Health Decline Among Recent Immigrants to Canada: Findings From a Nationally-representative Longitudinal Survey

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ABSTRACT

Objective: The healthy immigrant effect suggests new immigrants to Canada enjoy better health, on average, than those born in Canada, yet cross-sectional data suggest that immigrants who have been in Canada for decades have comparable health to their native-born peers. We analyzed prospective cohort data to identify the factors associated with health decline among new immigrants.

Methods: The Longitudinal Survey of Immigrants to Canada was conducted by Statistics Canada and Citizenship and Immigration Canada between April 2001 and November 2005. A probability sample of 7,716 recent immigrants from abroad was interviewed three times: at six months, two years and four years after arrival in Canada. Logistic regression was used to model predictors of a two-step decline in self-reported health (e.g., from excellent to good or from very good to fair).

Results: Among recent immigrants, 15% reported a two-step decline in health in the first four years after arrival in Canada. In comparison, only 6% of non-immigrants from a similar age cohort reported a two-step decline in health during the same time period. The characteristics associated with an increased likelihood of health decline among recent immigrants include initial health status, age, gender, marital status, language skills and place/region of birth. Experience of discrimination was also associated with health decline. One in four immigrants who experienced a health decline reported problems accessing Canadian health services.

Conclusions: The process of immigration is associated with health decline for some recent immigrants. These findings support Health Canada's identification of immigration as a determinant of health. Strategies need to be developed to improve access to health care among new immigrants.

Key words: Emigration and immigration; longitudinal studies; discrimination; health status disparities; minority health

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

Can J Public Health 2011;102(4):273-80.

Immigrants form a significant and growing proportion of the Canadian population. In 2006, there were more than 6 million immigrants living in Canada, making up almost 20% of the population. Each year, Canada accepts about 200,000 new immigrants, a number which represents 0.7% of its total population.[1] Recent immigrants to Canada tend to be in better health than the native-born population.[2] This phenomenon, known as the 'healthy immigrant effect', is a result of immigrants having better health habits in their countries of origin; a positive self-selection effect where healthier people are more likely to apply for immigration; and the selection policies of Citizenship and Immigration Canada whereby immigrants with serious health problems are rejected.[2,3] Many studies have suggested, however, that immigrants' health tends to decline following arrival in Canada.[2-8]

The majority of studies on immigrant health used cross-sectional data, comparing the health status of successive waves of immigrants at one point in time. This design is vulnerable to cohort effects. Ng and colleagues'[4] longitudinal analysis of self-reported health indicated that non-European recent immigrants experienced a greater decline in health status than did individuals born in Canada. However, sample size restrictions prohibited detailed analysis of which factors were associated with health decline among immigrants. The current study used the Longitudinal Survey of Immigrants to Canada (LSIC), a large, prospective nationally-representative population survey of new immigrants, to investigate baseline factors predicting health decline among immigrants four years after arriving in Canada. In addition to demographic predictors, we also assess the experience of discrimination and the effects of social networks on health decline. Perceived discrimination has been associated with lower self-reported health.[9] The role of social networks in the settlement and adaptation of immigrants has been well documented.[10-13]

METHODS

The Longitudinal Survey of Immigrants to Canada (LSIC) was jointly conducted by Statistics Canada and Citizenship and Immigration Canada (CIC) to learn more about how new immigrants adapt to life in Canada.[14] The target population was immigrants aged 15 or older who arrived in Canada from abroad between October 2000 and September 2001. Survey respondents were selected from CIC's

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Acknowledgements: The authors are grateful to the Social Sciences and Humanities Research Council of Canada for its support of this research (PI Usha George and Co-investigator Esme Fuller-Thomson). Thanks also to Marla Battiston for her assistance with references. The research and analysis are based on data from Statistics Canada and the opinions expressed do not represent the views of Statistics Canada.

Conflict of Interest: None to declare.

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Table 1. Self-reported Health of Recent Immigrants Following Arrival in Canada and 4 Years After Arrival* (weighted n=156,555)

Baseline Self-reported Health Status	Overall % 6 Months After Arrival (95% CI)	Outcome 4 Years After Arrival				Overall % 4 Years After Arrival (95% CI)
		% Excellent	% Very Good	% Good	% Fair/Poor	
Excellent	43.0 (41.8-44.3)	33.9 (32.1-35.7)	38.7 (36.8-40.5)	23.7 (22.1-25.3)	3.8 (3.1-4.5)	23.0 (22.0-24.0)
Very good	35.4 (34.2-36.5)	17.2 (15.7-18.9)	41.5 (39.5-43.5)	33.7 (31.9-35.6)	7.5 (6.5-8.6)	37.2 (36.0-38.3)
Good	18.6 (17.7-19.6)	11.3 (9.6-13.0)	28.6 (26.1-31.1)	45.1 (42.4-47.9)	15.0 (13.0-16.9)	31.8 (30.8-32.9)
Fair or Poor	3.0 (2.6-3.4)	7.0* (3.4-10.7)	18.0* (12.5-23.5)	42.4 (35.4-49.4)	32.6 (26.6-38.5)	8.0 (7.4-8.7)

* These estimates should be treated with caution; they have high coefficients of variation because of the small sample sizes in this group.

administrative database of all landed immigrants to Canada using a two-stage probability sampling method to first select 'immigrating units' (families/households) and then one member within each unit. A complete survey included three interviews, one approximately six months after arrival in Canada, one approximately two years after arrival, and one approximately four years after arrival. Computer-assisted interviews were conducted in person and by telephone.[14] Interviews lasted from 65 to 90 minutes and covered a wide range of topics, including employment, education, housing, health, social interactions, and perceptions of settlement. The first wave of interviews occurred between April 2001-May 2002, the second wave between December 2002-December 2003 and the final wave between November 2004-November 2005. Respondents were interviewed in one of the following 15 languages: English, French, Chinese (Mandarin, Cantonese), Punjabi, Farsi, Arabic, Spanish, Russian, Serbo-Croatian, Urdu, Korean, Tamil, Tagalog and Gujarati. These 15 languages are spoken by 93% of all recent immigrants in Canada. The majority of respondents chose to be interviewed in English. Back-translations and focus-group tests in different languages were conducted to establish that the questions were clearly understood.

In the first wave, 12,040 immigrants completed an interview, for a response rate of 61%. In the second wave, 9,322 respondents completed an interview.* In the final wave, 7,716 respondents completed an interview, for an overall longitudinal response rate of 40%. Among those who completed the first wave of the survey, the longitudinal response rate is 64%. The data were weighted to reflect the population of immigrants estimated to remain in Canada four years after arrival. Missing data were imputed longitudinally by Statistics Canada using the nearest-neighbour donor technique. In the health module used for the dependent variables in this analysis, less than 1% of cases had some imputation. Data were weighted to account for longitudinal attrition, and to ensure that the results accurately capture the estimated distribution of age, sex, immigration class and region of birth among immigrants from abroad who had remained in Canada after four years (weighted n in final wave=157,615).

* Among those first-wave respondents who did not complete a second interview, half (50%) were successfully contacted but did not or could not complete a second interview, 7% were deceased or had left Canada, and the remaining cases were unresolved. Among those second-wave respondents who did not complete a third interview, about half (51%) were successfully contacted but did not or could not complete a third interview, 10% were deceased or had left Canada, and the remaining cases were unresolved. There were no clear trends in age, gender, immigration class or place of birth in relation to non-response and unresolved cases across all three waves.

Table 2. Socio-demographic Characteristics of Recent Immigrants to Canada 6 Months After Arrival* (weighted n=156,555)

Characteristic	Value Among Recent Immigrants to Canada	95% CI
Age (years)		
Mean	35.1 (s.e=0.07)	34.9-35.2
<20	8.4%	7.9-8.9
20-29	4.9%	4.0-5.8
30-39	38.5%	37.5-39.5
40-49	17.3%	16.5-18.0
50-59	5.7%	5.3-6.2
≥60	5.2%	4.8-5.6
Women	50.5%	50.1-51.0
Marital status		
Married or common-law	76.4%	75.6-77.3
Single (never married)	19.8%	19.0-20.5
Divorced, separated or widowed	3.8%	3.4-4.2
Immigration class		
Skilled worker	60.4%	60.1-60.7
Family class	27.2%	27.0-27.5
Business class	6.2%	6.0-6.4
Refugees	6.2%	6.2-6.3
Highest level of education outside Canada		
Less than high school	14.1%	13.4-14.8
High school or equivalent	31.7%	30.6-32.7
Bachelor's degree	36.1%	35.0-37.2
Master's, Doctorate or professional degree	18.1%	17.2-19.0
Limited language skills (cannot speak English or French well)	44.0%	42.8-45.1
Have worked in a job in Canada	52.0%	50.1-53.1
Had a personal income of less than $10,000 since coming to Canada	84.6%	83.8-85.4
Arrived in Canada with savings of $20,000 or more	28.9%	27.8-29.9
Place/region of birth		
China	18.9%	18.0-19.7
India	16.1%	15.3-17.0
Other Asian country (excl. South Asia & China)	15.4%	14.6-16.2
Africa	9.3%	9.1-9.5
Other South Asian country (excl. India)	9.1%	8.4-9.7
Middle East	9.0%	8.4-9.6
Eastern Europe	7.9%	7.5-8.4
South America	6.1%	5.8-6.3
Western Europe	5.5%	5.1-6.0
North America and Oceania	2.7%	2.4-3.1

* Missing data are excluded on a variable-by-variable basis.

Data were analyzed using bivariate statistics and a series of logistic regression models of respondents aged 20 to 50. The first two models predict a two-step decline in self-reported health, first using socio-demographic characteristics and then adding experiences of discrimination as predictors. The second two models predict a two-step improvement in self-reported health, using the same predictors. Government- or privately-sponsored immigrants were removed from the analysis, since their immigration experiences are unlikely to be typical; immigrants in this class constituted less than 1% of respondents. Data were accessed through Statistics Canada's

Table 3. Social Networks, Social Integration and Overall Satisfaction of Recent Immigrants to Canada 6 Months After Arrival* (weighted n=156,555)

Characteristic	% of Recent Immigrants to Canada	95% CI
Had relatives living in the same Canadian city when you arrived	48.4%	47.4-49.4
Had friends already living in the same Canadian city when you arrived	47.1%	46.0-49.4
Have made new friends in Canada	86.1%	85.3-86.9
How often you see/talk with Canadian friends (both established and new)		
At least once a week	77.7%	76.7-78.7
At least once a month (but less than once a week)	10.9%	10.1-11.6
Less than once a month or no Canadian friends	11.4%	10.7-12.2
Participates in a religious group or organization	14.9%	14.1-15.8
Participates in a non-religious group or organization	9.8%	9.1-10.5
Satisfaction with Canadian experience		
Completely satisfied	18.8%	17.9-19.7
Satisfied	54.1%	52.9-55.3
Neither satisfied nor dissatisfied	17.7%	16.7-18.3
Dissatisfied	8.0%	7.3-8.7
Completely dissatisfied	1.4%	1.1-1.7
Would come again to Canada		
Yes	89.3%	88.5-90.1
No	8.7%	8.0-9.4
Don't know	2.0%	1.7-2.4

* Missing data are excluded on a variable-by-variable basis.

Research Data Centre program, and all Statistics Canada protocols for data confidentiality and reporting have been followed. Confidence intervals and coefficients of variation were produced using bootstrapping techniques. Except where otherwise noted, all statistics reported here have an acceptable level of data quality as assessed by Statistics Canada.

The main outcome of interest was a decline in respondents' self-reported health in the first four years after immigrating to Canada (between the first and third interviews). A second outcome of interest was improvement in respondents' self-reported health, although a comprehensive investigation into health improvement was limited by sample size. Self-reported health has been shown to be a good overall proxy for health status, a predictor of mortality, and is correlated with other more objective measures of health, such as frequency of doctor's visits.[4,15-17] In the LSIC, self-reported health was measured using a five-point scale (excellent, very good, good, fair and poor). This model predicts a two-step decline in self-reported health, that is a decline from 'excellent' to 'good' health or worse, from 'very good' to 'fair' health or worse, or from 'good' to 'poor' health. A two-step decline in health has been associated with significant changes in physical and mental health,[18] and thus the use of a two-step decline minimizes the likelihood that the results reflect response error. More crucially, there is some evidence that a two-step decline in self-reported health is associated with a larger trajectory of health decline, as opposed to a simple current assessment.[17,18] Respondents who reported an initial health status of 'fair' or 'poor' (3%) were omitted from the regression models predicting health decline, as they could not report a two-step change. For the same reason, respondents with an initial health status of 'very good' or 'excellent' were omitted from the regression model predicting health improvement. There was no significant relationship between initial health status and the likelihood of completing the final wave of the survey (x^2=2.94; df=4, p=0.568); that is, non-response does not appear to be associated with initial health status.

An approximate comparison of health decline among non-immigrants was made using data from two waves (2000/01-2004/05) of the National Population Health Survey (NPHS),[4] another Canadian longitudinal population survey. The comparison sample was restricted to NPHS respondents who were roughly of the same age cohort (20-50 years) in 2000/01.

Approval to conduct the secondary analysis of the LSIC data was obtained from the Research Ethics Board of the University of Toronto.

RESULTS

Six months after arrival in Canada, approximately four out of five immigrants (78.4%) reported having excellent or very good health (see Table 1). Four years after arrival, only three out of five immigrants (60.2%) reported having excellent or very good health. Fifteen percent of survey respondents (15.4%; 95% CI: 14.5%-16.3%) reported at least a two-step decline in health between their first interview and their last interview. Among those aged 20-50, 15.7% (95% CI: 14.7%-16.7%) of immigrants reported a two-step decline in health; in contrast, only 5.7% (95% CI: 4.8%-6.5%) of non-immigrants from the same age cohort reported a two-step decline in health in the NPHS analysis. Only about a fifth of new immigrants (21.6%) reported an initial health status of good, fair or poor, but among this group, 14.4% (95% CI: 12.7%-16.2%) reported a two-step improvement in health after living in Canada for four years. This represents 3.1% (95% CI: 2.7%-3.5%) of the total sample.

Relatively few respondents (5.9%, 95% CI: 5.3%-6.4%) in the 3rd wave of data collection reported having health problems within the previous 12 months for which they did not receive medical attention. Those who reported a two-step decline in self-reported health, however, were significantly more likely to report having health problems for which they had not received medical attention; 9.1% (95% CI: 7.3%-10.9%) with unmet health needs among those with a decline, compared to only 5.2% (95% CI: 4.6%-5.8%) with unmet health needs among those with no decline. Respondents were also asked whether they had experienced any problems getting access to or using health services since their last interview (in approximately the last 2 years). Approximately one in five respondents reported having some difficulty accessing or using health services (19.9%, 95% CI: 18.9%-20.9%). Among those who reported a two-step health decline, 27.2% (95% CI: 24.4%-30.1%) reported problems accessing Canadian health services. In contrast, among those who had not reported a health decline, only 18.5% (95% CI: 17.4%-19.5%) reported problems accessing Canadian health services.

Table 4. Predictors of Two-step Decline in Self-reported Health 4 Years After Immigrating to Canada (weighted n=150,520)

	Model 1		Model 2	
Predictors*	**Odds Ratio**	**95% CI**	**Odds Ratio**	**95% CI**
Intercept	0.00	0.00-0.00	0.00	0.00-0.00
Self-reported health status				
Excellent	24.78	16.40-37.44	24.98	16.50-37.82
Very good	3.94	2.59-6.00	3.93	2.58-6.00
Good (ref. grp.)	*1.00*	–	*1.00*	–
Place/region of birth				
South Asia (excl. India)	2.54	1.40-4.62	2.48	1.35-4.55
India	2.47	1.40-4.35	2.42	1.36-4.30
China	2.27	1.28-4.02	2.17	1.21-3.87
Eastern Europe	2.14	1.18-3.89	2.18	1.19-3.99
Asia (excl. South Asia & China)	1.96	1.12-3.43	1.84	1.04-3.24
Africa	1.88	1.05-3.35	1.77	0.98-3.19
Middle East	1.87	1.03-3.40	1.85	1.01-3.40
Western Europe	1.80	0.95-3.41	1.81	0.95-3.46
South America	1.58	0.85-2.96	1.50	0.80-2.81
North America/Oceania (ref. grp.)	*1.00*	–	*1.00*	–
Age (in 10-year intervals)	1.34	1.24-1.46	1.36	1.25-1.47
Gender				
Women	1.27	1.08-1.50	1.29	1.10-1.53
Men (ref. grp.)	*1.00*	–	*1.00*	–
Marital status				
Married or common-law	1.32	1.07-1.63	1.33	1.08-1.65
Single/widowed/separated/divorced (ref. grp.)	*1.00*	–	*1.00*	–
Language skills				
Cannot speak English or French well	1.19	1.01-1.40	1.20	1.02-1.42
Speaks English or French well/very well (ref. grp.)	*1.00*	–	*1.00*	–
Education outside of Canada				
Less than secondary school or equivalent	1.22	0.93-1.61	1.29	0.97-1.71
Secondary school or equivalent	0.97	0.79-1.20	0.98	0.80-1.21
Bachelor's degree (ref. grp.)	*1.00*	–	*1.00*	–
Master's, Doctorate or professional degree	1.09	0.87-1.37	1.08	0.86-1.35
Employment status				
Worked for pay in Canada	0.99	0.84-1.17	0.98	0.83-1.16
Has not worked for pay in Canada (ref. grp.)	*1.00*	–	*1.00*	–
Personal income since arrival				
<$10,000	1.42	1.12-1.80	1.39	1.10-1.77
≥$10,000 (ref. grp.)	*1.00*	–	*1.00*	–
Savings upon arrival in Canada				
<$20,000	0.99	0.81-1.20	1.00	0.82-1.21
≥$20,000	*1.00*	–	*1.00*	–
Immigration class				
Family class	1.01	0.80-1.28	1.06	0.84-1.34
Business class	1.11	0.79-1.56	1.11	0.79-1.56
Refugees	1.16	0.83-1.63	1.18	0.84-1.66
Skilled worker (ref. grp.)	*1.00*	–	*1.00*	–
Had relatives living in the same Canadian city when you arrived				
Yes	1.03	0.85-1.23	1.03	0.86-1.24
No (ref. grp.)	*1.00*	–	*1.00*	–
Had friends already living in the same Canadian city when you arrived				
Yes	0.86	0.73-1.02	0.86	0.73-1.02
No (ref. grp.)	*1.00*	–	*1.00*	–
Have made new friends in Canada				
Yes	1.17	0.84-1.64	1.17	0.83-1.65
No (ref. grp.)	*1.00*	–	*1.00*	–
How often you see/talk with Canadian friends (both established and new)				
At least once a week (ref. grp.)	*1.00*	–	*1.00*	–
At least once a month (but less than once a week)	0.98	0.76-1.25	0.97	0.75-1.24
Less than once a month or no Canadian friends	1.26	0.86-1.84	1.26	0.86-1.85
Participation in religious organizations or groups				
Yes	1.20	0.97-1.48	1.17	0.94-1.44
No	*1.00*	–	*1.00*	–
Participation in non-religious organizations or groups				
Yes	0.63	0.47-0.84	0.63	0.47-0.85
No	*1.00*	–	*1.00*	–
Satisfaction with the Canadian experience				
Completely satisfied or satisfied	0.84	0.70-1.01	0.87	0.72-1.06
Neutral or dissatisfied (ref. grp.)	*1.00*	–	*1.00*	–
Would come again to Canada				
Yes	0.90	0.68-1.19	1.00	0.74-1.36
No or don't know (ref. grp.)	*1.00*	–	*1.00*	–
Experience of discrimination				
Reported discrimination during 1st-2nd year in Canada			1.22	0.96-1.56
Reported discrimination during 3rd-4th year in Canada			1.76	1.40-2.22
Reported discrimination during both time periods			1.42	1.13-1.80
No discrimination reported (ref. grp.)			*1.00*	–
Nagelkerke R^2	*0.212*		*0.218*	

* All predictive characteristics are measured 6 months after arrival in Canada, with the exception of the final characteristic (experience of discrimination), which was measured 2 years and 4 years after arrival. The initial interview did not include a general question about experiencing discrimination in Canada.

Table 5. Predictors of Two-step Improvement in Self-reported Health 4 Years After Immigrating to Canada* (weighted n=31,665)

Predictors	Model 1 Odds Ratio	Model 1 95% CI	Model 2 Odds Ratio	Model 2 95% CI
Intercept	0.25	0.07-0.94	0.26	0.07-1.00
Self-reported health status				
Good (ref. grp.)	*1.00*	–	*1.00*	–
Fair	3.83	2.43-6.04	3.83	2.43-6.05
Poor	9.58	4.27-21.45	9.59	4.27-21.53
Age (in 10-year intervals)	0.86	0.74-0.99	0.86	0.74-0.99
Gender				
Women	0.93	0.65-1.32	0.92	0.64-1.31
Men (ref. grp.)	*1.00*	–	*1.00*	–
Marital status				
Married or common-law	1.01	0.67-1.52	1.00	0.67-1.50
Single/widowed/separated/divorced (ref. grp.)	*1.00*	–	*1.00*	–
Language skills				
Cannot speak English or French well	0.59	0.39-0.87	0.58	0.39-0.87
Speaks English or French well/very well (ref. grp.)	*1.00*	–	*1.00*	–
Education outside of Canada				
Less than secondary school or equivalent	0.73	0.38-1.38	0.72	0.38-1.36
Secondary school or equivalent	1.48	0.92-2.38	1.47	0.91-2.37
Bachelor's degree (ref. grp.)	*1.00*	–	*1.00*	–
Master's, Doctorate or professional degree	1.62	0.97-2.70	1.64	0.97-2.75
Employment status				
Worked for pay in Canada	1.31	0.90-1.91	1.32	0.90-1.92
Has not worked for pay in Canada (ref. grp.)	*1.00*	–	*1.00*	–
Personal income since arrival				
<$10,000	0.94	0.56-1.56	0.95	0.57-1.60
≥$10,000 (ref. grp.)	*1.00*	–	*1.00*	–
Savings upon arrival in Canada				
<$20,000	0.72	0.45-1.14	0.72	0.45-1.15
≥$20,000	*1.00*	–	*1.00*	–
Immigration class				
Family class	1.44	0.82-2.50	1.47	0.84-2.57
Business class	0.91	0.33-2.47	0.90	0.33-2.45
Refugees	1.64	0.84-3.20	1.68	0.85-3.30
Skilled worker (ref. grp.)	*1.00*	–	*1.00*	–
Had relatives living in the same Canadian city when you arrived				
Yes	0.86	0.55-1.32	0.85	0.55-1.31
No (ref. grp.)	*1.00*	–	*1.00*	–
Had friends already living in the same Canadian city when you arrived				
Yes	1.00	0.68-1.47	0.99	0.67-1.45
No (ref. grp.)	*1.00*	–	*1.00*	–
Have made new friends in Canada				
Yes	0.66	0.29-1.48	0.65	0.29-1.47
No (ref. grp.)	*1.00*	–	*1.00*	–
How often you see/talk with Canadian friends (both established and new)				
At least once a week (ref. grp.)	*1.00*	–	*1.00*	–
At least once a month (but less than once a week)	1.11	0.72-1.91	1.11	0.64-1.91
Less than once a month or no Canadian friends	1.01	0.39-2.57	1.00	0.39-2.56
Participation in religious organizations or groups				
Yes	1.06	0.66-1.71	1.07	0.66-1.73
No	*1.00*	–	*1.00*	–
Participation in non-religious organizations or groups				
Yes	1.26	0.69-2.29	1.27	0.69-2.32
No	*1.00*	–	*1.00*	–
Satisfaction with the Canadian experience				
Completely satisfied or satisfied	1.14	0.77-1.70	1.15	0.77-1.71
Neutral or dissatisfied (ref. grp.)	*1.00*	–	*1.00*	–
Would come again to Canada				
Yes	1.13	0.67-1.91	1.08	0.64-1.82
No or don't know (ref. grp.)	*1.00*	–	*1.00*	–
Experience of discrimination				
Reported discrimination during 1st-2nd year in Canada			0.91	0.54-1.55
Reported discrimination during 3rd-4th year in Canada			1.34	0.81-2.22
Reported discrimination during both time periods			0.86	0.51-1.43
No discrimination reported (ref. grp.)			*1.00*	–
Nagelkerke R^2	*0.125*		*0.128*	

* Because of the relatively small unweighted sample size, it was not possible to include country/region of birth in this model. All predictive characteristics are measured 6 months after arrival in Canada, with the exception of experience of discrimination, which was measured 2 years and 4 years after arrival. The initial interview did not include a general question about experiencing discrimination in Canada.

Respondents' demographic characteristics are reported in Table 2. Most respondents were married, had a university degree, and entered Canada as skilled workers. The average age was 35 years old (SD=6.1 years). China (including Hong Kong) and India were the two major source countries for immigration. Most immigrants had relatively low personal income in the first 6 months after arrival in Canada, and few arrived with substantial savings, reflecting the economic challenges associated with immigration. Approximately nine out of ten immigrants reported that they would immigrate to Canada again, and seven out of ten immigrants reported that they were satisfied or completely satisfied with the Canadian experience (Table 3). Just less than half of respondents already had friends or relatives living in Canada when they arrived, and most people reported that they had made new friends since arriving here. More than three quarters of respondents reported seeing their friends at least weekly. There were relatively low levels of participation, however, in formal groups and organizations.

In waves two and three (two and four years after arrival in Canada), respondents were told that "Discrimination may happen when people are perceived as being different from others" and were asked whether or not they had "experienced discrimination or been treated unfairly by others because of your ethnicity, culture, race or skin colour, language or accent, or religion?" Approximately three in five respondents (58.6%, 95% CI: 57.5%-59.8%) said that they had not experienced discrimination in Canada. Slightly more than one in ten immigrants (13.6%, 95% CI: 12.8%-14.4%) said that they had experienced discrimination only during their first two years in Canada, and a similar number (12.8%, 95% CI: 11.9%-13.6%) said that they had experienced discrimination only in the more recent two years in Canada. Fifteen percent of respondents (15.0%, 95% CI: 14.1%-15.9%) said that they had experienced discrimination at both times, suggesting that these respondents had more consistent experiences of discrimination.

The single largest predictor of health decline was reporting 'excellent' health status six months after arriving in Canada (Table 4). Immigrants in this situation had 25 times greater odds of reporting a health decline by wave three than those who reported 'good' health immediately after arriving. Even after controlling for baseline health status, immigrants' age, gender, marital status, language skills, personal income and region of birth were all significantly associated with health decline. Women had 27% higher odds of reporting a two-step health decline than men. Respondents who were married had 32% higher odds of reporting a health decline compared to single, widowed, separated or divorced respondents.* Respondents with limited English/French language skills had 19% higher odds of reporting a health decline than those who spoke English or French well. Respondents with low personal incomes also had higher odds of health decline. Finally, each additional decade of age was associated with a 34% higher odds of health decline.

Immigrants from India and 'other' South Asian countries, China and Eastern Europe had more than two times greater odds of reporting a health decline compared to immigrants from North America or Oceania (see Table 4, Model 2).

Participation in social networks had limited effects on the likelihood of health decline. Only participation in non-religious organizations or groups appeared to have some protective factors. Satisfaction with the Canadian experience, education before coming to Canada, employment status and immigration class all appear to have no significant effect on the likelihood of health decline.

There are fewer socio-demographic predictors of health improvement than of health decline (see Table 5). Immigrants who arrive with limited language skills are significantly less likely to report a health improvement. Not surprisingly, older immigrants are also less likely to report a health improvement.

DISCUSSION

Four out of five new immigrants to Canada reported they were in excellent or very good health six months after arrival. Four years later, 15.4% of these immigrants had experienced a 2-point decline in self-reported health (e.g., from 'excellent' to 'good' or from 'very good' to 'fair'). In a comparable time frame, only 5.7% of their Canadian-born peers experienced a similar health decline. Health decline among immigrants was associated with baseline health status, age, gender, marital status, language skills, income, region of birth and perceived discrimination. Participation in social networks, a characteristic often considered protective for health, was not associated with changes in self-reported health. Only participation in non-religious organizations seemed to protect against reporting health decline.

This prospective study supports previous cross-sectional surveys (for example, see references 2 and 4) indicating that duration in Canada is statistically significantly associated with a decline in health status. This study indicates that new immigrants experience a greater decline in health status in the four-year period of data collection than do their Canadian-born peers. Due to required health screening, only applicants who are in the best of health are allowed to immigrate. However, a substantial minority do not maintain that state of health. The strongest predictor of health decline was an initial health status of 'excellent'. This represents a ceiling effect, whereby respondents at the top of the scale cannot improve their health and are more likely to decline than those who report lower initial health. Conceptually, the decline from 'excellent' to 'good' health may be of less concern than the decline from 'good' to 'poor' health. Many of the other factors we found to be associated with health decline (e.g., age, gender, marital status, language skills) have been identified in cross-sectional research to be associated with worse self-reported health among immigrants.[5,8]

Our finding of elevated odds of health decline among women as compared to men is in keeping with the substantial immigration literature suggesting that women face additional challenges during the immigration process,[5,8] not only due to the intersecting oppressions related to race, gender and immigrant status, but also to the additional caring responsibilities they have to take on after immigration, particularly among married women with children. In their home countries, most immigrant women could afford paid help and had high levels of social capital in relation to family and friends.[19] The literature indicates that prevalence of depression among immigrant women is high.[20]

The emergence of age as a factor in health decline is expected, as individuals are more likely to develop a number of ailments and chronic conditions as they age. Language may be associated with health decline because of the sense of isolation without an appropriate medium of communication with the majority of the population. Individuals may also have difficulty accessing the health system due to language issues.

The reason for the substantial decline in self-reported health status among a disproportionate number of new immigrants is not clear. Ng, who followed Canadians for 7 years, concluded that immigrants from non-European countries were not more likely than Canadian-born respondents to adopt unhealthy behaviours such as smoking or physical inactivity,[4] although they were more likely to gain 10% or more of their body mass index during that period.

In the LSIC analysis, self-reported experience of discrimination seems to have a modest impact on health. In American data, perceived discrimination has been found to be associated with worse self-reported health,[9] higher levels of diastolic blood pressure,[21] coronary artery calcification[21] and increased mortality risk.[22] Paradies'[23] review of 138 empirical quantitative population-based

* Though the addition of an interaction term for gender and marital status to the model produced a non-significant coefficient and added little explanatory value.

studies found a consistent negative association between self-reported racism and health after adjusting for the range of confounders. Similar findings have been shown in Canada[24] and Europe.[25] Immigrants with limited social support and those experiencing financial strain are particularly vulnerable.[25] Perceived discrimination has been found to have an impact on health directly as well as indirectly through lower utilization of health care services. Perceived discrimination outside and within the health care system has been associated with lower utilization of needed health care.[26]

Contrary to expectations, education, personal income and savings were not significantly associated with health decline. Lower education levels have been associated with health decline in samples including both Canadian-born respondents and immigrants.[4] Income levels have been associated with mental health outcomes of Canadian visible minority immigrants.[27] The lack of correlation between education and health trajectory among immigrants in our sample may be reflective of the fact that foreign degrees cannot be translated into jobs and social class to the same extent that domestic degrees can.

The social networks of immigrants, comprising family and friends, have been found to help immigrants to establish economic security and promote advancement[28-30] and to meet their need for information and orientation[31] and for emotional and psychological support.[20,32] Familial social networks have been associated with better emotional health for immigrants,[32] thus it is perplexing as to why social networks did not play a role in trajectories of health in the four years post arrival. Our finding that married respondents were more likely to experience health decline is surprising in light of the substantial literature showing married respondents having better morbidity and mortality outcomes in comparison to their unmarried peers.[33-35] There is some literature suggesting that strained marital relationships are associated with negative health trajectories,[36] but it is unlikely that this could explain the robust association we found in the current study. In this study, marital status is likely to be highly correlated with child rearing. It is possible that family responsibilities may cause caregiver strain and/or disruption in sleep patterns that may explain some of the association with health decline. Further qualitative research is needed to understand the role marriage plays in the health trajectories of new immigrants.

It is cause for concern that one in four immigrants who experienced a health decline reported problems accessing Canadian health services. The LSIC did not provide information on what were the barriers to accessing care but further research in this area is clearly warranted.

Few measured socio-demographic factors predict health improvement after arrival in Canada. As a result, it is difficult to identify what might help the small proportion of immigrants who do not arrive in very good or excellent health to improve their health status once in Canada. Further research in this area is also warranted.

This study is limited by reliance on self-reports of health as opposed to more objective measures of health, such as physician reports. This is an effect of the study design, which included health as one area of inquiry among many. Language patterns and cultural expectations may affect individuals' self-reports of health.[37] Changed reports of health status may also reflect an individual's changing health expectations as a result of entering a new cultural environment, as opposed to objective changes in health. Other longitudinal studies of immigrants have found only limited support for this hypothesis, however, since immigrants who report decreased health also report increasingly frequent contacts with a physician.[4] Similarly, in this sample, respondents who reported fair or poor health were significantly more likely to report receiving medical attention within the previous 12 months compared to those in excellent or very good health. Those who reported fair or poor health were also more likely to report having a medical or emotional health problem in the previous 12 months compared to other respondents. The study is also limited by a lack of information on many salient aspects of the immigrants' social networks (e.g., density, size), characteristics of network ties (e.g., reciprocity, intimacy) and social support (e.g., appraisal, emotional support), which have been shown to strongly affect both mental and physical health.[38] As is the case with all longitudinal studies, these findings are also limited by panel attrition; some respondents did not complete all three interviews. Some of the reasons for non-completion included being 'unavailable' because of leaving Canada, death, inability to contact respondents, or simple refusal. The data are weighted to compensate for this non-response, but the results can only be generalized with caution to immigrants who have remained in Canada four years after arrival. Care must be taken in interpreting the effects of perceived discrimination on health decline when both variables are measured concurrently. It is not possible to determine whether health decline precedes discrimination or vice versa. Despite these limitations, this study contributes to the literature through its use of a large, population-based prospective study of new immigrants and inclusion of a wide range of important risk factors for health outcomes.

The process of immigration appears to be associated with health decline for some immigrants. These findings support Health Canada's identification of immigration as a determinant of health. Strategies need to be developed to improve access to health care among new immigrants.

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Received: August 1, 2010
Accepted: January 18, 2011

RÉSUMÉ

Objectif : Selon l'effet de l'immigrant en bonne santé, les nouveaux immigrants au Canada devraient jouir d'une meilleure santé, en moyenne, que les personnes nées au Canada; pourtant, les données transversales donnent à penser que la santé des immigrants établis au Canada depuis plusieurs décennies est comparable à celle de leurs pairs nés au Canada. Nous avons analysé des données prospectives de cohortes pour repérer les facteurs associés au déclin de la santé chez les nouveaux immigrants.

Méthode : L'Enquête longitudinale auprès des immigrants du Canada a été menée par Statistique Canada et Citoyenneté et Immigration Canada entre avril 2001 et novembre 2005. Nous avons interviewé à trois reprises un échantillon probabiliste de 7 716 personnes ayant récemment immigré de l'étranger : à six mois, deux ans et quatre ans après leur arrivée au Canada. Par régression logistique, nous avons modélisé les prédicteurs d'une baisse de deux niveaux dans leur état de santé autodéclaré (p. ex., d'excellent à bon ou de très bon à moyen).

Résultats : Parmi les immigrants récents, 15 % ont déclaré une baisse de deux niveaux de leur état de santé au cours des quatre premières années suivant leur arrivée au Canada. À titre de comparaison, seulement 6 % des non-immigrants de cohortes d'âges similaires ont déclaré une baisse de deux niveaux durant la même période. Les caractéristiques associées à la vraisemblance accrue d'un déclin de la santé chez les immigrants récents étaient l'état de santé initial, l'âge, le sexe, l'état matrimonial, la maîtrise de la langue et l'endroit/la région de naissance. L'expérience d'une discrimination était aussi associée à un déclin de la santé. Un immigrant sur quatre dont la santé avait décliné a évoqué des problèmes d'accès aux services de santé canadiens.

Conclusion : Le processus d'immigration est associé à un déclin de la santé chez certains immigrants récents. Ces constatations confirment, comme le considère Santé Canada, que l'immigration est un déterminant de la santé. Il faudrait élaborer des stratégies pour améliorer l'accès des nouveaux immigrants aux soins de santé.

Mots clés : émigration et immigration; études longitudinales; discrimination; disparités d'état sanitaire; santé des minorités