.

Table 4- Acculturation Orientation & Selected Characteristics of Women

	N=403	%	age (mean +/- SD)	P-value	Length of stay in Canada (mean +/-SD)	P-value
Acculturation						
Separation	205	58%	39.7 +/- 8.9	**	1.4 +/- 0.7	***
Marginalization	23	7%	40.9 +/- 6.7		1.5 +/- 0.7	
Integration	121	34%	42.4 +/- 9.9	**	1.7 +/- 0.9	***
Assimilation	6	2%	44.3 +/- 10.7		1.8 +/- 0.9	
Missing	48		** P< 0.01			
			*** P < 0.001			

Using the two dimensions method of categorization, I conceptualized one dimension as having no integration in the Canadian society (separation and marginalization) (64%) and having at least some integration (assimilation and integration) into the Canadian society (36%). Integrated women seem to be significantly older and living in Canada longer than women in the situations such as marginalization or separation. Approximately, 73% of women identified their culture as Iranian. These scores reflect a relatively strong preference for Iranian cultural involvement.

5.3. Profile of Breast Health Behaviour

Eighty six percent of the participants aged 20 years and up had heard of breast cancer screening and 87% know how their breasts normally look and feel, and 78% know what changes to check for. Overall 71% of the participants had practiced BSE sometime in their life (59% did it in Iran and 53% did it at least once in Canada) and 75% experienced CBE either in Iran or in Canada (56% of women had a clinical breast exam in Iran and 48% in Canada). Consequently, 91% of women participated in this study engaged positive Breast Health Behaviour meaning that they did at least once BSE or mammography, or either had at least one clinical breast examination (Table 5).

Table 5- Immigrant Iranian Women's Breast Cancer Screening Behaviours

Breast Health Behaviour	Total	
	N=403	%
Had heard of breast cancer screening	330	86%
Know how their breasts normally look and feel	350	87%
Know what changes to check for	312	78%
Had practiced BSE sometime in their life	278	71%
Experienced CBE either in Iran or in Canada	299	75%
Have had mammography at least once in their life	218	55%
Had Positive Breast Health Behaviour	363	91%

To see if the BHB was initiated in Iran or in Canada, we distinguished BHB variable based on where this behaviour was done. Overall, 75% of the women in our study had some positive BHB in Iran while 72% of them had some positive BHB in Canada. In the Figure 4, we presented for women with positive BHB, the kind of BHB they had in each country.

Figure 4- Positive BHB in Iran and in Canada
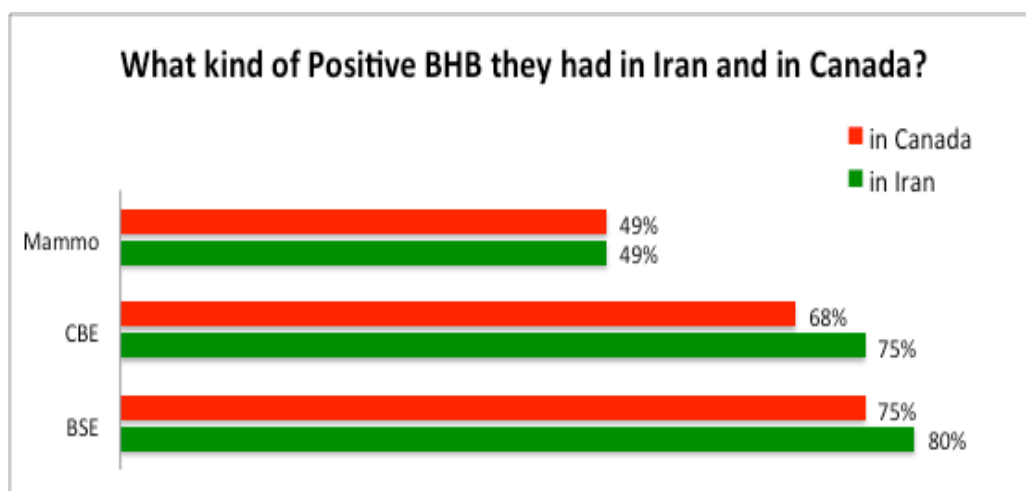
In Iran, 36% of women with positive BHB performed the three of these activities, 31% performed two of them and 33% performed only one of them. While in Canada, 32% did all the three, 28% did at least two and 40% did at least one of them.

5.4. BHB Guidelines and protocols in Iran and in Canada

Breast preventive measures and protection criteria are different in Iran and Canada. Iranian guidelines seem more aggressive than Canadian ones. In Iran, women are invited to mammography from the age of 40 while this preventive measure in Canada, is proposed to women after 50 years of age. In our study, as mentioned previously, the mean age of participants was 41 years (SD= 9.5 years) and 73 individuals (20% of the participants) migrated to Canada after age 40, meaning they were eligible for mammography based on Iranian health prevention program criteria, before leaving Iran. Among them, 58% have had a mammography in Iran, comparing to 34% among the group who left Iran before 40 years (P<0.001). Globally, among women aged 50 and more, 69% have had mammography in Canada, compared to 28% among those aged <50 years (P<0.001).

The prevalence of predisposing factors and positive BHB are reported in Table 6.

Table 6- Bivariate Analysis of Association Between Predictor Variables (Predisposing Factors) and Compliance with Breast Health Behaviour

Independent variables		Dependent variable					p-value
			Breast Health Behaviour				
		Total	Yes		No		
		N	N=363	(%)	N=36	(%)	
Marital Status	Married/Common law/living with a partner	309	284	92%	25	8%	0.19
	Divorced/Widowed	37	34	92%	3	8%	
	Never married	42	35	83%	7	17%	
Ethnicity							
	Persian	270	250	93%	20	7%	0.08
	Other ethnics	112	98	88%	14	12%	
Education Status							
	No University	20	17	85%	3	15%	0.25
	University	369	338	92%	31	8%	
Job status							
	without Employment	109	102	94%	7	6%	0.20
	employed	286	258	90%	28	10%	
Religiosity							
	Without Religiosity	347	315	91%	32	9%	0.52
	Within Religiosity	28	26	93%	2	7%	
Residency							
	Citizen	131	119	91%	12	9%	0.54
	Permanent resident	268	24	91%	24	9%	
Language	No French, No English	20	16	80%	4	20%	0.09
	Speak French and/or English	366	336	92%	30	8%	
Income							
	<30 000$	180	162	90%	18	10%	0.54
	>=30 000$	164	148	90%	16	10%	

In this study, a comprehensive list of *barriers* and *facilitators* were provided to participants. The five most commonly chosen *barriers* were unfamiliarity with available resources (34%), indifference (32%), long waiting list to visit a doctor and long waiting hours in clinic (30%), lack of concern (22%) and lack of time (20%) (Table 7).

Table 7- Self-identified Barriers into Mammography among Iranian immigrant women in Montreal

	N	%
Unfamiliarity with available resources	66	34%
Indifference for example (being young and priorities in life)	62	32%
It takes a long time to get the appointment and long waiting hours in clinics	59	30%
Lack of concern	43	22%
Lack of time	39	20%
Lack of regular physician	37	19%
Experienced barrier to care in last year	32	16%
Lack of knowledge about symptoms, risk factors, and screening methods	27	14%
Pain during mammography	24	12%
Not having private health insurance	22	11%
Fear of finding the mass, being diagnosed with cancer, losing the breast and radiation	19	10%
Cost or inconvenience	16	8%
Health care personnel's approach (having no advice and not giving information)	13	7%
Personal assessment of breast cancer risks	11	6%
Embarrassment about the procedure and its results	10	5%
Personal assessment of benefits and harms	9	5%
Language barrier	7	4%
Being strange to environment and transportation problems	5	3%
Magazine article or news report	2	1%
Fears about disease's impact on personal relationships	2	1%
Cultural factors (shame and fatalism)	2	1%
Problems in ADL	2	1%
Age>75 years	2	1%
Confidence in non-traditional cancer treatments	1	1%
Problems in IADL	0	
Missing	95	24%
not applicable (have had a mammography)	112	28%

The most important self-reported *motivators* among Iranian women were doctor's recommendation (76%), personal assessment of breast cancer risks (31%), having appropriate information about breast cancer and symptoms (22%), and self-efficacy, fear of losing breast, and beliefs about susceptibility to breast cancer (13%) (Table 8).

Table 8- Self-Identified Facilitators into Mammography among Iranian immigrant women in Montreal

	N	%*
Doctor's recommendation	103	76%
Personal assessment of breast cancer risks	42	31%
Having appropriate information about breast cancer risks and symptoms	29	22%
Self-efficacy	18	13%
Fear (harder treatment in case of the progression of the disease and fear of losing the breast)	17	13%
Beliefs about susceptibility to breast cancer	17	13%
Media sources (Magazine article or news report)	16	12%
Family member or friend's recommendation	15	11%
Personal assessment of benefits and harms	13	10%
Having usual source of care	11	8%
Have physician that speaks common language	9	7%
Public screening, accessibility	8	6%
Having female doctor	8	6%
Social support (spouse, relative, and neighbor)	7	5%
Information by health care personnel	5	4%
Missing	36	9%
Not applicable (have not had a mammography)	232	58%

*Valid percent among those who had a mammography

Need-related factors was assessed through two different subscales including *perceived health* and *evaluated health* (Table 9).

Table 9- Bivariate Analysis of Association Between Predictor Varibles (Evaluated Health) and Compliance with Breast Health Behaviour

Independent variables	Dependent variable						P-value
		Breast Health Behaviour					
	Total	Yes		No			
	N	N=363	(%)	N=36	(%)		
Having Breast Problem history							
No	282	251	89%	31	11%		0.006
Yes	105	102	97%	3	3%		
Cancer History in Family							
No	269	240	89%	29	11%		
Yes	107	101	95%	6	6%		0.1
I don't know	17	17	100%	0	0%		
Have evere had cancer							
No	379	345	91%	34	9%		0.6
Yes	14	13	93%	1	7%		
BRCA 1&2							
No	201	182	91%	19	10%		
Yes	3	3	100%	0	0%		0.8
I don't know	187	171	91%	16	9%		
Breast Cancer History in Mother or Sister							
No	361	329	92%	32	91%		0.6
Yes	33	30	8%	3	9%		
Breast/ Ovarian Cancer History in Family							
No	286	257	72%	29	83%		0.1
Yes	107	101	28%	6	17%		

Only two participants expressed problems in Activities of Daily Living (ADL) and nobody indicated problems in Instrumental Activities of Daily Living (IADL). Among the respondents 27% reported knowing a family member or relative who had been diagnosed with breast or ovarian cancer.

To assess the *health behaviours*, women were questioned about health service utilization. Eighty one percent reported that they have a regular primary healthcare provider such as family physician, gynecologist, or nurse practitioner and 85% have a regular source of care, while 15% reported no usual source of care meaning that they receive their health care services on a walk-in basis. Women who had a regular healthcare provider were more likely to report ever having a CBE (257, 86%) than women who did not (66, 66%) (P=0.001).

Over 67% of respondents had a recommendation for breast screening from their healthcare providers. Eighty six percent of the participants had heard about breast cancer while 61% of women who have never done a mammography. See Table 10 for associations between health behaviours and engaging in BHB.

Table 10- Bivariate Analysis of Association Between Predictor Varibles (Health Behaviours) and Compliance with Breast Health Behaviour

Independent variables	dependent variable						P-value
		Breast Health Behaviour					
	Total	Yes		No			
	N	N=363	(%)	N=36	(%)		
Usual healthcare provider							
No usual source of care	76	66	87%	10	13%		0.1
Source of care	323	297	92%	26	8%		
Nature of the usual source of care							
Clinic	198	178	90%	20	10%		
Hospital	60	54	90%	6	10%		0.8
Private office	80	74	93%	6	8%		
No usual source of care	58	54	93%	4	7%		
Mammography ever proposed by FD							
No	253	223	88%	30	12%		0.007
Yes	128	123	96%	5	4%		

Health Motivation						
Never	21	18	86%	3	14%	
Rarely	118	100	85%	18	15%	0.01
Unsure	67	62	93%	5	8%	
Often	137	128	93%	9	7%	
Always	51	51	100%	0	0%	

Having positive BHB was significantly more likely if mammography recommended by a physician or healthcare provider (P=0.007). Of the women who received the recommendation, 78% performed BSE (P=0.019), 88% received CBE (P=0.001) and 90% have done mammography (P<0.001).

The mean BMI was 24.5 kg/m^2 (SD=3.8; range 15-41) and BMI at age 18 (range 12 – 39; mean = 2; SD=3.1). The reproductive history of women was also investigated. Merely 12% of women stated their menarche age before twelve years old, 47% had their first period between twelve and thirteen and 31% after the age fourteen. One-hundred and twenty-five participants have never had a pregnancy and 29% have two kids. Of all participants, only 4% had their first child before age 20 and 25% had their first pregnancy after the age 30 years. No more than 6% have never had breastfeeding comparing to 36% of women who have exclusively breastfed their children whom 48% offered breastmilk at least one year to their kids. The majority of women (92%) declared that they do not take contraceptives.

Overall, 227 (57%) women declared having at least 3 *physical activities* per week, the majority (84%) were non-*smoker* and only 26% consume *alcohol*. None of the components of personal health practices (BMI, physical activity, smoking status, alcohol consumption) showed significant association with BHB (Table 11).

Table 11- Bivariate Analysis of Association Between Predictor Variables (Health Behaviours) and Compliance with Breast Health Behaviour

Independent variables	Dependent variable					p-value
		Breast Health Behaviour				
	Total	Yes		No		
	N	N=363	(%)	N=36	(%)	
Alcohol consumption						
None	280	254	91%	26	9%	
One or two	89	83	93%	6	7%	0.44
Three or more	11	11	100%	0	0%	
Smoking						
Never	284	260	92%	24	9%	
Former Tobacco Smoker	28	26	93%	2	7%	0.96
Current Tobacco Smoker	27	25	93%	2	7%	
Acculturation						
Separation	205	180	56%	22	69%	0.12
Marginalization	23	21	7%	2	6%	0.65
Integration	120	112	35%	8	25%	0.17
Assimilation	6	6	2%	0	---	0.56
No integration in the society (Separation or Marginalization)	225	201	63%	24	75%	0.12
Integration in the society (Integration or Assimilation)	126	118	37%	8	25%	

All participants were immigrants, with the mean *length of stay* in Canada of 6.2 years. About 85% of women whose length of stay in Canada is less than 5 years, are under 50 years. Length of stay in Canada was correlated with age (Table 12). Length of stay in Canada examined with ever having a mammography was not statistically significant (P value= 0.376). *Length of stay* in Canada also crossed with BHB (Pearson χ^2 =0.242). Among women with positive BHB, 69%

stayed in Canada less than 5 years (mean age=39 years), while in second group (length of stay=6-10 years) positive engagement decreased (14%), and again in women who lived more than 11 years in Canada (mean age=49 years) positive engagement slightly increased (17%). With greater length of stay in Canada (for example in the category of >11years), there is a higher possibility of having mammography in Canada, whereas, this possibility is 30% and 31% for the <5 years and 5-10 years group respectively. Therefore, the main difference can be seen among the group with length of stay more than 11 years and the results are highly significant (P< 0.001). Although global length of stay in Canada does not correlate significantly with positive BHB (P=0.242), but it positively correlated with mammography done in Canada (P<0.001) (Figure 5) and negatively with mammography done in Iran (P=0.008) (Figure 6).

Table 12 - Length of Stay in Canada * Age

Length of stay in Canada	N	Mean Age	Stand Dev	95% Confidence Interval for the mean	Minimum	Maximum
5 year and less	250	39.1	7.8	(38.1 - 40.0)	20	72
6 to 10 years	58	39.2	6.4	(37.5 - 40.9)	23	56
11 years and over	67	49.6	12.5	(46.5 - 52.6)	20	76
Total	375	41.0	9.5	(40.0 - 41.2)	20	76

Figure 5- Ratio of Having Mammography in Canada and Length of Stay in Canada

Had a Mammography in Canada?

Never
At least once

29%
31%
60%
35%

5 years and less | 6 to 10 years | 11 years and over | Total

Length of Stay in Canada

Figure 6- Ratio of Having Mammography in Iran and Length of Stay in Canada

Had a Mammography in Iran?

Never
At least once

42%
30%
23%
37%

5 years and less | 6 to 10 years | 11 years and over | Total
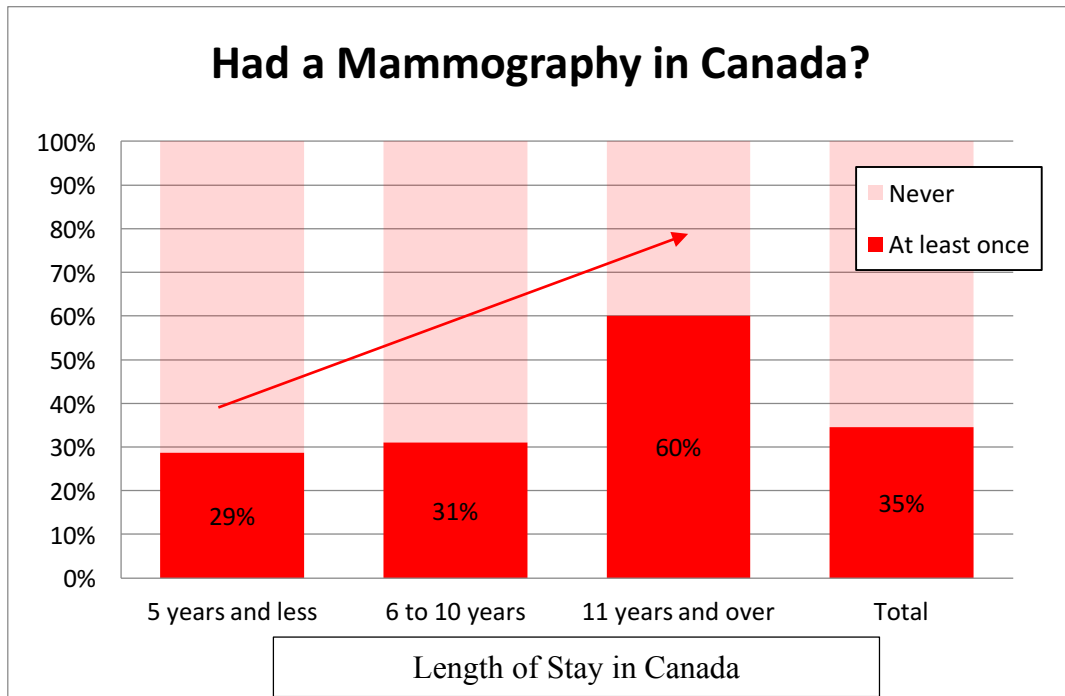
Length of Saty in Canada
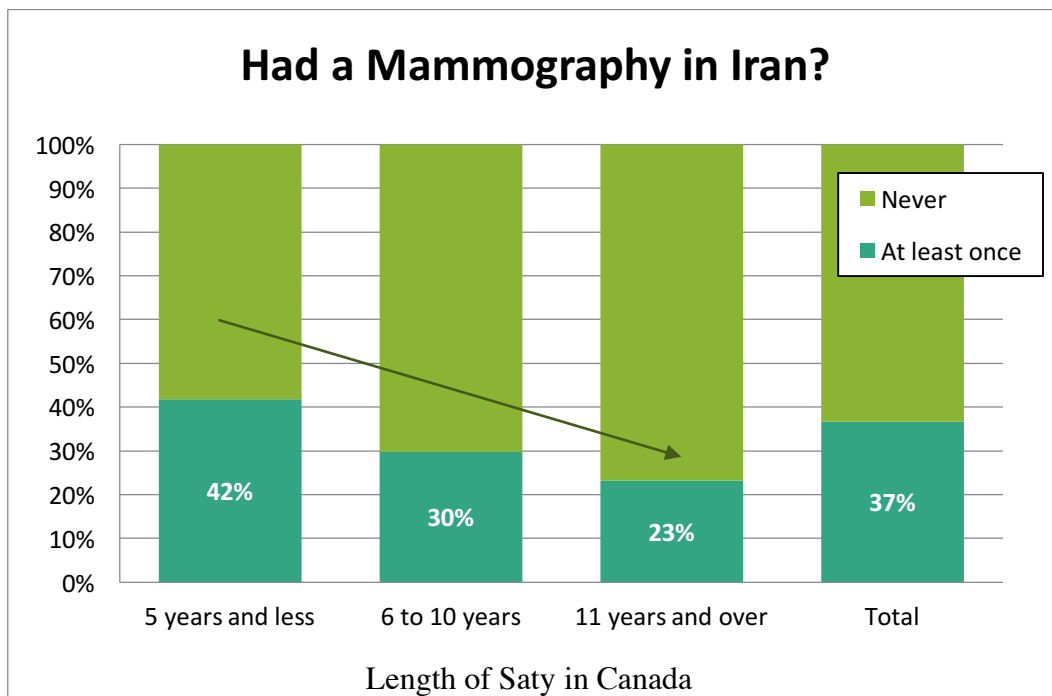
5.5. Determinants of Positive Breast Health Behaviour (BHB)

In the univariate analysis, among the predisposing factors, neither the perceived risk (OR=0.909; 95%CI= 0.746-1.107) nor the health motivation index (OR= 1.07; 95%CI= 0.997-1.148) was statistically significantly associated with BHB. We selected and included all the variables with p-value <0.20 for the multivariable analyses. In the adjusted model, women with positive BHB seems to be those with a highest BSE self-efficacy index (OR=1.12; 95%CI= 1.06-1.19), and older one, age seems to induce a positive BHB (OR=1.07; 95%CI= 1.01-1.14).

The final multivariate logistic regression models (Table 13) demonstrated that women who were integrated were significantly more likely than non-integrated group to have engaged in BHB. Approximately, 23.7% of the variability of BHB is explained by our multivariate model (adjusted model) (Nagekerke R^2 =0.237).

Table 13- Determinants of Breast Health Behaviour

variable			Unadjusted model			Adjusted model (Multivariate Logistic Regression)		
			OR	95%CI	p-value	OR	95%CI	p-value
	Age		1.070	(1.016-1.127)	0.010	1.071	(1.010-1.136)	0.022
	Marital Status							
		Married/common law….	1			---	---	---
		Divorced/Widowed	0.954	(0.273-3.337)	0.942	---	---	---
		Never married	0.421	(0.169-1.048)	0.063	---	---	---
	Perceived Risk		0.909	(0.746-1.107)	0.340	---	---	---
	Perceived Benefits		?					
	Health Motivation		1.07	(0.997-1.148)	0.059	---	---	---
	Ethnicity							
		Persian	1					

(left margin vertical label: PREDISPOSING FACTORS)

variable		Unadjusted model			Adjusted model (Multivariate Logistic Regression)		
		OR	95%CI	p-value	OR	95%CI	p-value
	Other Ethnics	1.786	(0.868-3.675)	0.115			
Education							
	No University	1					
	University	1.924	(0.534-6.929	0.317			
Employment Status							
	Without status	1					
	Within Job status	0.632	(0.268-1.493)	0.296			
Religiosity							
	Without Religiosity	1					
	Within Religiosity	1.321	(0.300-5.822)	0.713			
Acculturation							
	No Integration	1					
	Integration	1.761	(0.767-4.046)	0.182	---	---	---
Acculturation (Dummy Variable)							
	Assimilation	---					
	Integration	1.623	(0.706-3.732)	0.254			
	Marginalization	1.057	(0.236-4.729)	0.942			
	Separation	0.589	(0.270-1.284)	0.183			
Residency							
	Permanent Resident	1					
	Citizen	0.975	(0.472-2.018)	0.946			
Language							
	No French, No English	1					
	French or English	2.800	(0.880-8.910)	0.081			

variable			Unadjusted model			Adjusted model (Multivariate Logistic Regression)		
			OR	95%CI	p-value	OR	95%CI	p-value
ENABLING FACTORS	Income							
		< 30 000$	1					
		≥ 30 000$	1.028	(0.506-2.089)	0.94			
	Perceived Barriers		?					
	BSE Self-Efficacy		1.115	(1.060-1.174)	<0.001	1.123	(1.059-1.191)	<0.001
NEED-RELATED FACTORS	Breast Problem History		4.199	(1.256-14.043)	0.02	3.552	(0.791-15.958)	0.098
	Breast Cancer History in Family		0.973	(0.281-3.365)	0.965			
	Breast/Ovarian Cancer History in Family		1.899	(0.766-4.713)	0.166	---	---	---
	BRCA1/2		3?					
	Self-Cancer History		1.281	(0.163-10.095)	0.814			
HEALTH BEHAVIOURS	Source of Care							
		Family Physician	1					
		Gynecologist	2.329	(0.532-10.200)	0.262			
		No regular Source of Care/NP	0.57	(0.264-1.230)	0.152			
	Regular Source of Care							
		NO	1					
		YES	1.731	(0.796-3.763)	0.166	---	---	---
	Health Care Setting							
		Clinic	1					
		Hospital	1.011	(0.387-2.646)	0.982			

variable			Unadjusted model			Adjusted model (Multivariate Logistic Regression)		
			OR	95%CI	p-value	OR	95%CI	p-value
	Private Office		1.386	(0.535-3.589)	0.502			
	No Usual Source of Care		1.517	(0.497-4.630)	0.464			
Mammography Recommendation			4.17	(1.436-12.111)	0.009	---	---	---
Body Mass Index Now			1.056	(0.957-1.164)	0.277			
Body Mass Index 18yrs.			1.053	(0.935-1.185)	0.397			
Physical Activity			1.28	(0.639-2.565)	0.486			
Smoking Status								
	Never		1					
	Former Smoker		1.20	(0.268-5.366)	0.811			
	Current Smoker		1.154	(0.258-5.170)	0.852			
Alcohol Consumption(ROH)								
	No		1					
	Yes		1.116	(0.520-2.393)	0.778			

Chapter 6. Discussion

The results showed that this is a unique population with unique trends in breast cancer screening behaviours and demographic variables that potentially serve as predictors for cancer screening behaviours. Our sample of Iranian women were mostly younger than 50 years (80%), married (80%), highly educated (95%) as compared to 65% among Canadian women, less employed (72%) comparing to 82% of employment among Canadian-born women, with a high level of language proficiency (95%). Eighty-six percent of the participants have a regular source of care and the majority of women have had a high-profile health including engaging in regular physical activity, non-smoker (84%), and non-alcohol consumer (74%). We found that the majority of women (91%) had positive breast behaviour meaning that they did at least once BSE or mammography, or either had at least one clinical breast examination. Ninety-three percent of the samples declared that their religious beliefs does not affect their decisions made for their health practices. Among predictors, only age, breast self-examination self-efficacy, having history of breast problems, and receiving doctor's recommendation had strong association with positive breast health behaviour. Acculturation and religiosity were not significantly correlated to positive breast health behaviour.

For the first research question (What proportion of Iranian immigrant women in Montreal are practicing at least one positive breast health behaviour as recommended by the Canadian Breast Cancer Foundation (BSE, CBE, Mammography)?), it was found that a high proportion (91%) of Iranian immigrant women in Montreal have been engaged in at least one positive breast health behaviour in their life. This result refutes the first hypothesis (Iranian immigrant women in Canada will be engaged in less breast health behaviours as recommended by Canadian Task Force on

Preventive Health Care than the Canadian average). Studies of racial and ethnic subgroups incorporated mostly of immigrants illustrates they have lower screening rates for breast cancer (184, 185). According to the 2000 NHIS, the prevalence of mammography use in the past two years among white women aged 40 and older was 72.1%, including 68.2% African Americans, 62.6% Hispanics and Latinas, 52.4% among American Indian and Alaskan, 57% among Asian Americans. Based on the NHIS survey, only 55.3% of the women reported having a mammogram within the past year.

For the second research question (What is the association between predisposing, enabling, need-related and psychosocial factors with the likelihood of engaging in at least one positive breast health behaviours for Iranian immigrant women in Montreal?), it was found that age, having the history of breast problems, mammography recommendation by family doctor, BSE self-efficacy, and health motivation were positively related to positive breast health behaviour in unadjusted regression model. The adjusted regression model demonstrates that age from the predisposing factors, and BSE self-efficacy from the enabling factors in vulnerable domain are significantly related to positive BHB. Since regressions revealed BSE self-efficacy and age to be beneficial and related to engaging in breast screening, and self-efficacy is an important motivator for being engaged in BHB, the second hypothesis (higher levels of perceived risk; perceived benefits; self-efficacy and health motivation will be associated with higher levels of engaging in breast health behaviours and perceived barriers with lower levels of breast health behaviours) was partially supported.

The third hypothesis (this association will be impacted by other predisposing, enabling, need-related and psychosocial factors that include immigration status, religiosity, acculturation,

and family characteristics) was rejected, since there were not any significant association between positive BHB and immigrant status, religiosity, acculturation, and family characteristics.

In general, the screening rates for CBE and mammography among the participants in the current study were higher than levels in the Healthy People 2020 objectives. As stated earlier in the literature review, adherence to recommended screening behaviours is reported to be low in Iranian women (32). However, Canada's immigration policies favor highly educated and skillful immigrants (89), and migration has predominantly led to the exodus of educated and wealthy Iranian. These are demographic features that are often associated to more adherence to the screening programs(186).

In this study the majority of participants had heard of mammography (86%), albeit 61% had never had mammogram. With a shorter length of stay in Canada (less than 5 years), women show more positive BHB. There is a possibility that women go back to Iran to do mammography during the first years of their residency due to the minimum knowledge of the access to healthcare services in Canada. However, women who had lived in Canada for >11 years were more likely to show positive BHB. This may be so because women who have spent more of their lifetime in Canada may have higher language proficiency and better understanding of the medical system. They may also have had more opportunities for screening due to their age of eligibility for screening program. Another potential explanation for this result may be that Quebec has targeted efforts at reaching women for their baseline mammography at their 50s through an organized screening, and thus has successfully reached women who tend to fit this provincial screening program. Length of stay was not a significant predictor for compliance with breast cancer screening guidelines.

One hundred and twenty-nine (33.5%) received a mammogram recommendation by their physician. Of the women who received a recommendation from their physician 92% had at least one mammogram compared with 63.5% for the women who did not receive a recommendation. Our findings support earlier studies that found receiving a mammography recommendation from a healthcare professional promote breast cancer screening (107, 187). This suggests the importance of connecting immigrant women to primary care providers. However, having a female physician has not been significantly associated to the higher breast cancer screening uptake among Iranian women, which is inconsistent with results from women originated from other nationalities (188). Moreover, several studies have documented that good communication was associated with higher screening rates and the effect was mainly independent of physician's gender (189).

Nearly 25.5% of the women indicated having had at least one CBE in Iran and 24% in Canada. Eight percent was being offered to accomplish CBE every 3-5 years in Iran and 6% in Canada. Of the women reported having CBE in Iran 22.5% received it every year or every two years comparing 18.3% in Canada with the same frequency. Overall, 91% of women participated in this study had positive a breast health behaviour which will answer the first research question.

This higher than average reported screening rate for BSE, CBE, and mammography may reflect the unique circumstances of Iranian immigrant women in this sample which is in line with the results from other studies among Iranian immigrant women in other samples (31, 190). These findings are inconsistent with previous studies on migrant women from other countries living in Canada, which indicate low rates of screening compared with the Canadian women(107, 187, 191, 192). For instance, data from previous studies among immigrant women in Ontario reveals that the highest screening rate was among Muslim-majority countries in East Asia & Pacific (56.0%)

and Middle East & North Africa (52.1%) and the lowest screening rates was among Sub-Saharan African women from Muslim-majority countries (35.3%) followed by South Asia (43.1%) (107) which is considerably lower than 70% national target (193).

For example, all of the women were insured based on the Régie de l'assurance maladie du Québec (RAMQ), hence any measure to accomplish breast screening including visits to healthcare providers and mammography are free. Comparisons within and across countries illustrate that health insurance coverage plays an important role in immigrants' access to healthcare services, yet, their health influence by the extent of the coverage (194). On the other hand, health insurance should not be considered as a "magic bullet" for assuring access to care for immigrants and other vulnerable populations. Indeed, other existing barriers to care, including socioeconomic differences have not yet been adequately addressed(195).

Eighty-one percent of women have a regular primary healthcare provider and among them, 82% demonstrated a positive breast health behaviour, yet, there is no significant correlation in adjusted model of multivariate logistic regression that contradicts the results from previous studies among multiethnic women which indicates this variable as the strongest one among others (196). The majority (95%) of the respondents had obtained university degree that could justify the high rate of breast cancer screening among this population. A few studies however, revealed that education level has an important role in the perception of cancer screening (197). Two hundred and eighty-six women were currently employed and worked outside home. Education and training may have led to employment, but not necessarily high income. Among those who disclosed their annual family income as an enabling factor, 52% reported earning less than $30,000 which was not significantly associated to positive BHB. Moreover, seventy eight percent of women who have

compliance with regular health check-ups had had mammography as well. As a result, respecting health check-ups are significantly associated to mammography follow-up (P<0.001). These factors have repeatedly represented to positively affect women's adherence to screening guidelines.

Almost 35% of participants practiced BSE every year or every two years and 45% reported never practiced, and only 20% practiced CBE every year or every two years, while 22% in Iran and 6% in Canada reported having CBE. The comparatively lower BSE and CBE rates are in contrast with the higher reported knowledge of a normal breast (87%) and doing BSE (78%). This could be due to women placing lower priority on these methods of screening and hence lack of adequate recommendation from healthcare providers for CBE. Settlement challenges including limited financial capital and unemployment may be of few reasons that prohibited this group of women from taking part in preventive measures like cancer screening (198, 199). Further qualitative research is needed to explore this component as potential barriers to screening among Muslim immigrant women.

Although 87% reported that they are aware of the normal breasts and 78.4% indicated that they know how to perform BSE, more than half of the participants did not answer to the questions regarding BSE benefits, and only 24% of women among the respondents believe that performing BSE will help them to find the lumps earlier than healthcare providers. Only twenty-seven of women who indicated that performing BSE may reduce the mortality following breast cancer reported that they do BSE every year. This does not confirm the importance of knowledge as an influential factor on breast cancer screening behaviours. As stated in several studies women who had time to perform BSE were more likely to follow this behaviour. In this study, only 28.6% declared that BSE takes a lot of time, and 71.4% are not sure about the allocated time to BSE. Lack

of confidence in performing BSE has also been identified as a barrier to BSE. In this study 64.4% of the women rated themselves as confident that they are able to perform BSE correctly. The significant of confidence related to BHB is consistent with results of other studies(200, 201). The extent to which women have had mammography for screening purposes rather than diagnosis is very difficult to determine (202). Our data demonstrates that women with a history of breast abnormalities were more likely to have positive BHB. Furthermore, there is not a certain estimate of the proportion of women who have been screened with mammography at some point in their lives comparing to the proportion who are screened according to the routine screening program and age-specific guidelines. Therefore, determined documentation for the reason and the prevalence of screening should be prioritized in research concerning the screening utilization. In the adjusted model, we could not show the influence of breast history on BHB, which is quiet against intuitive, but there was not enough variability in this variable and also just looking to the range of the confidence interval we can conclude a lack of power.

In this study, BSE self-efficacy was positively associated to positive breast health behaviour (P<0.001), which confirms the results from other studies in breast cancer screening among ethnic minorities. The majority of Asian women who lacked confidence, admitted that they did not perform breast self-examination, while results from other studies illustrates the positive significant relationship between self-efficacy and BSE (203). Self-efficacy is also positively associated with participating at the breast screening practices (204). Self-efficacy was considered as a significant variable for mammography use (205). A survey in Iran also represented that the adherent women to mammography showed greater self-efficacy than non-adherent group (206). Bandura and Adams confirmed the avoidance behaviour among people with low self-efficacy and

in reverse, dominant behaviour among people who are able to overcome the personal barriers such as fear (137). Along with early detection, sufficient self-efficacy is required to challenge the psychological obstacles (190).

With regards to positive perceptions concerning breast cancer screening, Iranian immigrant women realized the importance of breast cancer screening. The women also perceived breast cancer as serious and believed that they have control over their own health and were motivated to maintain their health. Prior studies of the role of acculturation in breast cancer screening have predominantly focused on Iranians as a whole. In this study, ethnic subgroups have been identified and divided into Persian and non-Persian. For both groups, acculturation was not significantly associated with higher rates of engaging in BHB (engaging in at least one of the screening methods: BSE, CBE, OR Mammography). Previous studies on breast cancer screening and acculturation have had conflicting results. Some discovered no statistically significant effect of acculturation on screening engagement (207, 208), while others found an effect (209, 210). All of the studies that found no significant effect applied a comprehensive scale of acculturation in which language, social patterns, family values and also ethnic identification were measured. Another study that found a significant association between acculturation and screening added birthplace as another factor in the scale (209). All evaluated factors are along with the measured factors in Berry's AO scale. Placing our results in the context of these conflicting findings is complicated by the controversy over deciding how best to measure acculturation and determining the association between acculturation and breast cancer screening utilization in host country.

Some studies argue that language preference is the best measure of cultural integration (211) which is a reliable and valid factor in acculturation scales. Limited proficiency in English or

French is associated with socioeconomic factors known to be related to decreased use of health care services (212). Some consider language as a communication barrier between patient and healthcare provider, whereas others focus on the effects of language on screening practices as an access factor. Looking at language as an "access factor" in healthcare utilization might be an oversimplification. Language has an influence on cognitive structure, self-expression, and perceptions which may affect how Iranian women interact with healthcare providers (213). Therefore, language presumably works on both sides and the combination can affect on the likelihood of obtaining recommended screening. A high percentage of Iranian immigrants who participated in this study (95%) are able to communicate to either official languages in Quebec, whereas nearly 60% of women declared Persian as their preferred spoken language within their cultural context. Therefore, the role of language in relation to level of acculturation is not consistent with the findings of similar studies. In one study, results shows that Hispanic women who were more acculturated had significantly higher odds of ever and recently receiving a clinical breast examination (P<=0.01) and of ever (P<=0.01) and recently (P<=0.05)receiving a mammogram than did less acculturated women (102). As an example of complex role of language and acculturation, I found that among the subset of women who are not integrated into Canadian society (who were the least acculturated), level of acculturation is not predictive of screening use.

Surprisingly, in this group of women, religiosity, acculturation orientation, and language were not significantly associated with higher engagement in breast cancer screening. However, due to the presence of a highly skilled Iranian workers category and a highly educated women population in Montreal, the participants are not representative of Iranian women in home country. Moreover, the variation in rates by region of origin in other research data highlights that participation rate in breast cancer screening among Muslim immigrants may be influenced by

conflict of cultural beliefs and practices, socio-demographic and immigration status. Given the fact that Muslims originated from different countries with different national, political, racial, ethnic, and cultural traditions, cultural and religious values link together to form a unique set of norms to conduct women's behaviour and health practices. A few studies reported that the religiosity was not significantly associated with mammography screening perception (197, 214).

Although our study did not account for education nor income associated with screening uptake, length of stay in Canada revealed direct association with the screening uptake, which are not consistent with other studies among immigrant population (107).

Social and cultural factors correlated to knowledge, beliefs and attitudes as well as associated components of the health services organization have been recognized as barriers and facilitators for improving mammography screening practices (215). The importance of incorporating these factors in the design and implementation of breast cancer screening programs among immigrant women has been forcefully emphasized by public health authorities and policy makers (216). However, there is a lack of information about the characteristics of these factors among Iranian immigrant women. Further community- and practice-based research is needed to evaluate the effectiveness of tailoring cancer screening communications to the acculturation level of the women being served. Further study would also help to clarify whether providing healthcare professionals with the same language or cultural orientation could contribute to the screening rates for Iranian women (217).

Perceptions of barriers and facilitators into mammography and to breast cancer screening have been recommended by theoretical health models (218)and affirmed in previous studies (219, 220). Interestingly, this study does not suggest a significant positive relationship between self-reported barriers (exposure to radiation, pain, embarrassment, and Fears about disease's impact on

personal relationships) and facilitators (having female doctor, having family doctor who speaks common language, and social support) and positive breast health behaviours for Iranian immigrant women. Several participants, however, identified specific barriers and facilitators that they found interfering with participation in breast cancer screenings. Amongst the cultural barriers, embarrassment, shame and fatalism were not strong barriers for most of the participants, while they have been reported by many studies as a strong barrier (221). On the other hand, cultural beliefs , such as embarrassment associated with discussing and showing the breast , and fatalism have been recognized as barriers to breast cancer screening among Asian women (222). Although Canada is officially a bilingual country committed to the provision of services in French and English, immigrants who are not fluent in either of these languages would be expected to have poor access to care(195). Since, the majority of women are language oriented, having a physician that speaks the same language is not a significant barrier. In Canada, however, language barriers in access to care have been identified (223-225).

6.1. Limitations and Strengths

Several factors should be considered in interpreting my data such as potential selection bias, applying a self-report approach to collect data, and a potential lack of generalizability to women who have never been involved in Iranian communities or live far reach areas. Moreover, the participant women may be systematically different from non-participant in terms of practicing or not practicing breast screening. So, my data lacks the nonparticipants' data. However, the refusal rate among the eligible women for the current study was low (10%).

Sample representativeness is a concern for studies conducted in any population and with greater concern specifically among immigrant populations since migration often occurs in a selective manner. A wide range of factors prompted immigrants to leave their homes and settle

down in a host country. These factors often only apply pressure on specific sub-groups of people in a society. For example, the outcome of different social forces has resulted in an over-representation of secular and educated Iranians in Los Angeles (226). Therefore, the composition of a sample drawn from a migrant group does not resemble to their home society.

Selection bias is a potential problem and our sample may not be completely representative of the Iranian immigrants in our study communities and it is possible that sampling will recruit better off populations. To minimize the impact of this, recruitment was being done in all Iranian communities including different religious groups, community-based organizations (CBO), and Persian schools within different regions of greater Montreal. Another limitation of our study is that survey data is self-reported information which may differ inherently from mammography screening information obtained from medical records of healthcare providers. Persons tend to over- report their use of screening and to underreport the time since their last screen thus leading to self-report bias(227). However, although not the first research among Iranian in Montreal, this is the first research of its kind that explore the predictive factors in positive breast health behaviours from a broad sample perspective. Since there is no published report on screening practices of Iranian women in Canada and national surveys do not specify screening rates for this population, it is not possible to compare our findings with other Iranian women living elsewhere in Canada. The specific contribution of the present study is that it investigates in detail, the sources of the facilitators and barriers for the Iranian women in their access to breast cancer screening. A strength of the study can be derived from the mix of participating members; different religion groups, first and second generation, young, middle-aged and old women, low and high educated. The diversity of the participants contributes to the potential for transferability of the findings to other Iranian migrant communities. One of the strength of this study include the common culture

shared by the investigator and the study participants. Common culture and language and applying the Persian version of the questionnaire facilitated the quality of data collection which resulted in a high response rate (90%).

6.2. Future Challenges

Healthcare systems are commonly challenged by the unique requirements of immigrants needed to maintain health. One-size-fits-all policies may not be practical and efficient to address immigrants' health requirements. Policies must be targeted at particular stages of life, within different age groups, and disadvantages of health outcomes among immigrant population(113). In addition, some immigrants have specified health needs that reflect their place of birth, experiences, and knowledge that vary from Canadian-born population. In addition, having enough data to monitor immigrants' health is crucial in order to design and implement appropriate health services(228). However, in Canada, existing gaps in data regarding immigrant health which is not able to assess the health impact of moving and resettling into a new environment(229).

As such, it is necessary to better recognize the accessibility of services and to deliver appropriate care to migrants. The result of this study can inform the advancement and evaluation of targeted policies and programs that address the healthcare needs of immigrants in Canada. They also highlight the unique patterns of health among Iranian immigrant women and support the necessity to acknowledge the diversity of immigrant populations in population health research and development of related programs and policy. While the current study identified the barriers and facilitators for breast cancer screening among Iranian immigrant women, the next steps will examine issues surrounding timely access to primary healthcare by newcomers to Canada.

Governments can also reinforce programs and policies that ameliorate linkages between

organizations and agencies involved in immigrant population health. Inter-institutional networks can enhance the efficacy of existing programs and can cause the formation of new programs. Looking forward, the development and funding of immigrant health-based databases or adding a larger number of immigrant sample to the existing databases may also be helpful.

There is growing evidence that promoting cultural and linguistic competency among healthcare professionals can improve service delivery and use. Migrant-friendly services comprising easy and fast access to all levels of care, involvement of immigrant communities, and introducing immigration process and challenges to healthcare providers may improve health outcomes. Creating and maintaining culturally competent healthcare systems might alleviate health disparities and overcome communication barriers resulting in appropriate diagnosis, treatment, and follow-up, thus, increasing the efficacy of clinical staff, resulting in greater client satisfaction with services (230)**.**

Many studies show that screening program reduce mortality due to breast cancer by at least 25% among women aged 50-69, over a ten-year period. Since breast cancer is a health priority for women population, this research will address these priorities by involving women as participants, will enhance community well-being, and also reduce health disparities. Indeed, by engaging women in this research, the proportion of women who are adherent to current breast cancer screening guidelines will increase through empowering individuals to regain control of their health. In addition, present research may increase Iranian communities' capacity to identify and solve their problems regarding accessibility of screening services and decision makers' and service providers' ability to mobilize resources, improve policies by building up cultural competence, and enhance professional practices.

6.3. Conclusion

Our study raised a few questions that should be addressed in future research and policy to better understand the healthy immigrant effect in Canada. Previous studies did not consider potentially significant pre-migration experiences. It is highly recommended that future studies incorporate early life conditions in the home country such as infant mortality rate, cancer mortality rate and examine how pre-migration exposures influence post-migration health status.

More research is required on specific health issues, the various types of helpful services and plans to maintain their health, and how to address key determinants of health. Steps must be taken to strengthen existing databases and build up new ones. Recommendation from a study by Hyman confirmed the necessity of more research on exemplary health care delivery models, institutional reforms and culturally sensitive health promotion strategies. Also, more research is needed to recognize best measures to decrease the barriers to access that Canadian immigrants continue to face (231). This may happen with the creation of educational health promotion programs that take into account women's cultural and social realities in order to motivate women to obtain breast cancer screenings. For instance, some studies reported that few minorities have access to community resources and language- oriented information that provide a greater opportunity to participate in breast cancer screening and being informed about the process (232). Information about breast cancer screening should be equitably available among various Canadian population. This exploration can be further expanded to other culturally diverse cities to examine whether similar AO influences are observed and the extent to which resulting conclusions can be generalized.

To conclude, this research has demonstrated that Iranian immigrant women are developing their own unique combination of cultural values and beliefs representing the cultural dimensions of both their past and present life experience (233). The women in this study identified themselves as bilingual in terms of language use. Other studies have revealed lack of language proficiency to be an important barrier into breast cancer screening (234). Physician communication and recommendation were significant predictors of mammography practice. Therefore, encouraging women to ask their questions at the time of CBE or mammogram and making them feel comfortable may facilitate the likelihood of follow-up and regular screening.

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Appendix 1: Questionnaire

Date: Participant's ID Number:

Note: To answer the questions from section A to section I, please indicate the extent to which you agree or disagree with the following statements.

A. Please answer the following questions that relate to your adherence to breast cancer screening.

➢ (*Screening*: the process of examining people for the presence of a disease).

➢ (*Breast self-examination (BSE):* is a screening method used in an attempt to detect early breast cancer. The method involves the woman herself looking at and feeling each breast for possible lumps, distortions or swelling).

➢ Self-efficacy: people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives.

1. Do you know how your breasts normally look and feel?
   - Yes
   - No
2. Do you know what changes to check for?
   - Yes
   - No
3. Ever had a clinical breast exam in Iran?
   - Every year or every 2 years
   - Every 3-5 years
   - Once
   - Never
4. Ever had a clinical breast exam in Canada?
   - Every year or every 2 years
   - Every 3-5 years
   - Once
   - Never
5. Even had a mammogram in Iran?
   - Within the past 2 years
   - 2-5 years ago

- >5 years ago
- Never

6. Ever had a mammogram in Canada?
    - Within the past 2 years
    - 2-5 years ago
    - >5 years ago
    - Never

7. Ever had a breast self-examination in Iran?
    - Within the past 2 years
    - 2-5 years ago
    - >5 years ago
    - Never

8. Ever had a breast self-examination in Canada?
    - Within the past 2 years
    - 2-5 years ago
    - >5 years ago
    - Never

B. Please answer the following questions that relate to your perceived risk (susceptibility) of breast cancer screening.

(1) It is likely that I will get breast cancer.
   A. Strongly disagree
   B. Disagree
   C. Undecidd
   D. Agree
   E. Strongly agree

(2) My chances of getting breast cancer in the next few years are great.

   A. Strongly disagree
   B. Disagree
   C. Undecidd
   D. Agree
   E. Strongly agree

(3) I feel I will get breast cancer sometime during my life.

   A. Strongly disagree
   B. Disagree

C. Undecidd

D. Agree

E. Strongly agree

C. **Please answer the following questions that relate to your Perceived Benefits (Seriousness) of breast cancer screening.**

(1) The thought of breast cancer scares me.

    A. Strongly disagree

    B. Disagree

    C. Undecidd

    D. Agree

    E. Strongly agree

(2) When I think about breast cancer, my heart beats faster.

    A. Strongly disagree

    B. Disagree

    C. Undecidd

    D. Agree

    E. Strongly agree

(3) I am afraid to think about breast cancer.

    A. Strongly disagree

    B. Disagree

    C. Undecidd

    D. Agree

    E. Strongly agree

(4) Problems I would experience with breast cancer would last a long time.

    A. Strongly disagree

    B. Disagree

    C. Undecidd

    D. Agree

    E. Strongly agree

(5) Breast cancer would threaten my relationship with my husband.

    A. Strongly disagree

    B. Disagree

C. Undecidd

D. Agree

E. Strongly agree

(6) If someone had breast cancer, her whole life would change.

A. Strongly disagree

B. Disagree

C. Undecidd

D. Agree

E. Strongly agree

(7) If someone developed breast cancer, she would not live longer than 5 years.

A. Strongly disagree

B. Disagree

C. Undecidd

D. Agree

E. Strongly agree

*If your answer to questions number 7 & 8 in part A is positive, you will answer to the questions in part D, otherwise, please go to part E.

D. Please answer the following questions that relate to your perceived benefits of breast self-examination.

(1) When I do self-examination, I feel self-satisfied.

A. Strongly disagree

B. Disagree

C. Undecidd

D. Agree

E. Strongly agree

(2) When I complete monthly breast self-examination I don't worry as much about breast cancer.

A. Strongly disagree

B. Disagree

C. Undecidd

D. Agree

E. Strongly agree

(3) Completing breast self-examination each month will allow me to find lumps early.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

(4) Completing BSE each month may decrease my chances of dying of breast cancer.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

(5) Completing BSE each month will decrease requiring radical or disfiguring surgery if breast cancer occurs.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

(6) Completing BSE each month may help me find breast lumps early before it is detected by a doctor.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

E. Please answer the following questions that relate to your perceived barriers of breast self-examination.

(1) I don't feel I can do breast self-examination correctly.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree

E. Strongly agree

(2) Doing breast self-examination will make me worry about what is wrong with my breast.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

(3) BSE is embarrassing to me.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

(4) BSE takes too much time.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

(5) It is hard to remember to do breast self-examination.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

(6) I don't have enough privacy to do breast self- examination.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

(7) BSE is not necessary if you have a breast self-examination by a healthcare provider.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

(8) BSE is not necessary if you have a routine mammogram.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

(9) My breasts are too lumpy for me to complete breast self-examination.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

F. Please answer the following questions that relate to your perceived self-efficacy (confidence) of breast self-examination.

(1) I know how to perform BSE.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

(2) I can perform BSE correctly.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree

E. Strongly agree

(3) I could find a breast lump by performing BSE.

A. Strongly disagree
B. Disagree
C. Undecidd
D. Agree
E. Strongly agree

(4) I am able to find a breast lump that is the size of rather greater than a Hazelnut.

A. Strongly disagree
B. Disagree
C. Undecidd
D. Agree
E. Strongly agree

(5) I am able to find a breast lump that is the size of a filbert.

A. Strongly disagree
B. Disagree
C. Undecidd
D. Agree
E. Strongly agree

(6) I am able to find a breast lump that is the size of a pea.

A. Strongly disagree
B. Disagree
C. Undecidd
D. Agree
E. Strongly agree

(7) I am sure of the steps to follow for doing BSE.

A. Strongly disagree
B. Disagree
C. Undecidd
D. Agree
E. Strongly agree

(8) I am able to tell something is wrong with my breast when doing breast self-examination.

      A. Strongly disagree
      B. Disagree
      C. Undecidd
      D. Agree
      E. Strongly agree

(9) I am able to tell something is wrong with my breast when I look in the mirror.

      A. Strongly disagree
      B. Disagree
      C. Undecidd
      D. Agree
      E. Strongly agree

(10) I can use the correct part of my fingers when examining my breasts.

      A. Strongly disagree
      B. Disagree
      C. Undecidd
      D. Agree
      E. Strongly agree

G. Please answer the following questions that relate to your perception of mammography benefits.

(1) When I get a recommended mammogram, I feel self-satisfied.

      A. Strongly disagree
      B. Disagree
      C. Undecidd
      D. Agree
      E. Strongly agree

(2) If I get a mammogram and nothing is found, I don't worry as much about breast cancer.

      A. Strongly disagree
      B. Disagree

C. Undecidd
D. Agree
E. Strongly agree

(3) Having a mammogram will help me find breast lumps early.

A. Strongly disagree
B. Disagree
C. Undecidd
D. Agree
E. Strongly agree

(4) Having mammogram will decrease my chances of dying from breast cancer.

A. Strongly disagree
B. Disagree
C. Undecidd
D. Agree
E. Strongly agree

(5) If I find a lump through a mammogram, my treatment for breast cancer may not be as bad.

A. Strongly disagree
B. Disagree
C. Undecidd
D. Agree
E. Strongly agree

(6) Having a mammogram is the best way for me to find a very small lump.

A. Strongly disagree
B. Disagree
C. Undecidd
D. Agree
E. Strongly agree

H. Please answer the following questions that relate to your perception of mammography barriers.

(1) I am afraid to have a mammogram because I might find out something is wrong.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

(2) I am afraid to have a mammogram because I don't understand what will be done.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

(3) I don't know how to go about getting a mammogram.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

(4) Having a mammogram is too embarrassing.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

(5) Having a mammogram takes too much time.

    A. Strongly disagree
    B. Disagree
    C. Undecidd
    D. Agree
    E. Strongly agree

(6) Having a mammogram is too painful.

    A. Strongly disagree

B. Disagree

C. Undecidd

D. Agree

E. Strongly agree

(7) I cannot remember to schedule a mammogram.

A. Strongly disagree

B. Disagree

C. Undecidd

D. Agree

E. Strongly agree

(8) I have other problems more important than getting a mammogram.

A. Strongly disagree

B. Disagree

C. Undecidd

D. Agree

E. Strongly agree

(9) I am too old to need a routine mammogram.

A. Strongly disagree

B. Disagree

C. Undecidd

D. Agree

E. Strongly agree

I. **Please answer the following questions that relate to your health motivation**

(1) I want to discover health problems early.

A. Strongly disagree

B. Disagree

C. Undecidd

D. Agree

E. Strongly agree

(2) Maintaining good health is extremely important to me.

A. Strongly disagree
B. Disagree
C. Undecidd
D. Agree
E. Strongly agree

(3) I search for new information to improve my health.

A. Strongly disagree
B. Disagree
C. Undecidd
D. Agree
E. Strongly agree

(4) I feel it is important to carry out activities that will improve my health.

A. Strongly disagree
B. Disagree
C. Undecidd
D. Agree
E. Strongly agree

(5) I eat well-balanced meals.

A. Strongly disagree
B. Disagree
C. Undecidd
D. Agree
E. Strongly agree

(6) I exercise at least 3 times a week (walking for a minimum of 30 minutes or any other type of physical activities).

A. Strongly disagree
B. Disagree
C. Undecidd
D. Agree
E. Strongly agree

(7) I have regular checkup even when I am not sick.

A. Strongly disagree

B. Disagree

C. Undecidd

D. Agree

E. Strongly agree

J. Your Health History

1. Have you ever had any type of cancer?
   1) Yes
   2) No

2. How many servings of alcohol do you have on a typical day? (one serving is a can of beer, a glass of wine or a shot of hard liquor)
   a. 0
   b. 1-2
   c. 3 or more

3. Do you smoke?
   a. Never
   b. Former
   c. Current

K. Your Family History

4. Do you have multiple family members who have had breast and/or ovarian cancer?

   a. Yes
   b. No
   c. Don't know

5. Do you have a sister who has had breast cancer?
   a. Yes
   b. No
   c. Don't know

6. Has your mother ever had breast cancer?
   a. Yes
   b. No
   c. Don't know

7. Do you have a BRCA1 or BRCA2 gene mutation?
   a. Yes
   b. No
   c. Don't know

L. Your Height and Weight

8. What is your height? (……….cm)
9. What is your weight? (………kg)
10. How much did you weigh at age 18 (…………kg)?

M. Your Reproductive History

11. How old were you when you started having menstrual periods?
    a. Younger than 12 years
    b. 12-13 years
    c. 14-15
    d. 16 years or older
    e. Not sure

12. How many children have you given birth to?
    a. 1
    b. 2
    c. 3 or more
    d. None (go to question #16)

13. If yes, how old were you when you first gave birth?
    a. Younger than 20 years
    b. 20-24 years
    c. 25-29 years
    d. 30 years or older

14. Breastfeeding experience
    a. Exclusive breast feeding
    b. Formula
    c. Both of them
    d. Unknown

15. Have you breastfed for a total of at least 1 year? If you have more than 1 child, this includes time spent breast feeding all your children.
    a. Yes
    b. No

16. Are you currently taking birth control pills?
    a. Yes
    b. No

17. History of personal breast problem

a. Yes
b. No

N. Acculturation

For this section, please first write in the space what you feel is your 'home culture' – this means the culture into which you were born, or where you have spent most time in your life so far.

My home culture is: _____

Please mark with an 'x' how much you agree or disagree with the following statements.
Mark only one box for each statement.
When the statement uses "my home culture", please think of the country you wrote above.

1. First, please think about your home culture…

	Completely disagree	Slightly disagree	Slightly agree	Agree Completely
It is important to me that others see me as part of my home culture	❑	❑	❑	❑
It is important to me to see myself as part of my home culture	❑	❑	❑	❑
Being part of my home culture is an important part of who I am	❑	❑	❑	❑
At home, I eat food from my home culture	❑	❑	❑	❑
I celebrate the holidays of my home culture	❑	❑	❑	❑
Most of my friends are from my home culture	❑	❑	❑	❑
I can easily communicate with people from my home culture	❑	❑	❑	❑

2. Now, please think about Canada…

	Completely disagree	Slightly disagree	Slightly agree	Agree Completely
It is important to me that others see me as a Canadian	❑	❑	❑	❑
It is important to me to see myself as a Canadian	❑	❑	❑	❑
Being Canadian is an important part of who I am	❑	❑	❑	❑
At home, I eat Canadian food	❑	❑	❑	❑
I celebrate Canadian holidays	❑	❑	❑	❑
Most of my friends are Canadian	❑	❑	❑	❑
I can easily communicate with people from Canada	❑	❑	❑	❑

O. **Demographic profile**

1. Age ………. years

2. Ethnicity
    - Persian
    - Azerbaijani
    - Kurd
    - Turkmen
    - Gilaki
    - Mazandarani
    - Lur
    - Tat
    - Talysh
    - Baluch
    - Arab
    - Armenian
    - Others (please specify) …….

3. Marital status
    - Married/ common law/living with a partner
    - Never been married
    - Widowed
    - Divorced/separated

4. Education
    - Less than 5 years
    - 6-8 years
    - Primary (9-11 yrs.)
    - Tertiary (> 13 yrs.)

5. English-speaking proficiency
    - Not at all/ not very well
    - Fairly well
    - Very well

6. French-speaking proficiency
    - Not at all/not very well
    - Fairly well

- Very well

7. Employment Status: Are you currently…?
   - Employed for wages: Working full time (30 hours or more per week)
   - Employed for wages: working part time (less than 30 hours per week)
   - Self-employed
   - On vacation or sick leave with pay
   - Out of work and looking for work
   - Out of work but not currently looking for work
   - A homemaker
   - A student
   - Retired
   - Disabled or unable to work

8. Annual family income
   - Less than 30,000$
   - 30,000$ and more

9. Immigration status
   - Permanent resident
   - Citizen

10. Time lived in Canada…………. (in years)

P. Health Service Use

1. Ever heard/read about breast cancer
   - Yes
   - No

2. Where is your usual location of care?

   - Clinic
   - Hospital
   - Private office
   - No usual source of care

3. What is the usual type of healthcare professional you refer to?

- Family physician
- Gynecologist
- Nurse practitioner
- No usual source of care

4. Have a doctor/healthcare professional ever recommended that you have a mammogram?
   - Yes
   - No

5. Have you ever done a mammography?
   - Yes
   - No

*If your answer to question about ever having mammography is negative, please go to question number 7.

Q. Please choose from the options below. Check all that applies:

6. Which of the following was the most important factor/factors in your decision <u>to have a mammogram</u>? (Select all that apply)
   - Doctor's recommendation
   - Family member or friend's recommendation
   - Media sources (Magazine article or news report)
   - Public screening, accessibility
   - Social support (spouse, relative, and neighbor)
   - Personal assessment of breast cancer risks
   - Personal assessment of benefits and harms of mammography
   - Having appropriate information about breast cancer risks and symptoms
   - Information by health care personnel
   - Fear (treatment becomes harder in case of the progression of the disease and fear of losing the breast)
   - Beliefs about susceptibility to breast cancer
   - Having usual source of care
   - Having female doctor
   - Have physician that speaks common language
   - Self-efficacy
   - Other………………………

7. Which of the following was the most important factor in your decision <u>not to have a mammogram</u>? (Select all that apply)
   - Unfamiliarity with available resources
   - Experienced barrier to care in last year

- Magazine article or news report
- Personal assessment of breast cancer risks
- Personal assessment of benefits and harms
- Cost or inconvenience
- Fear of finding the mass, being diagnosed with cancer, losing the breast and radiation
- Fears about disease's impact on personal relationships
- Confidence in non-traditional cancer treatments
- Embarrassment about the procedure and its results
- Cultural factors (shame and fatalism)
- Lack of regular physician
- Language barrier
- Lack of time
- Pain during mammography
- Lack of concern
- Lack of knowledge about symptoms, risk factors, and screening methods
- Indifference for example (being young and priorities in life)
- Health care personnel's approach (having no advice and not giving information)
- It takes a long time to get the appointment and long waiting hours in clinics
- Not having private health insurance
- Being strange to environment and transportation problems
- Problems in performing activities of daily living (ADL: Feeding, continence, transferring, going to toilet, dressing, and bathing)
- Problems in instrumental activities of daily living (IADL: use of telephone, shopping, food preparation, housekeeping, laundry, transportation, medications, finances)
- Age>75 years
- Other………………………………

R. Religiosity

8. Are there ways that your religious beliefs affect your health care choices or might provide guidance?
   - Yes
   - No

S. Do you have any question or comments?

………………………………………………………………………………………..

Thank you for taking your time to complete this questionnaire.

Appendix 2: CONSENT FORM

Title of Research Project:	Evaluation of Predictive Factors for Engaging in Positive Breast Health Behaviors: A Quantitative Study among Iranian Immigrant Women in Montreal
Principal Investigator:	Dr. Gillian Bartlett, Professor, Department of Family Medicine, McGill University
Co-investigators:	Ms. Nina Mamishi, MSc Candidate, Department of Family Medicine, McGill University
	Dr. Ellen Rosenberg, Family Physician, Department of Family Medicine, McGill University
	Dr. Brenda MacGibbon, Professor, Dept of Mathematics and Statistics, UQAM
	Dr. Amalia Issa, Professor, Dept of Health Policy and Public Health, University of the Health Sciences
	Dr. Tamara Carver, Postdoctoral Fellow, Dept. of Family Medicine, McGill University
	Ms. Vasiliki Rahimzadeh, PhD Candidate, Dept. of Family Medicine, McGill University
Institution:	McGill University
Project sponsored by:	Genome Canada

RESEARCH PROJECT DESCRIPTION

You are being invited to take part in a study called "Evaluation of Predictive Factors for Engaging in Positive Breast Health Behaviors: A Quantitative Study among Iranian Immigrant Women in Montreal" which aims to identify barriers and facilitators to breast cancer prevention in Iranian immigrant women. The purpose of this study is to find out the behaviors toward breast awareness that Iranian women in Montreal are engaging in. We would like to know that for this community, what are the important factors that are associated with breast cancer screening here in Montreal.

To decide whether or not you want to be a part of this research study, you should understand what is involved and the potential risks and benefits. This form gives detailed information about the research study. After you have read this form, you will be asked to sign it if you wish to participate.

> **What will my responsibilities be if I take part in the study?**

If you choose to take part in this study, one of the research team will contact you by telephone to set up a time to give you the questionnaire and to assist you if needed in filling out the questionnaire.

You will be asked questions that will help us better understand obstacles and promoters in breast cancer

screening including questions about:

- Your demographic profile (age, ethnicity, marital status, education, employment)
- Your level of integration into Canadian society
- Your health history
- Your reproductive history
- Your family history
- Your physical activity
- Your adherence to breast cancer screening
- Your level of religiousness

We anticipate needing 30 – 45 minutes to complete this questionnaire. There is no risk associated with participation in this study.

Participant's rights

Your participation is completely free and voluntary. Your decision to participate or not to participate will have no adverse effect on your health care. You may take the time necessary to reflect on your decision and discuss your participation in the project with persons close to you before giving us your answer. You have the right to ask questions at any time. You are free to withdraw from the study at any time.

Confidentiality and anonymity of data

Only Dr. Gillian Bartlett will have access to participants' identification. You will be given a study ID number. A secure document will be kept by Dr. Bartlett linking your study ID with your name. The data will be kept at the secured research offices at McGill University until the end of the study, and for no longer than 10 years. Information stored on computers will be protected by a password.

Information gathered will remain strictly confidential and will only be used for this project. No individual data shall be divulged in the course or subsequent reporting of the results of the research to insure confidentiality for participants.

Risk and Benefits

We do not anticipate that there will be any harm or discomfort from taking part in this study. Some people may feel uncomfortable sharing their opinions; however, you do not need to answer any questions that you are not comfortable with.

There will be no medical benefits to you from your taking part in this study. We hope that what is learned in this study could help people like you in the future.

Contact Information

If you have any questions regarding your rights as a research participant, you may contact Sacha Young, Ethics Review Administrator at McGill, at: 514.398.2334.

Consent Statement

I have familiarized myself with the consent form and have received a copy. I have had the opportunity to ask questions that have been answered. The study has been explained to me and my questions have been answered to my satisfaction. Upon reflection, I agree to participate in this research project. I do not waive any of my legal rights by signing this consent. I am aware that I can withdraw from this study at any time.

_____ _____

Participant's Signature   Date

_____

Participant's Name (please print)

_____ _____

Research Team Member's Signature   Date

_____

Research Team Member's Name (please print)

Appendix 3: List of Recruitment Sites

Schools:
Ferdowsi school
Dehkhoda school
West Island School
Les Amis du Monde
École de la Mosaïque

Art & Music Centres:
Re-Mi Music Academy
Iranian Youth Choir of Montreal
Iranian Adult Choir of Montreal

Women's Groups & Community Centers:
Montreal Women Organization

Community Centers:
Social Service Center for Immigrants in
Montreal (Centre Sociale d'Aide aux
Immigrants, CSAI)
Sina Community Centre
Nowrouz Zamin Centre
Khane Ma Cultural Centre
Mackic Cultural Centre
Greene cultural Centre
Iranian Immigrants' Community Services
Nima Library

Religious Groups & Centers:
Noor Cultural Centre
Iranian Islamic Cultural Centre
Bahaii Centre
Zoroastrian Association
Al-Khoei Foundation
Persian Christian Church Montreal
Fairview Alliance Church

Beauty & Hair Saloons:
Farah Beauty Saloon
SOPRA Epilation
Soheila Hair Style

Iranian Food Stores:
Noor

Akhavan Sherbrooke
Akhavan West Island
Alborz

Other Places Recognized with Iranian Staff:
Royal Bank of Montreal
BMO Bank of Montreal
Scotia Bank
Canada Trust
Fengye College
MATCI college
Elite College
Dollarama
IGA
Herbalife Montreal
Pharmaprix
John Coutu
Arya Dental Clinic
Persepolis Exchange
Five-Star Exchange

Virtual Community Centers:
Mehrbanovan Montreal (Women's Group)
Irandokht Montreal (Women's Group)
Iranian Wikipedia of Montreal
Montreal Home (Public Group)
Montreal Nameh (Public Group)
Montreal Mothers (Women's Group)
Iranian McGill Society
Iranian Concordia Society
Iranian Life Experiences Guide in Montreal
(Public Group)

Appendix 4 : Euclidien Distance Calculassions Example

Scores :

Completely disagree = 1

Slightly disagree = 2

Slightly agree = 3

Agree completely = 4

Mean of answers to questions about home culture: 2.86

Mean of answers to questions about host culture (Canada): 2.43

Calculate Distance Score from each orientation with Euclidean Distance Formula:

$D(x, y) = \sqrt{(x_1 - y_1)^2 + (x_2 - y_2)^2}$

X_1 = mean score on questions about home culture

X_2 = mean score on questions about host culture

Y_1 and Y_2 = Most extreme scores for each orientation (Marginalization = 1, 1; Separation = 4, 1; Assimilation = 1, 4; Integration = 4, 4).

Distance Scores for Participant A:

From full Marginalization: $\sqrt{(2.86-1)^2 + (2.43-1)^2} = \sqrt{5.5} = 2.35$

From full Separation: $\sqrt{(2.86-4)^2 + (2.43-1)^2} = \sqrt{3.34} = 1.83$

From full Assimilation: $\sqrt{(2.86-1)^2 + (2.43-4)^2} = \sqrt{5.92} = 2.43$

From full Integration: $\sqrt{(2.86-4)^2 + (2.43-4)^2} = \sqrt{3.76} = 1.93$

*Distance scores can range from 0-4.24. Proximity scores to each orientation are then calculated:

Marginalization: 4.24- 2.35 = 1.89

Separation: 4.24-1.83= 2.41

Assimilation: 4.24-2.43 = 1.81

Integration: 4.24-1.93 = 2.31

*These scores are used to plot the person in two-dimensional space, and observe visually toward which orientation they lean the most