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**Examining the “Healthy Immigrant Effect” in Later Life:
Findings from the Canadian Community Health Survey**

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SEDAP Research Paper No. 98

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Examining the “Healthy Immigrant Effect” in Later Life: Findings from the Canadian Community Health Survey

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Abstract

Recent studies have established that a “healthy immigrant effect” operates in Canada – immigrants are generally healthier than Canadian-born persons – but that this effect tends to diminish over time, as the health of immigrants converges to the Canadian norm. Although this effect has been examined by place of birth, language, marital status, socio-economic status, charter language ability, and category of immigrant status in Canada, less is known about the “healthy immigrant effect” at different stages of the life course, particularly in mid- to later adulthood, stages at which there is an increased likelihood of decline in physical and mental health status. This study examines how age at immigration affects the health of mid- to later life immigrants, compared to Canadian-born persons, using data from the 2000-01 Canadian Community Health Survey. These data indicate that the “healthy immigrant effect” applies to later mid-life immigrants; that is, new immigrants – those who immigrated less than 10 years ago – aged 45-64 have better functional and self-rated health compared to their longer-term counterparts – those who immigrated 10 or more years ago – whose health status is similar to Canadian-born persons. Interestingly, a different picture emerges in old age (65 + years) where recent immigrants have poorer overall health compared to longer-term residents and the Canadian-born. This disadvantage, however, disappears after controlling for selected socio-demographic, socio-economic, and health behaviour factors. The findings are discussed in terms of their implications for Canadian health care policy and program planning for immigrants in the latter stages of the life course.

Key Words: “healthy immigrant effect,” mid-life, later life, functional health, self-rated health

Introduction

a. A Profile of Immigrants in the Canadian Population

According to the 2001 Census, 18.4% (5,400,000) of the Canadian population is foreign-born, the highest proportion in 70 years. This figure, up from 17.4% in 1996, reflects the increasing number of immigrants entering Canada, particularly in the past two decades. Further, of those who are born outside of the country, one-third (1,800,000) are recent immigrants who arrived between 1991 and 2001.

In addition to the growth of the foreign-born population over time, the make-up of this population according to country of birth has also changed. Until the early 1970s, the primary sources of immigrants were European countries. In the last decade however, immigrants are most likely to be from Asia, with China and India being the major source countries. Concomitantly, an increasing proportion of new immigrants are allophones – neither English nor French mother tongue – while the proportion with English mother tongue has been on the decline.

A break-down of the adult (20+) immigrant population in Canada by age in 2001 indicates that 35.6% (the rate is 36% for males and 35.3% for females) are mid-life (45-64 years) individuals while approximately 19.4% (18.1% for males and 20.7% for females) are older adults (65+ years). Further, recent immigrants (<10 years since immigration) comprise 13.6% (the rate is 14.2% for males and 13.1% for females) of the mid-life immigrant population, but only 6.2% (6% for males and 6.4% for females) of the later-life group. An examination of immigrants (excluding refugees) and their length of residence in Canada in these two age categories is important in that it may provide insights into the reasons for immigration. For example, it is assumed that recent immigrants who are currently 65 years of age or older have moved to Canada to join adult children as they have most likely completed their work force participation and are in

the retirement stage of their lives. Longer-term immigrants (10+ years of residence) who are currently in the mid-life category (45-64 years) however, were most likely seeking employment or further education/training in Canada at the time of immigration. These variations in reasons for immigration, dependent on age at immigration and other socio-demographic variables like gender and marital status, may be related to status in other domains like work and health over time.

With regard to health, mid- to later life are important age categories to examine given that both of these stages in the life course are periods of time when great physical and psycho-emotional changes are likely to occur, particularly for women. Do the recent changes in Canada's immigrant population – its size and composition – have implications for the health status and/or health care utilization patterns of its members? An examination of the “healthy immigrant effect” by adult age groups attempts to respond to this inquiry.

b. The Healthy Immigrant Effect

The “healthy immigrant effect” hypothesis maintains that recent immigrants are healthier (and subsequently, that they use the health care system less) than their Canadian-born counterparts, but that over time this health status advantage decreases. It is believed that the effect is strongest among new immigrants for two reasons: (1) healthier (and younger, better educated) individuals self-select into the immigration process; and (2) the health requirements in the Immigration Act for entrance into Canada tend to disqualify people with serious medical conditions (Oxman-Martinez, Abdool, and Loiselle-Leonard, 2000). It is thought that the decline in health status over time can be attributed to the adoption of mainstream (Canadian) beliefs, attitudes, and lifestyle behaviours (e.g., smoking, dietary changes, increased alcohol consumption) by immigrants, resulting in a convergence in health status (and health care utilization) between the foreign- and

non-foreign-born populations (Ali, 2002; Chen, Ng, and Wilkins, 1996a; Hull, 1979; Perez, 2002; Zambrana, 1997). This argument is supported by Canadian studies comparing immigrants by time since immigration, which tend to show that longer-term immigrants are not as healthy as newly arrived individuals due to a deterioration in their health over time.

Using data from the 1994-95 National Population Health Survey, Chen and his colleagues (1996a) find the following support for the “healthy immigrant effect:” immigrants, particularly recent immigrants, are less likely than the Canadian-born population to have chronic conditions or disabilities. Further, their results indicate that the effect is strongest for those from non-European countries, individuals who constitute the majority of recent immigrants to Canada.

Recent research by Perez (2002) and Ali (2002) provide further support for the “healthy immigrant effect” in Canada. In examining health status and health behaviour in the Canadian population, Perez (2002) compares the physical health (incidence of heart disease, diabetes, high blood pressure, and cancer) of immigrants with the Canadian-born, while Ali (2002) focuses on variations in mental health (incidence of depression and dependence on alcohol). Both studies observe the “healthy immigrant effect” with respect to selected physical and mental health indicators. In addition, the findings indicate that time since immigration is also related to variations in the health of immigrants; that is, the longer the period of residence in Canada, the more likely the health status of immigrants converges toward the Canadian norm. These findings remain significant even after controlling for demographic, socio-economic, and lifestyle factors.

Further research, using a number of different measures of health (e.g., disability, dependency, life expectancy), also finds evidence for the “healthy immigrant effect” in Canada (Chen, Ng, and Wilkins, 1996b; Chen, Ng, and Wilkins, 1995; Dunn and Dyck, 2000; Hyman, 2001; Parakulam, 1992). These studies indicate that length of residence in Canada (along with country of birth and demographic/SES factors) contributes to variations in the health of immigrants.

c. The “Healthy Immigrant Effect” and Age

Globerman (1998:31), in his study on the health care utilization patterns of immigrants, concludes that “age is the strongest single determinant of health problems” regardless of immigrant status; in fact, his research suggests that immigrants and the Canadian-born utilize health care resources in similar ways at all stages of the life course including in old age. According to Globerman, a “healthy immigrant effect” does not exist with regard to the use of health care services even in later life. However, research to-date on the “healthy immigrant effect” has yet to explore the intersection between immigrant status, time since immigration, health status, and age.

This study uses a population health perspective to examine the relationship between length of residence in Canada (time since immigration) and health status in mid- to later-life individuals. Such a perspective recognizes that the immigrant, socio-economic, and demographic (gender, ethnicity, language, age, marital status) characteristics of individuals, rather than “medical care inputs and health behaviours” (Dunn and Dyck, 2000:2) are the most salient predictors of health status over the life course. This study explores differences between recent immigrants, longer-term immigrants, and non-immigrant Canadians using overall/global measures of health status.

Methods

a. Data

Although recent research shows strong support for the "healthy immigrant effect" among the immigrant/Canadian-born population in general, the current study examines whether or not this effect applies equally to mid- and later-life populations. Data used in this analysis come from

Statistics Canada's 2000/2001 Canadian Community Health Survey (CCHS) Cycle 1.1 (public-use microdata file), which collects cross-sectional information on health status, health care utilization, and health determinants for the Canadian population. The sample consists of about 131,000 respondents from all provinces and territories that are aged 12 or older living in private occupied dwellings, with an overall response rate of approximately 85%. The large sample size of the CCHS makes it possible to compare health outcomes by length of residence of immigrants in later life (45+ years). However, given the relatively smaller sample size of some groups, namely recent immigrants 65+ years, more "liberal" statistical significance levels (i.e., $p < .10$) are used to capture health differences between immigrant groups. Further, sample weights, which were adjusted to sum to sample size, were used to account for unequal probabilities of selection in the multistage stratified cluster sampling design employed in the CCHS.

c. Measures

The CCHS public-use microdata file contains general information on respondents' country of birth (i.e., Canada or Other). Those who were not born in Canada (or as a Canadian citizen) were defined as immigrants and grouped by their length of time in Canada since initial immigration: 0-9 years (new immigrants) and 10 + years (longer-term immigrants). It is important to note that there is likely variation in health status among immigrant arrivals. Immigrants include naturalized citizens, landed immigrants, refugees, and non-permanent residents. They can also be classified into different categories of entry into Canada, namely "family reunion" (e.g., spouses, children, and parents of Canadian citizens/residents), "refugee," and "investment and independent" (e.g., skilled workers and business persons). Refugees are more likely to be disadvantaged in health compared to any other type of immigrant (Perez, 2002). However, it is not possible to break down the analysis by reasons for entry into Canada because the CCHS does not collect this information.

We measure the “healthy immigrant effect” in terms of global or overall health, as opposed to a specific health condition/problem (e.g., heart disease, depression). To provide a more comprehensive measure of global health status, health is measured both on subjective and objective (i.e., self-reported indicators of physical health) levels.

Subjective health status, which provides a respondent’s assessment of his/her overall health, is based on the question “In general, would you say your health is: excellent, very good, good, fair, or poor?” It can be assumed that self-rated health (SRH) is an indicator of how an individual perceives his/her physical health. Researchers often collapse SRH into two logical, divergent groups: “positive” health perception (good, very good, or excellent) and “negative” health perception (poor or fair). The current study also uses this approach.

Two tangible measures of global health status are also used. Together, they provide a fairly objective measure of overall functional limitations and disabilities. First, the Health Utility Index (HUI) provides an overall index of functional ability. The HUI is based on respondents’ answers to questions about their vision, hearing, speech, mobility, dexterity, cognition, emotions, and pain and discomfort. Scores range from 0 (completely non-functional) to 1 (perfect functional health) in increments of 0.001. The second objective measure examines health limitations that may affect one’s daily activities. Activity restriction (AR) (or disability) refers to the need for help – as a result of any health problem/condition, including a disability or handicap, that has lasted 6 + months – with instrumental activities of daily living such as preparing meals, shopping for groceries or other necessities, doing everyday housework, doing heavy household chores (yard work), and personal care (washing, dressing or eating, or moving about inside the house). Restriction of activities is often considered a very broad measure of individual health.

c. Analysis

The goal of this paper is to examine the “healthy immigrant effect” (i.e., the relationship between length of residence in Canada and health) in mid- to later-life. Logistic regression analysis is used to estimate the odds of reporting positive SRH and AR for mid- to later-life Canadian-born, new immigrant, and longer-term immigrant groups, and analysis of variance is used to estimate mean HUI scores for these groups. This analysis is done separately for the 45-64 years and the 65 years and older populations because reasons for entry into Canada (and hence the characteristics – e.g., health and SES – of immigrants) are likely to differ by age. Specifically, older adults are more likely than persons of working age to come to Canada for family reasons.

Both unadjusted and adjusted odds and means are presented. Unadjusted coefficients describe actual differences in health between immigrants and non-immigrants. On the other hand, adjusted coefficients describe fundamental differences since they take into consideration the well-known differences in socio-demographic (sex, age, marital status, race, and language proficiency), SES (income and education), and lifestyle (alcohol/tobacco use, exercise, and diet/weight) factors between immigrants and non-immigrants (Perez, 2002).

In terms of socio-demographic control variables, age is a categorical variable divided into 5-year intervals, but we assign a value indicating years of age to each category (45-49=47, 50-54=52....); marital status is categorized as: married/common-law, single, and divorced/separated/widowed (reference category); cultural/racial origin in the CCHS is coded as: white and visible minority; and language proficiency (i.e., language(s) in which the respondent can converse) is coded as: English and/or French and neither English nor French.

It is important to note that while respondents who could not understand English or French were interviewed in their own language, language (as well as cultural) barriers faced by new immigrants may prevent them from consulting health-care professionals, resulting in an under-

diagnosis of health problems (Laroche, 2000; Perez, 2002). Relatedly, cultural factors like adherence to traditional values and beliefs may influence an individual's willingness to report health problems (Ali 2002; Kopec, Williams, To, and Austin, 2001) as there may be differences in the fundamental concepts of health and illness (Saldov, 1991). Overall, the extent to which cultural and language differences in the Canadian population influence the interpretation and reporting of health problems is not well known. However, the magnitude of the differences in health status between immigrant and Canadian-born populations reported in the results here make it unlikely that cultural factors exclusively may explain these results.

Education and income adequacy provide a control for SES. Education is categorized in the CCHS into four groups: less than secondary school graduation (reference category), secondary school graduation, some post-secondary, and post-secondary graduation. Income is measured using an income adequacy indicator – based on total household income (before taxes) and the number of persons in the household – produced by Statistics Canada, which is comprised of five discrete income adequacy categories: low (reference category), low-middle, middle, upper-middle, and high.

Four commonly used health behaviour controls are included in this analysis: alcohol consumption (i.e., the sum of numbers of drinks consumed on all days in the week prior to the interview); number of years smoked (for current daily smokers only; all others are coded as 0 years); physical activity level (active, moderate, or inactive [reference category]); fruit/vegetable consumption (i.e., the average number of times per day fruits and vegetables are consumed); and the Body Mass Index (i.e., weight in kilograms divided by height in meters squared, which we collapse into three commonly-used categories: underweight ($BMI < 20$), acceptable weight (≥ 20.0 and < 25.0), and overweight (≥ 25.0 , reference category)).

Some variables in the CCHS have missing cases. While the number of missing cases is relatively small for most variables, two methods are used to include them in the sample (i.e., to

keep a fuller and less biased sample). First, a dummy variable for missing cases in categorical variables is created (see Table 1). Second, for continuous-type variables (e.g., alcohol/cigarette consumption) that had missing data, a regression model (based on age, gender, education, and so on) is developed to impute values for these missing data.

Results

a. The “healthy immigrant effect” by age

The "healthy immigrant effect" hypothesis maintains that immigrants are healthier than Canadian-born persons, and that the effect is strongest among recent immigrants because healthier (and younger, better educated) individuals are more likely to enter Canada. With the passage of time, as immigrants become more assimilated into Canadian society and begin to adopt more Westernized health beliefs and behaviours, a convergence in health status between immigrants and Canadian-born persons occurs. Indeed, Table 1 shows that recent immigrants, in both the 45-64 and 65+ age groups, are younger and more likely to be male, married, and post-secondary graduates compared to the Canadian-born population. They are also less likely to smoke, drink excessively, and to be overweight than longer-term residents, who have lifestyles resembling that of Canadian-born persons.

[Table 1 about here]

It is, therefore, not surprising that Table 2a, which is reflected graphically in Figure 1, shows strong support for the "healthy immigrant effect" among the 45-64 age group: new immigrants have better functional and self-rated health, however this advantage decreases with time spent in Canada. Specifically, recent immigrants in this age group are healthier than their Canadian-born counterparts. They are about 0.55 times as likely – or 45% (1-0.55) less likely – to have a physical disability (i.e., limitation of daily activities) compared to Canadian-born persons.

They also have a significantly higher mean HUI score. Ranging from 0 to 1, where the latter equals perfect or full health, the mean HUI score for recent immigrants is 0.883 compared to 0.866 for Canadian-born persons (this difference is statistically significant at $p < .05$). Also, as expected, recently arrived persons are more likely to report positive health (O.R. 1.163, $p < .10$).

[Figure 1 about here]

In support of the "healthy immigrant effect" hypothesis, the results also indicate that there is a gradient of increasing deterioration in health with time since immigration (i.e., a convergence in health differences between immigrants and Canadian-born persons). In contrast to new arrivals, longer-term immigrants aged 45-64 are just as likely to experience a disability and to have a comparable level of overall functional health (HUI), and are even less likely to rate their health as good or better compared to Canadian-born persons. It is important to note here however, that longitudinal data are needed to verify a true convergence in health status between immigrants and Canadian-born persons over time. It is not possible with the cross-sectional data used here to rule out a cohort effect, whereby differences in health among immigrant groups are partly due to the country of birth of immigrants. For instance, longer-term immigrants are more likely to be from Europe and recent immigrants from non-European regions, and both regions vary in terms of general population health – today's immigrants may make-up a healthier cohort than cohorts who immigrated earlier – and in the type and quality of health care systems; additionally, health requirements for entry into Canada have changed over time (Perez, 2002).

Although the findings from Table 1 are consistent with the assumptions of the "healthy immigrant effect" hypothesis and the results of research on this phenomenon, the results in Table 2a contradict the assumption that a healthier immigrant population stems from advantages in socio-demographic, SES, and lifestyle factors. After controlling for these factors, recent immigrants still have the lowest risk of disability, the highest odds of reporting positive health, and the highest average HUI score. Hence, these factors do not appear to explain the "healthy

immigrant effect." More research is therefore needed on what controls/explanatory variables (e.g., social-psychological factors, which are not available in the data used here) might account for the "healthy immigrant effect" among this population.

[Table 2a about here]

Table 2b (reflected graphically in Figure 2) describes the relationship between immigrant status and health for persons 65 years of age and older. These results differ from those reported for the 45-64 year age group in three important ways. First, the "healthy immigrant effect" does not apply to the older adult population. In fact, recent older arrivals have significantly poorer health compared to their Canadian-born counterparts – this is in opposition to the findings reported in Table 2a. New immigrants aged 65 years and older are 1.5 times (or 50%) more likely on average to have a limitation of activity, and are disadvantaged in overall functional health relative to the older Canadian-born population (0.765 vs. 0.792, $p < .05$). Further, recent older arrivals are about 33% less likely to rate their health in a positive manner relative to Canadian-born seniors. It is important to note that while statistically significant differences in health between immigrant groups partly depend on sample size – which is smallest for the new immigrant sample – the magnitude of these difference indicate that it is unlikely that these results can simply be attributed to sample size alone.

[Figure 2 about here]

Second, when the data are adjusted for socio-demographic, SES, and lifestyle differences, the health of recent immigrants becomes statistically indifferent from that of non-immigrants. In other words, when the disparities faced by recent older immigrants observed in Table 1 (especially deficiencies in speaking an official language and in income) are partialled out, rates of disability, positive self-rated health, and average HUI score for older new immigrants become increasingly comparable to those of their Canadian-born counterparts.

Third, the results suggest that not only do older immigrants converge to the Canadian norm in terms of their health status, but that they experience a more rapid deterioration in their health status over the latter stages of the life course. Older immigrants who have resided in Canada for 10+ years are less likely to be disability-free and to positively rate their health; they also have a significantly lower average HUI score relative to the older Canadian-born population. These findings hold even after adjusting for differences between these groups in socio-demographic, SES, and health behaviour factors. Again, longitudinal data are needed to verify a convergence in health status between immigrants and Canadian-born persons over time.

[Table 2b about here]

d. The “healthy immigrant effect” by age and sex

The previous analysis is an examination of the health of immigrants with the influence of various socio-demographic factors statistically removed. Although it provides an overall profile of the health status of Canadian immigrants by age, an important piece of this picture is missing. It is important to break down this analysis by gender given variations in the experiences of men and women in the health domain (e.g., Denton and Walters, 1999; McDonough and Walters, 2001; Verbrugge, 1985). Tables 3a and 3b test the “healthy immigrant effect” hypothesis for men and women, separately, aged 45-64 years and 65 years and older respectively.

Indeed, the data in Table 3a indicate that the “healthy immigrant effect” applies more to men than women, both before and after the introduction of controls. Recent male immigrants aged 45-64 are significantly advantaged in both functional and self-rated health compared to their Canadian-born counterparts; an advantage that decreases with time spent in Canada. By contrast, recent female immigrants are no healthier in terms of HUI than their Canadian-born counterparts, and are actually less likely to rate their health in a positive manner (O.R. 0.776, $p < .05$).

Table 3b describes the relationship between immigrant status and health by sex at age 65 years and older. The results from this table again show considerable differences between men and women. Overall, the "healthy immigrant effect" does not apply to the older male population. While recent immigrant men are more likely on average to have an activity limitation, they are not statistically different in terms of HUI and SRH than Canadian-born men, with or without socio-demographic and behavioural factors removed. Yet, the data show a much different picture for older women – that is, recent female arrivals in this age group have significantly poorer health on all three measures compared to their Canadian-born counterparts; however, these health disadvantages do disappear with the introduction of the control variables.

[Tables 3a and 3b about here]

Conclusion

The findings from the current study indicate that the “healthy immigrant effect” applies to mid-life immigrants in Canada. Specifically, recent mid-life (45-64 years) immigrants – those who immigrated less than 10 years ago – have better functional and self-rated health compared to their longer-term counterparts – those who immigrated 10 or more years ago. The latter group’s health status is similar to Canadian-born persons. Interestingly, a different picture emerges in old age (65 + years) where recent immigrants have poorer overall health compared to longer-term residents and the Canadian-born. This disadvantage, however, disappears after controlling for selected socio-demographic, socio-economic status, and health-related behaviour factors.

When the data are examined by age and gender, support for the “healthy immigrant effect” is found only for men in mid-life. These findings indicate that gender plays an important role in our understanding of the “healthy immigrant effect” across the adult life course. The finding for women in later life supports the general findings in the literature on the association between gender and health in the latter stages of the life course, namely that women have longer

life expectancies despite poorer health (Bolaria and Bolaria, 2002; Gee and Kimball, 1987; Lorber, 2000).

Based on these findings, there are a number of implications for the development of Canadian health care policy and program planning for immigrants in mid- to late adulthood, individuals that make up over one-half of the foreign-born adult population. First, health care policies must begin to address the differential needs of immigrant adults by age group. A mid-life group of recent immigrants will have fewer needs for services and programs in the early years of their residency in Canada, while certain sub-groups of older new immigrants may have an increased need for services due to poor health status. Policies must be developed at both the federal and provincial levels, particularly in Ontario (Toronto), Quebec (Montreal), and British Columbia (Vancouver), provinces in which the majority of immigrants choose to reside, that: (a) target immigrants as they age over time; and (b) respond to the needs of an older immigrant population from the outset.

Second, health care policies and programs must take into account the intersection between ethnicity, gender, immigrant status, length of time since immigration, and its impact on health. For example, older female immigrants who have recently settled in Canada have different health care needs than their older male counterparts. Specifically, in addition to working outside the home out of economic necessity, these women are often burdened with the majority of child care and homemaking responsibilities, which may, in turn, cause an increased amount of stress and subsequently, poor health (Kobayashi, 2003). Similarly, older immigrant women, although not charged with the responsibility of labour force participation, are most often relied upon to provide a large amount of the caregiving for grandchildren. This “obligation” to the family can sometimes become a “burden” as older women are isolated from interaction with members of their own age cohort, leading to depression and loneliness (Kobayashi, 2003).

Further, related to physical health status, both men and women from large South Asian or Asian source countries like India or Taiwan may experience nutritional deficiencies as diet and dietary behaviours change at an accelerated rate after immigration. The rate at which lifestyle behaviours converge to the Canadian norm will, of course, vary according to a number of different factors related to the assimilation process including: age at immigration; country of birth, adherence to traditional (country of birth) value and belief systems; place of residence (urban versus rural); and “institutional completeness” of the immigrant’s ethno-cultural group in the place of residence. In the end, these issues and related ones must be considered in any comprehensive Canadian health care policy and program planning initiatives.

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Table 1: Summary Statistics for health, socio-demographic, SES, and behavioural variables, by years since immigration and age

Study Variables	45-64			65+		
	0-9 (n=1,206)	10+ (7,634)	CB (27,695)	0-9 (300)	10+ (4,525)	CB (13,488)
AR						
No	90.9%	85.1%	84.7%	49.8%	58.5%	60.1%
Yes	9.1	14.9	15.3	50.2%	41.5	39.9
SRH						
Positive	87.1%	83.3%	85.4%	62.9%	68.3%	71.4%
Negative	12.9	16.7	14.6	37.1	31.7	28.6
HUI	0.881	0.861	0.866	0.765	0.763	0.792
Sex						
Male	52.1%	49.6%	49.4%	44.5%	46.1%	43.0%
Female	47.9	50.4	50.6	55.5	53.9	57.0
Age	51.3	53.9	53.1	72.8	73.5	73.5
Marital Status						
Married/CL	85.0%	79.9%	75.6%	66.2%	64.4%	59.1%
Wid/Dv/Sp	9.9	14.0	16.3	33.8	32.5	35.3
Single	4.6	5.9	8.0	-	3.0	5.5
Missing	.5	.1	.1	-	-	.1
Race						
Non-Vis Min	26.5%	64.3%	97.2%	24.3%	82.0%	98.1%
Vis Min	72.6	34.8	2.3	75.3	17.5	1.5
Missing	.9	1.0	.5	.3	.5	.4
Language						
Eng/Fren	66.0%	92.8%	99.5%	39.5%	87.6%	99.5%
Non-Eng/Fr	34.0	7.2	.5	60.5	12.4	.5
Education						
<HS	19.4%	20.8%	25.1%	40.3%	42.1%	52.0%
HS	18.7	20.4	18.9	20.5	19.9	14.4
Some PS	4.2	5.2	6.6	1.7	5.5	5.0
PS	55.6	52.7	48.4	34.9	31.3	27.4
Missing	2.1	.9	1.0	2.7	1.2	1.1
Income						
Low	7.0%	2.8%	4.0%	14.0%	3.9%	2.4%
Low-mid	10.9	5.0	4.9	13.0	10.1	12.5
Middle	29.3	16.7	14.9	35.7	30.8	33.2
Upper-mid	26.4	31.3	33.4	13.0	28.5	27.1
High	14.5	33.8	33.9	14.3	13.7	10.8
Missing	11.8	10.4	9.0	10.0	13.0	14.0
Alcohol p/w	1.4	2.6	3.5	0.8	2.4	2.2
Years Smoke	2.9	4.6	8.6	1.4	4.0	5.9
Fruit-Veg p/d	4.9	5.0	4.6	4.8	5.2	5.1
Physical Act						
Active	10.8%	15.0%	17.9%	9.4%	17.7%	14.6%
Moderate	17.2	20.2	23.2	16.7	18.7	19.6
Inactive	51.6	55.3	53.3	35.5	50.3	58.4
Missing	20.4	9.5	5.5	38.5	13.3	7.4
BMI						
Underw	6.0%	5.6%	4.5%	19.4%	7.3%	7.6%
Accept	50.4	40.7	35.9	38.5	39.5	41.0
Overw	40.6	52.8	57.5	37.4	51.5	49.6
Missing	3.0	1.4	1.8	3.7	1.7	1.8

Source: 2000/2001 Canadian Community Health Survey (CCHS) Cycle 1.1

Table 2a: Odds ratios for selected health outcomes, by years since immigration, before and after socio-demographic, SES, and behavioural controls, 45-64 years of age

Years since immigration	Odds of AR	Odds of Positive SRH	Mean HUI
Before controls			
0-9	0.555*** (0.455, 0.678)	1.163* (0.979, 1.382)	0.881 ^{ac} (0.870, 0.892)
10+	0.965 (0.899, 1.036)	0.858*** (0.801, 0.919)	0.861 (0.857, 0.866)
CB	1.00	1.00	0.866 (0.863, 0.868)
Model Fit	30,815	30,822	5.3
After controls			
0-9	0.495*** (0.393, 0.622)	1.321*** (1.074, 1.624)	0.890 ^{abc} (0.878, 0.902)
10+	0.995 (0.915, 1.082)	0.784*** (0.721, 0.852)	0.855 (0.850, 0.860)
CB	1.00	1.00	0.867 (0.865, 0.870)
Model Fit	28,619	27,615	106.7

Source: 2000/2001 Canadian Community Health Survey (CCHS) Cycle 1.1

- Significantly different from reference group (CB) at: *p<.10; **p<.05; ***p<.01.
- Difference between: ^a [0-9 and 10+] ^b [10+ and CB] ^c [0-9 and CB] is significant at p<.05.
- 95% C.I. for odds/means are in brackets.
- Control variables: sex; age; marital status; race; language; education; income; alcohol consumption; years smoked; physical activity level; fruit/veg consumption; BMI.
- Model fit based on -2 Log likelihood for AR and SRH and on F-ratio for HUI.

Table 2b: Odds ratios for selected health outcomes, by years since immigration, before and after socio-demographic, SES, and behavioural controls, 65+ years of age

Years since immigration	Odds of AR	Odds of Positive SRH	Mean HUI
Before controls			
0-9	1.518*** (1.207, 1.909)	0.677*** (0.534, 0.858)	0.765 ^{bc} (0.735, 0.795)
10+	1.067* (0.997, 1.143)	0.864*** (0.804, 0.930)	0.763 (0.756, 0.771)
CB	1.00	1.00	0.792 (0.787, 0.796)
Model Fit	24,656	22,170	18.8
After controls			
0-9	1.154 (0.866, 1.539)	0.811 (0.610, 1.077)	0.818 ^{ab} (0.787, 0.849)
10+	1.107** (1.020, 1.202)	0.804*** (0.740, 0.874)	0.765 (0.757, 0.773)
CB	1.00	1.00	0.790 (0.785, 0.794)
Model Fit	20,985	20,550	99.3

Source: 2000/2001 Canadian Community Health Survey (CCHS) Cycle 1.1

- Significantly different from reference group (CB) at: *p<.10; **p<.05; ***p<.01.
- Difference between: ^a [0-9 and 10+] ^b [10+ and CB] ^c [0-9 and CB] is significant at p<.05.
- 95% C.I. for odds/means are in brackets.
- Control variables: sex; age; marital status; race; language; education; income; alcohol consumption; years smoked; physical activity level; fruit/veg consumption; BMI.
- Model fit based on -2 Log likelihood for AR and SRH and on F-ratio for HUI.

Table 3a: Odds ratios for selected health outcomes, by years since immigration and sex, before and after socio-demographic, SES, and behavioural controls, 45-64 years of age

Years since immigration	Odds of AR		Odds of Positive SRH		Mean HUI	
	Before controls					
	Men	Women	Men	Women	Men ^{ac}	Women ^b
0-9	0.525*** (0.376, 0.732)	0.581*** (0.452, 0.747)	2.012*** (1.498, 2.703)	0.766** (0.617, 0.950)	0.903 (0.888, 0.918)	0.857 (0.841, 0.874)
10+	0.864** (0.766, 0.975)	1.033 (0.945, 1.129)	.952 (0.861, 1.053)	0.778*** (0.708, 0.855)	0.874 (0.868, 0.880)	0.849 (0.842, 0.855)
CB	1.00	1.00	1.00	1.00	0.872 (0.869, 0.875)	0.860 (0.856, 0.863)
Model Fit	12096	18160	14915	15911	7.6	3.9
	After controls					
	Men	Women	Men	Women	Men ^{ac}	Women ^b
0-9	0.502*** (0.341, 0.738)	0.501*** (0.375, 0.668)	1.866*** (1.326, 2.626)	0.989 (0.758, 1.291)	0.920 (0.903, 0.936)	0.862 (0.844, 0.880)
10+	0.914 (0.795, 1.050)	1.027 (0.923, 1.142)	0.835*** (0.741, 0.940)	0.757*** (0.673, 0.852)	0.870 (0.864, 0.877)	0.841 (0.834, 0.848)
CB	1.00	1.00	1.00	1.00	0.872 (0.869, 0.875)	0.862 (0.858, 0.865)
Model Fit	11123	17301	13290	14160	60.6	56.7

Source: 2000/2001 Canadian Community Health Survey (CCHS) Cycle 1.1

→ Significantly different from reference group (CB) at: *p<.10; **p<.05; ***p<.01.

→ Difference between: ^a [0-9 and 10+] ^b [10+ and CB] ^c [0-9 and CB] is significant at p<.05.

→ 95% C.I. for odds/means are in brackets.

→ Control variables: age; marital status; race; language; education; income; alcohol consumption; years smoked; physical activity level; fruit/veg consumption; BMI.

→ Model fit based on -2 Log likelihood for AR and SRH and on F-ratio for HUI.

Table 3b: Odds ratios for selected health outcomes, by years since immigration and sex, before and after socio-demographic, SES, and behavioural controls, 65+ years of age

Years since immigration	Odds of AR		Odds of Positive SRH		Mean HUI	
	Before controls					
	Men	Women	Men	Women	Men	Women ^{bc}
0-9	1.920*** (1.358, 2.715)	1.321* (0.970, 1.799)	0.766 (.535, 1.097)	0.615*** (0.448, 0.844)	0.790 (0.747, 0.834)	0.745 (0.704, 0.785)
10+	1.050 (0.942, 1.171)	1.130*** (1.032, 1.238)	0.989 (0.886, 1.103)	.776*** (0.704, 0.856)	0.793 (0.782, 0.804)	0.738 (0.727, 0.749)
CB	1.00	1.00	1.00	1.00	0.798 (0.791, 0.805)	0.787 (0.780, 0.793)
Model Fit	9801	14244	9789	12383	.31	29.2
	After controls					
	Men	Women	Men	Women	Men	Women ^{ab}
0-9	1.057 (0.670, 1.667)	1.101 (0.756, 1.604)	0.856 (0.547, 1.340)	0.741* (0.510, 1.078)	0.820 (0.773, 0.867)	0.801 (0.759, 0.842)
10+	1.046 (0.919, 1.191)	1.136** (1.020, 1.266)	0.869** (0.768, 0.984)	0.771*** (0.688, 0.864)	0.786 (0.776, 0.797)	0.749 (0.739, 0.760)
CB	1.00	1.00	1.00	1.00	0.800 (0.793, 0.806)	0.781 (0.775, 0.787)
Model Fit	8457	12429	9055	11379	45.4	67.5

Source: 2000/2001 Canadian Community Health Survey (CCHS) Cycle 1.1

→ Significantly different from reference group (CB) at: *p<.10; **p<.05; ***p<.01.

→ Difference between: ^a [0-9 and 10+] ^b [10+ and CB] ^c [0-9 and CB] is significant at p<.05.

→ 95% C.I. for odds/means are in brackets.

→ Control variables: age; marital status; race; language; education; income; alcohol consumption; years smoked; physical activity level; fruit/veg consumption; BMI.

→ Model fit based on -2 Log likelihood for AR and SRH and on F-ratio for HUI.

Figure 1: Odds ratios for selected health outcomes, by years since immigration, before and after socio-demographic, SES, and behavioural controls, 45-64 years of age

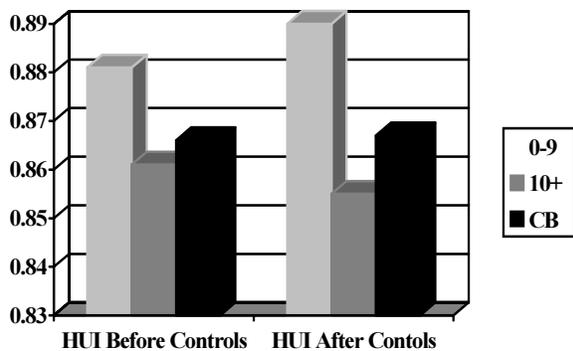
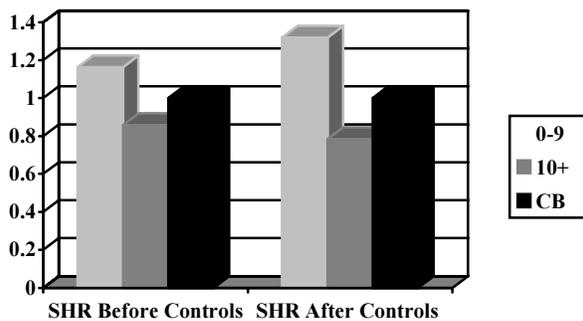
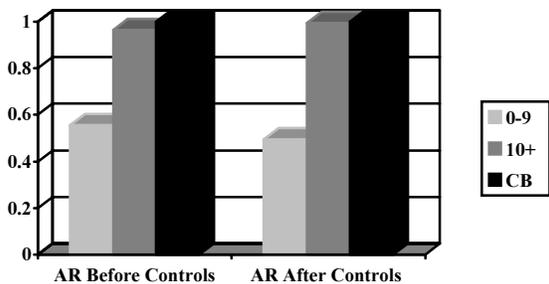
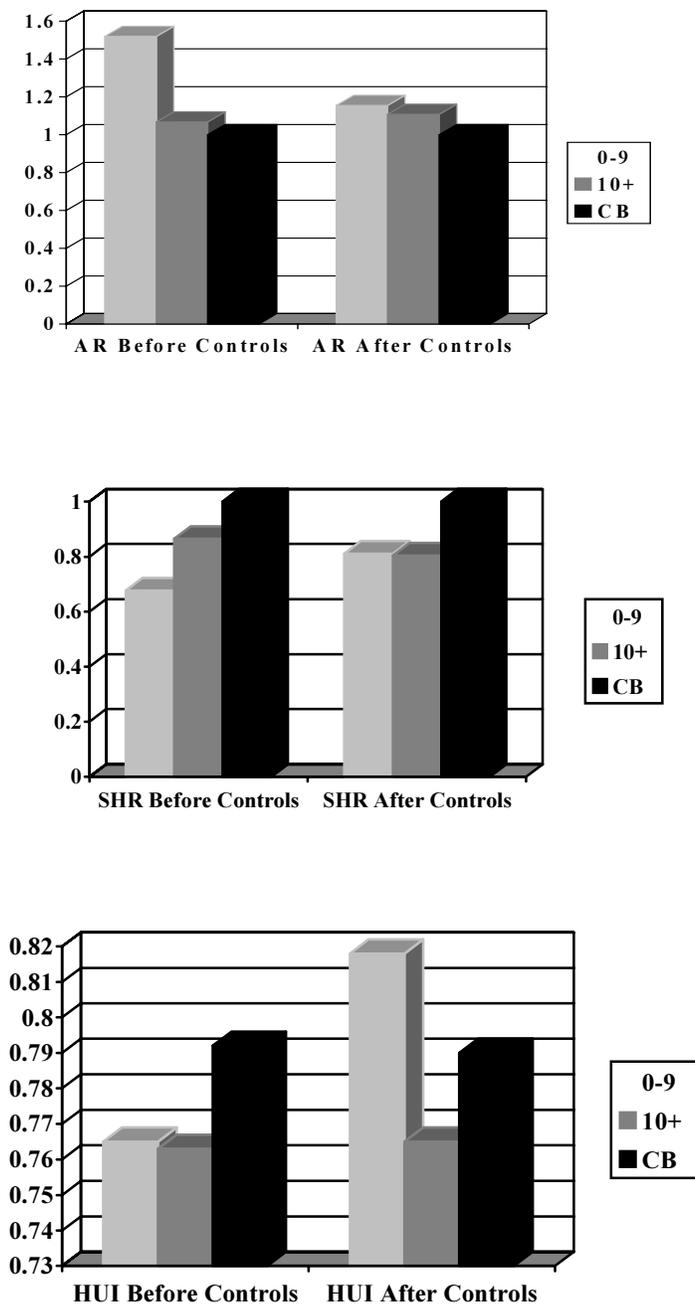


Figure 2: Odds ratios for selected health outcomes, by years since immigration, before and after socio-demographic, SES, and behavioural controls, 65+ years of age



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