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Area-based methods to calculate hospitalization rates for the foreign-born population in Canada, 2005/2006



by Gisèle Carrière, Paul A. Peters and Claudia Sanmartin

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Abstract

Background
Hospital records lack information about country of birth. This study describes a method for calculating hospitalization rates by the percentage of foreign-born in Census Dissemination Areas (DAs).

Data and methods
Data from the 2006 Census were used to classify DAs by the percentage of the foreign-born population who lived in them. Quintile and tercile thresholds were created to classify DAs as having low to high percentages of foreign-born residents. This information was appended to the 2005/2006 Hospital Morbidity Database via postal codes. Age-sex standardized hospitalization rates were calculated for low to high foreign-born concentration DAs, nationally and subnationally.

Results
Nationally, quintile thresholds had better discriminatory power to detect variations in hospitalization rates by foreign-born concentration, but tercile thresholds produced reliable results at subnational levels. All-cause hospitalization rates were lowest among residents of the high foreign-born concentration terciles. Similar gradients emerged in hospitalization rates for heart disease, diseases of the circulatory system, and mental health conditions. The pattern varied more at the subnational level.

Interpretation
With this approach, administrative data can be used to calculate hospitalization rates by foreign-born concentration.

Keywords
Administrative data, ecological studies, hospital records, immigration, public health surveillance

Authors
Gisèle Carrière (1-604-666-5907; gisele.carriere@statcan.gc.ca) is with the Health Analysis Division at Statistics Canada, Vancouver, British Columbia, V6B 6C7. Paul A. Peters and Claudia Sanmartin are with the Health Analysis Division at Statistics Canada, Ottawa, Ontario, K1A 0T6.

By 2031, it is projected that 28% of Canada's population could be foreign-born, up from about 20% in 2006.[1] Understanding patterns of health care use among this growing segment of the population is important for the planning and delivery of services. While evidence suggests better health among the foreign-born compared with people born in Canada,[2-9] much of that research is based on survey data.[3-6, 10,11] Those studies are typically constrained by small sample sizes that limit area-level comparisons. Furthermore, analysis based on survey data may be subject to recall bias or affected by linguistic and cultural barriers.

Hospital administrative records cover all acute-care hospitalizations and allow analysis at detailed levels of geography. However, these records do not contain information about patients' country of birth and immigration status. In the absence of individual-level information, area-based methods can be applied to study hospital use patterns for areas with high concentrations of foreign-born individuals. Such approaches have been used in Canada to analyze health outcomes by neighbourhood socio-economic status and concentration of the Aboriginal population.[12-14]

Because immigrants have tended to settle in large urban areas,[15] and because the concentration of the foreign-born has increased over time,[16-18] area-based methods can be applied to study hospitalization patterns in areas with high concentrations of foreign-born individuals. While hospital data for specific regions have been linked to immigration data,[2] such work has not been undertaken at the national level.

This study describes an area-based method of calculating standardized, comparable hospitalization rates for areas with varying concentrations of

foreign-born, at national and subnational levels.[19] Based on previous research,[2-7] the hypothesis is that hospitalization rates are likely to be lower in areas with high percentages of foreign-born residents.

Methods

Data sources

Counts of the foreign-born population are from the 2006 Census long-form questionnaire, which was administered to 20% of households (non-institutionalized population). The information collected in the questionnaire included country of birth, immigrant status, and socio-economic and demographic characteristics.

Hospitalization data are from the Hospital Morbidity Database, which covers all inpatient acute-care hospital discharges in Canada. The data are compiled by the Canadian Institute of Health Information. Hospital records from fiscal year 2005/2006 (April 1, 2005 through March 31, 2006) were used because they are closest in time to the census year. These records contain medical information such as diagnoses and procedures, and patient information such as date of birth, sex, and importantly for this analysis, postal codes. Six-character postal codes are available for all provinces/territories except Quebec, for which only the first three characters are provided.

Definition of foreign-born

In this study, "foreign-born" refers to those who either (1) ever held the legal status of immigrant to Canada, or (2) were non-permanent residents (NPRs). NPRs are people from another country who, at the time of the census, held a work or study permit or were refugee claimants, or who had applied for landed immigrant status but had not yet been accepted, as well as family members living with them in Canada.[20] From a health perspective, NPRs more closely resemble immigrants than people born in Canada, so they are combined with immigrants to represent the foreign-born. In 2006, NPRs made up 4% of the foreign-born population, and less than 1% of the total Canadian population.

Level of geography

This analysis requires that areas with high percentages of foreign-born residents be distinguished from areas with low percentages of foreign-born residents. A small geographic unit is needed because population homogeneity across an area tends to increase with geographic size,[21] thereby diluting associations between foreign-born concentration and hospitalization rates.

To some extent, the foreign-born population in Canada is spatially concentrated. Immigrants tend to settle in Census Metropolitan Areas (CMAs), such as Toronto and Vancouver,[15] and many remain in these "gateway" cities.[22]

This analysis is based on Dissemination Areas (DAs), the smallest level of geography (400 to 700 residents) for which aggregate census information is available.[23] In 2006, DAs totalled 54,626; aggregate information about population characteristics was available for 92% of them (50,214).

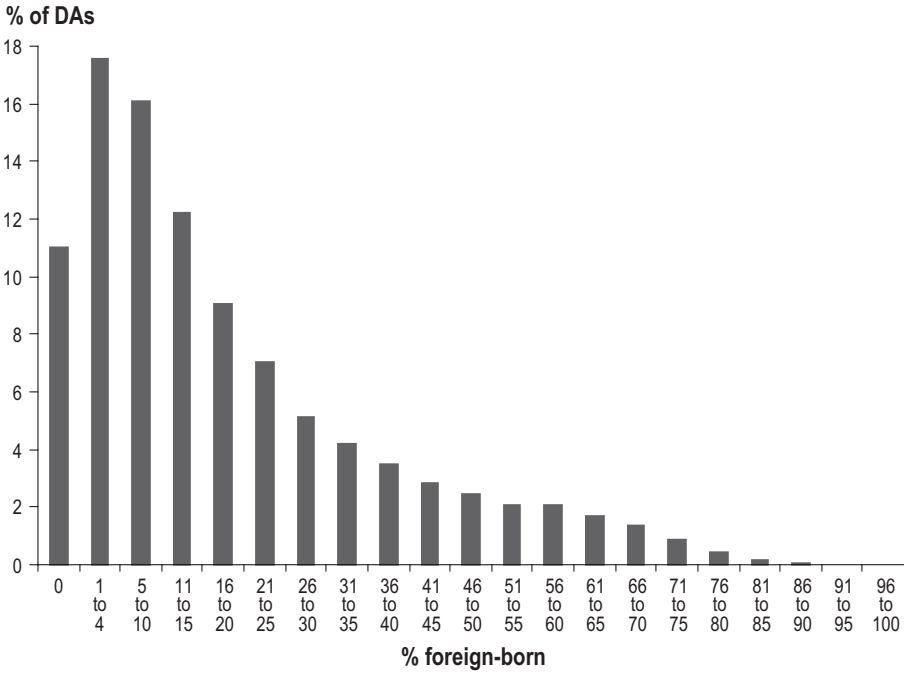
Development of area-based measure of foreign-born

Development of an area-based measure of foreign-born concentration involves three steps: 1) calculation of foreign-born population concentrations; 2) selection of the base population to measure the distribution of concentration values; and 3) selection of a quantile to delineate thresholds that will be used to classify areas according to their foreign-born concentration.

Calculation of foreign-born population concentration

Foreign-born *concentration* is the percentage of individuals in each DA in 2006 who were foreign-born. In 45% of DAs, no more than 10% of the population were foreign-born, on the other hand, in about 9% of DAs, at least 50% of the population were foreign-born (Figure 1).

Figure 1
Distribution of Dissemination Areas (DAs), by percentage foreign-born in DA population, Canada, 2006



Note: Foreign-born include those with landed immigrant status (ever) and non-permanent residents.
Source: 2006 Census of Population.

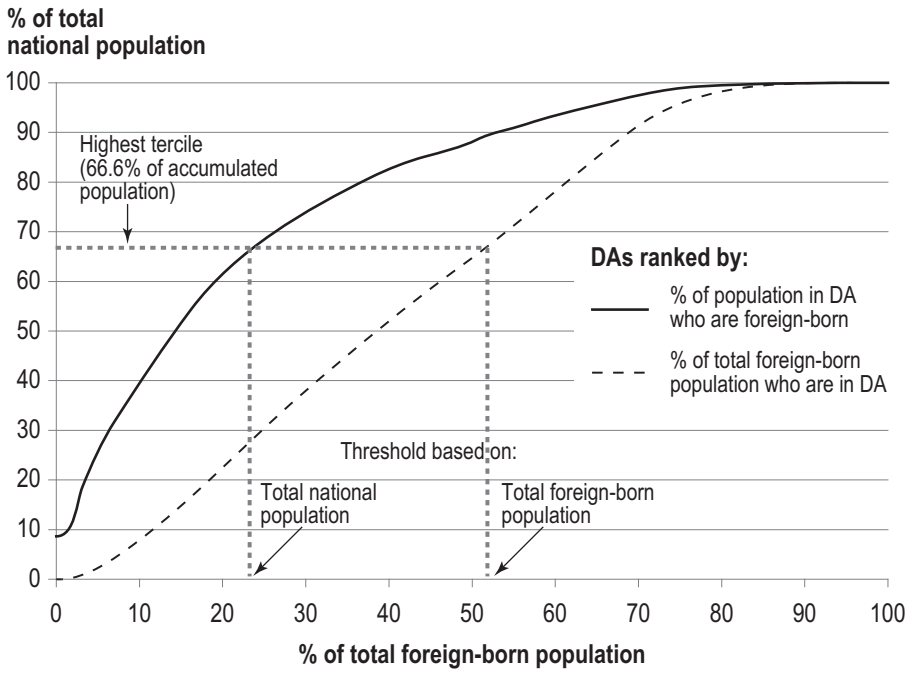
Selection of base population

To establish concentration thresholds, all DAs across Canada were ordered from lowest to highest DA percentage of foreign-born. Next, this percentage foreign-born (the DA measure) was distributed across each of two possible base populations: the total national population and the total foreign-born population. By distributing the percentage foreign-born measure this way, a specific foreign-born percentage value could be discerned to divide the base population into a given quantile, for example, thirds (terciles) or fifths (quintiles). The foreign-born population is preferred as the base population because the resulting thresholds that define any given quantile contain greater foreign-born concentrations than do thresholds derived if the total national population had been used as the base. The advantage of using the foreign-born population as the base population is illustrated in Figure 2. If the total national population is used as the base population, thresholds that delineate areas that contain terciles of the total population show that the highest tercile (where 66.6% of the national population has accumulated) cut-off occurs when the percentage foreign-born DA measure is equal to 24%. That is, DAs in which at least 24% of the population are foreign-born would be considered "high concentration of foreign-born." However, thresholds that delineate areas containing thirds of the *foreign-born* population yield a "high-concentration" cut-off of 52% foreign-born. Given these results, the distribution of the percentage foreign-born across the foreign-born population was used to establish thresholds to classify each DA.

Selection of quantile

The choice of quantiles (thirds or fifths of the foreign-born) to set foreign-born concentration thresholds for classifying DAs was based on two criteria: 1) the range of percentage foreign-born within a given quantile; and 2) the feasibility of calculating hospitalization rates at national and sub-national (provincial/regional/territories or CMA) levels.

Figure 2
Cumulative distribution of percentage foreign-born in Dissemination Areas (DAs), by percentage of total national or total foreign-born population, Canada, 2006



Note: Foreign-born include those with landed immigrant status (ever) and non-permanent residents.
Source: 2006 Census of Population.

Because admission to hospital is a relatively rare event—on average, fewer than one person in ten is hospitalized in any year—population counts must be large enough to produce stable estimates.

Thresholds for terciles and quintiles are presented in Table 1. By definition, each level of either quantile contains approximately equal numbers of the foreign-born: about 2.1 million in each tercile, and about 1.3 million in each quintile. All DAs across Canada were ordered from lowest to highest percentage of the foreign-born population in each, and the foreign-born population was then classified into terciles and quintiles. While the absolute *number* of foreign-born individuals is the same in each level of a quantile, the *percentage* of the total population in each level who are foreign-born (concentration) varies. For example, while approximately 2.1 million foreign-born are in each tercile, they make up 9.8% of the total population in the "low-concentration" tercile, but 63.7% of the total population in the "high-concentration" tercile.

For the *quintile* thresholds, quintile 1 (lowest foreign-born concentration) consists of DAs in which the percentage of the population who were foreign-born was 19.0% or less; quintile 5 (highest foreign-born concentration) consists of DAs in which the percentage of the population who were foreign-born was more than 62.0%. The percentage of the population who were foreign-born in the lowest *tercile* is less than 27.0%, and in the highest, more than 51.8%.

Hospitalization rates were calculated based on quintiles and terciles (Table 1). Quintile-based thresholds result in better discrimination of national all-cause hospitalization rate differences between the highest and lowest quantiles (rate ratio=0.64) than do tercile-based thresholds (rate ratio=0.69). For both quantiles, 95% confidence intervals

Table 1
Age-sex standardized all-cause hospitalization rates (per 10,000), by quantile of percentage of foreign-born population, Canada, 2005/2006

Foreign-born concentration quantile	Foreign-born Number	Foreign-born % of quantile population	% foreign-born range	Hospitalization rate	95% confidence interval from	95% confidence interval to	Rate ratio	95% confidence interval from	95% confidence interval to
Canada	**6,377,250**	**20.8**	**...**	**753.0**	**752.0**	**753.9**	**...**	**...**	**...**
Quintile									
1 (lowest)	1,282,165	7.1	19.0 or less	840.7	839.4	842.0	1.00	..	..
2	1,270,545	24.4	More than 19.0 to 32.0	663.8*	661.6	666.0	0.79	0.79	0.79
3	1,277,825	38.3	More than 32.0 to 46.0	621.8*	619.1	624.5	0.74	0.74	0.74
4	1,278,465	53.8	More than 46.0 to 62.0	586.7*	583.6	589.9	0.70	0.69	0.70
5 (highest)	1,268,250	69.8	More than 62.0	539.0*	536.4	543.5	0.64	0.64	0.65
Tercile									
1 (lowest)	2,124,740	9.8	27.0 or less	814.0	812.9	815.2	1.00	...	...
2	2,137,055	37.6	More than 27.0 to 51.8	621.9*	619.8	623.9	0.76	0.76	0.77
3 (highest)	2,115,455	63.7	More than 51.8	558.5*	555.9	561.2	0.69	0.68	0.69
Selected Census Metropolitan Areas†									
Total	4,600,320	34.1	...	616.2	614.9	617.6	...	...	...
1 (lowest)	814,030	14.0	27.0 or less	655.4	653.3	657.5	1.00	...	...
2	1,708,150	38.7	More than 27.0 to 51.8	607.9*	605.6	610.3	0.93	0.92	0.93
3 (highest)	2,078,140	63.9	More than 51.8	555.4*	552.8	558.1	0.85	0.84	0.85

† Halifax, Montreal, Toronto, Hamilton, Winnipeg, Calgary, Vancouver
* significantly different from lowest foreign-born concentration quantile (p<0.05)
... not applicable
Notes: Excludes pregnancy-related conditions. Rates are age-sex standardized to 2006 national population. Foreign-born include those with landed immigrant status (ever) and non-permanent residents.
Source: 2006 Census of Population; 2005/2006 Hospital Morbidity Database.

indicate that the national hospitalization rates were stable. However, at the sub-national level (province/region/territory and CMA), rates were less stable (wider confidence intervals) based on quintiles than on terciles, particularly for areas with smaller populations (total and foreign-born). For example, in Alberta, hospitalization rates produced using tercile thresholds had a smaller standard error for areas with the highest foreign-born concentration than did rates produced using quintile thresholds (data not shown). As a result, the tercile measure was selected for this analysis.

Criteria for immigrant concentration within DAs could also be defined at the sub-national level (provincial/regional or CMA) to produce jurisdiction-specific thresholds. These would be more sensitive to the spatial distribution of immigrants within each jurisdiction. Jurisdiction-specific terciles were created for provinces/regions and selected CMAs. A comparison of threshold levels revealed significant variation in the definition of high, medium and low concentration of immigrants. For example, thresholds for including DAs in the high foreign-born concentration tercile range from a low of 10.7% in the Atlantic Region to a high of 57.8% in Ontario (data not shown), whereas the nationally derived threshold is 51%. This variation limits the ability to compare hospitalization rates across jurisdictions within similar terciles owing to cross-classification of DAs. For example, DAs with 25% foreign-born would be considered medium-concentration in some areas, but high-concentration in others. Because the objective of this study is to produce nationally comparable results for each level of geography, the analyses are based on nationally defined terciles.

Table 2
Age-sex standardized all-cause hospitalization rates (per 10,000), by selected causes and foreign-born concentration tercile, Canada, 2005/2006

Foreign-born concentration tercile	Circulatory diseases Rate	95% confidence interval from	95% confidence interval to	Heart conditions Rate	95% confidence interval from	95% confidence interval to	Mental health and behavioural disorders Rate	95% confidence interval from	95% confidence interval to
Canada	**120.1**	**119.7**	**120.5**	**66.9**	**66.6**	**67.2**	**50.7**	**50.4**	**50.9**
Low foreign-born	128.4	128.0	128.9	71.5	71.2	71.9	54.7	54.3	55.0
Medium foreign-born	100.0*	99.2	100.8	54.9*	54.3	55.5	43.8*	43.3	44.4
High foreign-born	93.4*	92.3	94.5	53.2*	52.4	54.1	37.1*	36.4	37.7

* significantly different from low foreign-born concentration tercile (p<0.05)
Note: Foreign-born include those with landed immigrant status (ever) and non-permanent residents.
Source: 2006 Census of Population; 2005/2006 Hospital Morbidity Database.

Applying the area-based measure to hospital data

Using the PCCF+ application developed at Statistics Canada, a 2006 Census DA code was assigned to each hospital separation record based on the patient's residential postal code.[24,25] The DA code was used to classify each hospital record into a foreign-born concentration tercile.

Causes of hospitalization were determined from the "most responsible diagnosis" (excluding pregnancy-related) coded either to the *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Canada* (ICD-10)[26] or to the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9)[27] for Quebec. The following cause-specific hospitalizations were defined: circulatory system diseases; selected heart conditions (heart failure, pulmonary edema; ischemic heart disease including acute myocardial infarction); and mental and behavioural disorders. These causes were chosen for analysis because earlier research reported differences in the prevalence between ethnic minority populations and other Canadians,[11] and because of the need for information about the mental health of immigrants.[28]

Hospitalization rates were calculated as the number of hospitalizations per 10,000 population in DAs with high, medium or low percentages of foreign-born residents. The number of hospital separations and the corresponding population denominators are shown in Appendix Table A for Canada and by province/region/territory and selected CMAs, based on nationally defined foreign-born concentration terciles. No DAs in the Atlantic Region had a "high" concentration of foreign-born residents. In Saskatchewan, fewer than 700 people were in the high foreign-born concentration tercile.

Rates were standardized to the age and sex structure of the 2006 population of Canada using the direct method. Age-sex standardized rates and 95% confidence intervals were calculated for Canada, for each province/region/territory, and for selected CMAs. Confidence intervals for the standardized rates used methods derived from Spiegelman.[29]

Table 3
Age-sex standardized all-cause hospitalization rates (per 10,000), by province/region/territory and foreign-born concentration tercile, Canada, 2005/2006

Province/Region/Territory and foreign-born concentration tercile	Hospitalization rate	95% confidence interval		Rate ratio
		from	to	
Canada	**753.0**	**752.0**	**753.9**	**...**
Atlantic	**931.2**	**927.4**	**935.2**	**...**
Low foreign-born	931.0	927.1	934.9	1.00
Medium foreign-born	965.4	903.6	1,031.4	1.04
High foreign-born	...	...	...	...
Quebec	**717.9**	**716.0**	**719.8**	**...**
Low foreign-born	742.2	740.1	744.3	1.00
Medium foreign-born	597.6*	592.6	602.6	0.81
High foreign-born	592.2*	583.5	601.0	0.80
Ontario	**698.3**	**696.8**	**699.8**	**...**
Low foreign-born	773.4	771.3	775.4	1.00
Medium foreign-born	620.6*	617.7	623.5	0.80
High foreign-born	560.9*	557.7	564.1	0.73
Manitoba	**813.6**	**808.3**	**818.9**	**...**
Low foreign-born	835.5	829.7	841.3	1.00
Medium foreign-born	679.5*	666.3	692.9	0.81
High foreign-born	703.5*	645.7	766.5	0.84
Saskatchewan	**1,059.0**	**1,052.5**	**1,065.5**	**...**
Low foreign-born	1,059.1	1,052.6	1,065.7	1.00
Medium foreign-born	1,111.2	1,035.5	1,192.4	1.05
High foreign-born†	F	F	F	F
Alberta	**846.0**	**842.7**	**849.4**	**...**
Low foreign-born	898.3	894.5	902.2	1.00
Medium foreign-born	632.9*	626.0	639.9	0.70
High foreign-born	617.2*	592.4	643.1	0.69
British Columbia	**709.0**	**706.4**	**711.6**	**...**
Low foreign-born	807.1	803.4	810.7	1.00
Medium foreign-born	616.6*	612.1	621.2	0.76
High foreign-born	518.3*	512.6	524.0	0.64
Territories and Nunavut	**990.3**	**962.7**	**1,018.7**	**...**
Low foreign-born	990.3	962.7	1,018.7	1.00
Medium foreign-born	...	...	...	...
High foreign-born	...	...	...	...

† based on one Dissemination Area (population of 695) and 13 hospitalizations; use with caution
* significantly different from low foreign-born concentration tercile ($p<0.05$)
F too unreliable to be published
... not applicable
Notes: Excludes pregnancy-related conditions. Foreign-born include those with landed immigrant status (ever) and non-permanent residents.
Source: 2006 Census of Population; 2005/2006 Hospital Morbidity Database.

Results

The national all-cause acute-care hospitalization rate was lowest among residents of DAs in the high foreign-born concentration tercile (559 hospitalizations per 10,000 population), and highest among residents of DAs in the low foreign-born concentration tercile (814 hospitalizations per 10,000 population) (Table 1). This pattern persisted for hospitalizations due to circulatory system diseases, selected heart conditions, and mental and behavioural disorders (Table 2).

Patterns in Ontario, Alberta and British Columbia were similar to the national level, with lower hospitalization rates among residents of areas classified in the high or medium foreign-born

Table 4
Age-sex standardized all-cause hospitalization rates (per 10,000), by selected Census Metropolitan Area (CMA) and foreign-born concentration tercile, Canada, 2005/2006

CMA and foreign-born concentration tercile	Hospitalization rate	95% confidence interval		Rate ratio
		from	to	
Selected CMAs	**616.2**	**614.9**	**617.6**	...
Vancouver	**596.8**	**593.4**	**600.1**	...
Low foreign-born	684.6	677.5	691.9	1.00
Medium foreign-born	602.7*	597.7	607.7	0.88
High foreign-born	516.1*	510.4	521.8	0.75
Calgary	**660.5**	**655.2**	**665.9**	...
Low foreign-born	678.2	671.6	685.0	1.00
Medium foreign-born	634.6*	625.1	644.2	0.94
High foreign-born	553.9*	527.2	581.9	0.82
Toronto	**587.9**	**585.7**	**590.1**	...
Low foreign-born	639.4	634.0	644.8	1.00
Medium foreign-born	596.7*	593.2	600.3	0.93
High foreign-born	559.0*	555.8	562.3	0.87
Montreal	**633.6**	**631.0**	**636.2**	...
Low foreign-born	653.0	649.7	656.3	1.00
Medium foreign-born	595.9*	590.9	600.9	0.91
High foreign-born	594.4*	585.6	603.2	0.91
Halifax	**612.8**	**604.6**	**621.0**	...
Low foreign-born	613.2	605.0	621.6	1.00
Medium foreign-born	576.0	509.2	651.6	0.94
High foreign-born	...	...	...	...
Hamilton	**690.2**	**684.2**	**696.4**	...
Low foreign-born	690.9	683.2	698.7	1.00
Medium foreign-born	691.3	681.0	701.7	1.00
High foreign-born	699.1	656.3	744.8	1.01
Winnipeg	**643.6**	**637.7**	**649.6**	...
Low foreign-born	638.1	631.5	644.8	1.00
Medium foreign-born	661.8*	648.3	675.6	1.04
High foreign-born	689.8	632.7	752.1	1.08

* significantly different from low foreign-born concentration tercile ($p<0.05$)
... not applicable
F too unreliable to be published
Notes: Excludes pregnancy-related conditions. Foreign-born include those with landed immigrant status (ever) and non-permanent residents.
Source: 2006 Census of Population; 2005/2006 Hospital Morbidity Database.

Why is this study important?

- A growing percentage of the Canadian population is foreign-born.
- Understanding the health and health services use patterns of this population is increasingly important.
- Administrative health data typically do not contain information about country of birth.

What is already known on this subject?

- In the absence of individual-level information, ecological methods have been applied to understand patterns of hospital use among areas having greater or lesser percentages of subpopulations.

What this study adds

- Hospital records that lack information on country of birth can be analysed with aggregate census data to compare hospitalization rates for areas with greater or lesser percentages of foreign-born residents.
- Hospitalization rates tend to be lowest among residents of areas with a high percentage of foreign-born residents.

concentration terciles, compared with residents of areas in the low foreign-born concentration tercile (Table 3). In Quebec and Manitoba, hospitalization rates for residents of the medium and high foreign-born terciles differed significantly from each other (data not shown), and both differed significantly from the low foreign-born concentration tercile. As well, in Manitoba, the lowest hospitalization rate was among residents of the medium foreign-born concentration tercile.

All-cause hospitalization rates by foreign-born concentration also varied across CMAs (Table 4). The national pattern prevailed in Vancouver, Calgary, Toronto, and to a lesser extent, Montreal—the lowest hospitalization rates were among residents of areas classified in the high foreign-born concentration tercile. Differences across terciles were not significant in Hamilton or Halifax.

Discussion and limitations

This study demonstrates how an area-based method can be used to examine hospitalization rates in areas with high versus low percentages of foreign-born residents. The approach yields comparable information at national and sub-national levels.

Research generally suggests that it would be reasonable to expect lower hospitalization rates (excluding pregnancy-related) in areas with high percentages of foreign-born residents. Individual-level data show better self-reported health, lower prevalence of chronic conditions, lower age-specific mortality risks, and longer life expectancy among immigrants compared with the

Canadian-born.[3,7,9,30] The distribution of hospitalization rates in this analysis supports that expectation.

Differences in hospitalization rates between high and low foreign-born concentration terciles should be interpreted in the context of area characteristics, including the composition of the foreign-born population (region or country of birth). Recent studies have reported differences in health status by country of birth and time since immigration.[6-8] As well, some segments of the foreign-born may be at higher risk of hospitalization than are others because of poorer health and higher rates of chronic disease.[4,7,9,11,31,32] Given this evidence, differences in the composition of the foreign-born population are relevant in interpreting differences in hospitalization rates across immigrant terciles. For example, in 2006, more than 70% of immigrants in Vancouver reported that their country of birth was in Asia, compared with 31% of those in Montreal. In Montreal, more than 25% of immigrants reported being of Africa origin, higher than any other jurisdiction in Canada.[23] Differences in the composition of the foreign-born populations may explain variations in the gradient of hospitalization rates across jurisdictions. The steeper gradient between high and medium tercile hospitalization rates in Vancouver than in Montreal, for example, may be due to the higher percentage of Asian-born immigrants in Vancouver. Other area-level factors that have been found to be associated with higher rates of hospitalization include low-income and a high concentration of Aboriginal peoples.[33]

A key limitation of this study is that the hospitalization rates cannot be regarded as rates for foreign-born and non-foreign-born individuals per se, but rather, as rates among people living in areas with varying concentrations of the foreign-born. The analysis suggests an association between hospitalization and percentages of foreign-born in the population, but does not allow for causal inferences.

Furthermore, the hospital discharge records that Statistics Canada receives from Quebec contain only the first three characters of the postal codes. PCCF+ uses population weights to probabilistically assign cases to DAs. This method results in less precise matching than would the full six-character postal code. It may result in greater misclassification of hospital records in urban areas, but has little effect in rural areas which are predominately in the low foreign-born concentration tercile.

Conclusion

The results confirm that this area-based methodology can be employed to compare hospitalization rates among areas having greater versus lesser concentrations of foreign-born than Canadian-born populations. An advantage of this approach is its use of existing data, which makes it a cost-effective method for routine surveillance of health care utilization. As well, the measure allows for comparisons between different geographic areas, particularly those with high foreign-born concentrations.

Finally, definitive analysis of health services use by the foreign-born awaits the creation of administrative data with person-level information such as country of birth, year of immigration, income, and educational attainment. The linkage of health care administrative records to other Statistics Canada data holdings such as the Census under the Longitudinal Health and Administrative Data Initiative should address this information gap. ■

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Appendix

Table A
Population and all-cause hospitalizations, by foreign-born concentration tercile, province/region/territory and selected Census Metropolitan Areas, Canada, 2005/2006

	Population 2006				Hospitalizations 2005/2006			
	Total	Tercile 1 (lowest % foreign-born)	Tercile 2 (medium % foreign-born)	Tercile 3 (highest % foreign-born)	Total	Tercile 1 (lowest % foreign-born)	Tercile 2 (medium % foreign-born)	Tercile 3 (highest % foreign-born)
Province/Region/Territory								
Atlantic	2,274,315	2,263,740	10,575	...	220,292	219,352	940	...
Quebec	7,480,310	6,269,040	906,290	304,980	546,010	471,809	56,282	17,919
Ontario	12,077,010	6,814,775	2,918,810	2,343,425	835,330	539,592	175,488	120,250
Manitoba	1,090,955	925,255	156,895	8,805	91,991	81,063	10,369	559
Saskatchewan	917,545	909,095	7,755	695	104,148	103,163	972	13
Alberta	3,219,455	2,540,690	634,035	44,730	247,682	211,111	34,152	2,419
British Columbia	4,009,085	2,273,955	1,100,105	635,025	294,239	191,963	69,910	32,366
Territories	100,510	100,510	...	...	7,154	7,154	...	...
Census Metropolitan Area								
Vancouver	2,095,580	526,240	944,370	624,970	122,791	35,161	55,869	31,761
Calgary	1,075,680	683,245	356,110	36,325	61,286	40,951	18,642	1,693
Toronto	5,093,485	923,815	1,886,145	2,283,525	279,335	55,128	107,344	116,863
Montreal	3,613,520	2,417,560	890,980	304,980	226,116	152,812	55,320	17,984
Halifax	371,350	365,575	5,775	...	21,632	21,354	278	...
Hamilton	692,120	441,635	235,415	15,070	49,380	30,980	17,412	988
Winnipeg	693,665	542,360	142,500	8,805	45,207	35,326	9,331	550

... not applicable
Notes: Excludes pregnancy-related conditions. Foreign-born include those with landed immigrant status (ever) and non-permanent residents.
Source: 2006 Census of Population; 2005/2006 Hospital Morbidity Database.