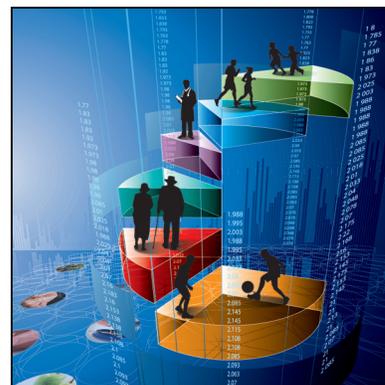


## Article

# Unintentional injury hospitalizations and socio-economic status in areas with a high percentage of First Nations identity residents

by Evelyne Bougie, Philippe Finès, Lisa N. Oliver  
and Dafna E. Kohen

October 2014



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- |                |  |
|----------------|--|
| .              | not available for any reference period   |
| ..             | not available for a specific reference period  |
| ...            | not applicable   |
| 0              | true zero or a value rounded to zero   |
| 0 <sup>s</sup> | value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded |
| P              | preliminary  |
| r              | revised  |
| X              | suppressed to meet the confidentiality requirements of the <i>Statistics Act</i>                                   |
| E              | use with caution   |
| F              | too unreliable to be published   |
| *              | significantly different from reference category ( $p < 0.05$ )   |

# Unintentional injury hospitalizations and socio-economic status in areas with a high percentage of First Nations identity residents

by Evelyne Bougie, Philippe Finès, Lisa N. Oliver and Dafna E. Kohen

## Abstract

### Background

Few national studies of hospitalizations due to injuries among the First Nations population have been conducted.

### Data and methods

Based on 2004/2005 to 2009/2010 data from the Discharge Abstract Database, this study examines associations between unintentional injury hospitalizations, socio-economic status and location relative to an urban core in Dissemination Areas (DAs) with a high percentage of First Nations identity residents versus a low percentage of Aboriginal identity residents.

### Results

Unintentional injury hospitalization rates were higher in the less affluent and the most remote DAs. When DAs with the same socio-economic status and location were compared, the risk of hospitalizations was greater in high-percentage First Nations identity DAs relative to low-percentage Aboriginal identity DAs.

### Interpretation

Socio-economic conditions and remote location accounted for some, but not all, of the differences in unintentional injury hospitalizations between high-percentage First Nations identity and low-percentage Aboriginal identity DAs. This suggests that characteristics not measured in this analysis—such as environmental, behavioural or other factors—play an additional role in DA-level unintentional injury hospitalization risk.

## Keywords

Aboriginal, hospital records, wounds

## Authors

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Injuries are a leading cause of death among the First Nations population in Canada and have been identified as a serious public health issue in terms of health care costs and diminished quality of life.<sup>1</sup>

Although relatively few studies of injuries among the Aboriginal population have been conducted,<sup>2</sup> recent population-based research shows high rates of morbidity and mortality due to injuries in the First Nations population. Karmali et al.<sup>3</sup> reported that the incidence of severe fatal and non-fatal injuries in the Calgary Health Region was higher among individuals with Registered Indian status, compared with other residents. Using survey data, Tjepkema<sup>4</sup> reported higher non-fatal injury rates among the provincial off-reserve Aboriginal population, compared with the non-Aboriginal population. Linkages of census and mortality data show higher rates of mortality due to injuries over the 1991-to-2001 period for Status and non-Status Indians, compared with the non-Aboriginal population.<sup>5,6</sup>

National studies of hospitalizations due to injuries among the First Nations population have been even scarcer because of the lack or inconsistent reporting of Aboriginal identity information on hospital administrative records. Hospital data are important because discharge records contain information about injuries severe enough to

warrant hospital admission. Currently, three provinces (British Columbia, Saskatchewan and Manitoba) report population-based rates of hospitalization due to injuries. Although each provincial database uses different methods to identify First Nations patients,<sup>7</sup> these data show higher injury hospitalization rates among First Nations people living both on- and off-reserve in Western Canada, compared with the general population.

To overcome the general lack of Aboriginal identity data on hospital records, some researchers have adopted an area-based approach<sup>8</sup> and examined injury hospitalizations in geographic areas with a relatively high percentage of Aboriginal identity residents. For instance, Fantus et al.<sup>9</sup> found higher all-cause injury hospitalization rates in northern Ontario's First Nations communities, compared with similarly located non-Aboriginal communities. Alaghebandan et al.<sup>10</sup> reported higher all-cause unintentional injury hospitalization rates among children and adolescents in high-percentage Aboriginal identity communities in Newfoundland and Labrador, compared with lower-percentage Aboriginal iden-

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tivity communities. At the national level (excluding Quebec), Oliver and Kohen,<sup>11</sup> Finès et al.,<sup>12</sup> and Carrière et al.<sup>13</sup> found higher rates of unintentional injury hospitalizations among children, youth and adults in high-percentage First Nations identity areas relative to low-percentage Aboriginal identity areas.

An important limitation of many of these area-based studies is that they did not investigate the role of area characteristics, such as socio-economic conditions or remote location, which may help explain the elevated injury rates in high-

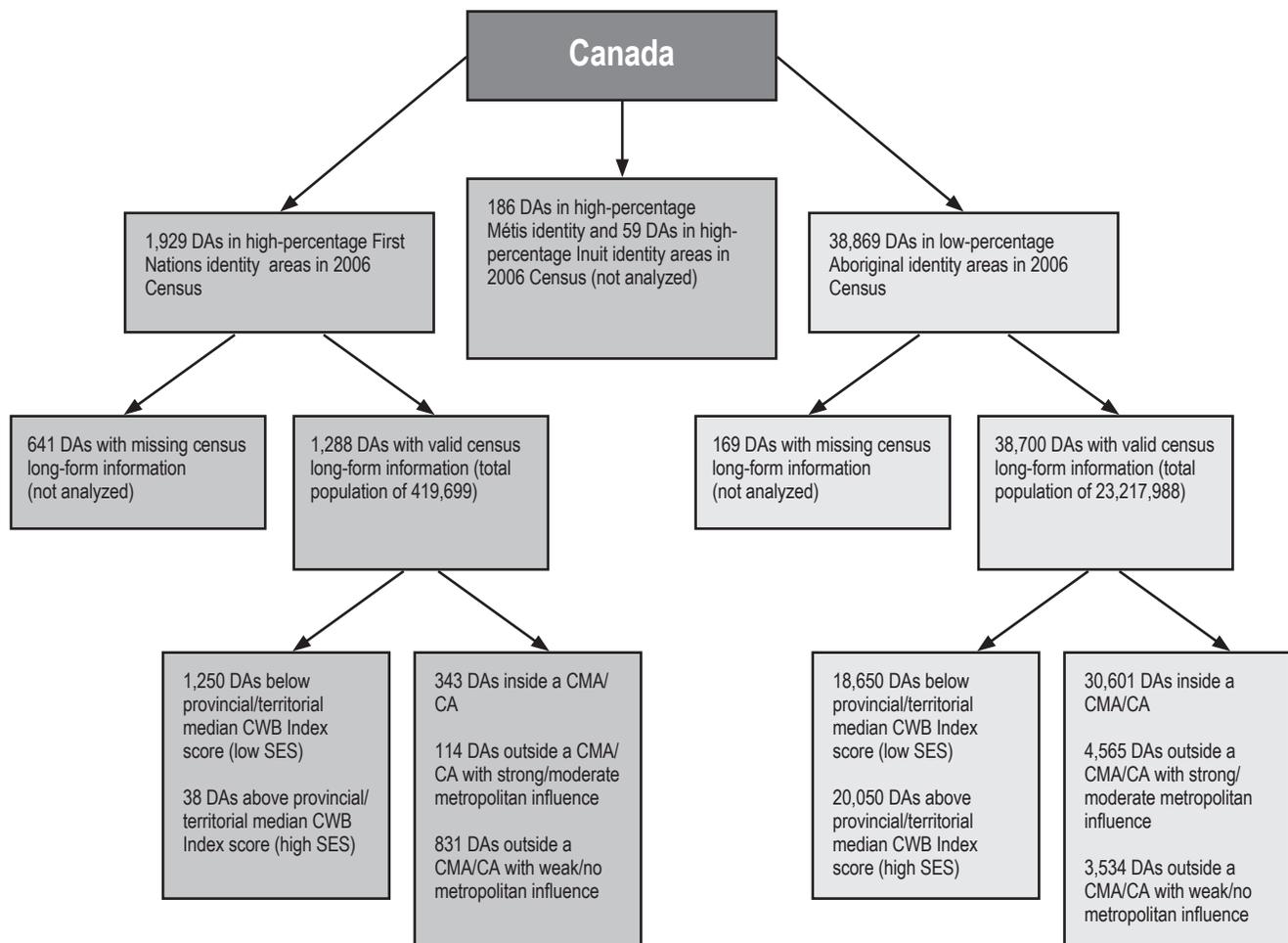
percentage Aboriginal identity areas. An exception is Carrière et al.<sup>13</sup> who demonstrated that adjusting for housing in need of major repair and for rural location reduced (but did not eliminate) the difference in all-cause injury hospitalization rates between areas with relatively high and low percentages of Aboriginal identity residents.

Population studies have shown patterns in injury hospitalizations and mortality by neighbourhood income.<sup>14-18</sup> Evidence also suggests that individuals living in rural areas may be at an

increased risk for injury-related comorbidities because of reduced access to health care and emergency facilities and because of greater distances travelled in motor vehicles for commodities and services.<sup>1,18-20</sup>

Compared with the Canadian population overall, the First Nations population tends to have lower educational attainment, lower employment rates, and lower-quality housing,<sup>21-23</sup> all of which may be associated with increased injury risk.<sup>1,24</sup> Thus, the goal of this analysis is to investigate whether the higher unin-

**Figure 1**  
Dissemination Area (DA) inclusion criteria



CWB = Community Well-Being  
SES = socio-economic status  
CMA = census metropolitan area  
CA = census agglomeration

Source: 2006 Census of Population.

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tentional injury hospitalization rates observed in areas with a high percentage of First Nations identity residents are associated with area socio-economic conditions and remote location.

Using a geographic approach and six years of national hospitalization data, this study: 1) describes the extent to which unintentional injury hospitalization rates varied based on area socio-economic conditions and location relative to an urban core; 2) describes variations in these associations by age group and sex; and 3) compares unintentional injury hospitalization rates in areas with a high percentage of First Nations identity residents with rates in areas with a low percentage of Aboriginal identity residents with similar socio-economic conditions and location relative to an urban core.

This is an ecological study reporting results for geographic areas. Because Aboriginal identifiers were not available on hospital records, hospitalizations of Aboriginal people could not be ascertained. The associations should, therefore, be interpreted as applying to geographic areas only.

**Data and methods**

The data are from the Discharge Abstract Database (DAD) for 2004/2005 to 2009/2010 and the 2006 Census. The DAD contains discharge records for all hospital separations in Canada except Quebec.<sup>25</sup> For each separation, information is available on the patient’s age, sex, residential postal code, diagnosis codes, and dates of admission and discharge.

The *International Classification of Diseases, 10<sup>th</sup> Revision (ICD-10-CA)*<sup>26</sup> diagnosis codes were used to classify injuries, based on the external cause. The injury episodes extracted for analysis pertained only to *unintentional* injuries—those for which there was no intent to harm, on the part of the victim or anyone else. Adverse effects due to drugs or medical care were excluded. Data quality reports indicate high accuracy of ICD-10-CA on separation records.<sup>25</sup>

Patients transferred between facilities have multiple separation records

for the same injury episode. To avoid double-counting, any patient who was discharged and re-admitted to another hospital on the same day was counted as a single episode. For injury hospitalizations with multiple separation records, the ICD codes on the first record were used.

The data represent the number of injury episodes rather than the number of individuals.

**Geozones**

Because the DAD does not contain information on patients’ Aboriginal identity, a geographic method—geozones<sup>8,27</sup>—was used to identify dissemination areas (DAs) with a relatively high percentage of residents who identified as Aboriginal in the 2006 Census. DAs are the smallest geographic unit for which census information is available nationally. They are composed of one or more neighbouring dissemination blocks, with a population of 400 to 700.

This study uses DAs as a proxy for neighbourhoods. Following previous work,<sup>11-13</sup> DAs with less than 33% of residents reporting an Aboriginal identity were classified as areas with a low percentage of Aboriginal identity residents. DAs where at least 33% of residents reported an Aboriginal identity were classified as areas with a high percentage of Aboriginal iden-

tity residents, and then further classified as First Nations, Métis, or Inuit areas based on the predominant Aboriginal group. Only DAs identified as high-percentage First Nations identity or low-percentage Aboriginal identity were retained for this analysis. Residential postal codes on the hospital separation record were used to determine the patient’s DA of residence via the PCCF+.<sup>28</sup> The availability and accuracy of postal codes on separation records was high, with more than 99% of records successfully assigned to a DA. Because hospital separation records for Quebec contain only the first three digits of the postal code, they were excluded from this study.

In most DAs (38,869) in Canada (excluding Quebec), fewer than 33% of residents reported an Aboriginal identity in the 2006 Census. Of the DAs where at least 33% of residents reported an Aboriginal identity, 1,929 were predominantly First Nations. Owing to small populations, global non-response, or incompletely enumerated Indian Reserves, a number of DAs had insufficient census information and were excluded from this analysis. This left 1,288 DAs in high-percentage First Nations areas (total population of 419,699) and 38,700 DAs in low-percentage Aboriginal areas (total population of 23,217,988) in the analysis (Figure 1).

**Table 1**  
**Number and percentage distribution of unintentional injury hospitalizations, by Dissemination Area (DA) Aboriginal identity percentage, age group and sex, Canada (excluding Quebec), 2004/2005 to 2009/2010**

	High-percentage First Nations identity DAs		Low-percentage Aboriginal identity DAs	
	Number	%	Number	%
<b>Total unintentional injury hospitalizations</b>	27,887	100	814,313	100
<b>Age group (years)</b>				
0 to 19	6,665	24	110,824	14
20 to 44	9,516	34	164,875	20
45 or older	11,706	42	538,614	66
<b>Sex</b>				
Male	15,821	57	407,949	50
Female	12,066	43	406,364	50

**Notes:** High-percentage First Nations identity DAs are Dissemination Areas where 33% or more of the total population reported an Aboriginal identity (predominantly North American Indian) on the 2006 Census. Low-percentage Aboriginal identity DAs are those where less than 33% of the total population reported an Aboriginal identity on the 2006 Census.

**Sources:** Discharge Abstract Database 2004/2005 to 2009/2010; 2006 Census of Population.

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In 2006, an average of 80% of residents of high-percentage First Nations areas reported an Aboriginal identity (74% single North American Indian identity, 4% single Métis identity, 0.2% single Inuit identity, and 1% multiple or other Aboriginal identities). An average of 3% of residents of low-percentage Aboriginal areas reported an Aboriginal identity.

### Socio-economic status and remote location

A composite measure of socio-economic status (SES) was chosen to classify DAs as relatively “high” or “low” SES. The Community Well-Being (CWB) Index, devised by Aboriginal Affairs and Northern Development Canada, consists of seven census-based indicators: income

per capita; percentage of population aged 20 or older with at least a secondary school diploma; percentage of population aged 25 or older with at least a university degree; labour force participation and employment among those aged 20 to 65; percentage of population living in crowded conditions; and percentage of population living in dwellings in need of

**Table 2**

**Age-standardized unintentional injury hospitalization rates (ASHR) per 10,000 person-years, high-percentage First Nations identity and low-percentage Aboriginal identity Dissemination Areas (DAs), by age group, sex, and DA socio-economic status and location, Canada (excluding Quebec), 2004/2005 to 2009/2010**

	Total			Ages 0 to 19			Ages 20 to 44			Age 45 or older		
	ASHR	95% confidence interval		ASHR	95% confidence interval		ASHR	95% confidence interval		ASHR	95% confidence interval	
from		to	from		to	from		to	from		to	
<b>High-percentage First Nations identity DAs</b>												
<b>Males</b>												
Low socio-economic status DAs	120.5	118.6	122.4	80.1	77.6	82.6	141.3	137.7	144.9	161.8	157.5	166.2
High socio-economic status DAs	101.0	92.0	111.0	82.9	69.0	99.5	104.6	89.6	122.1	128.5	111.4	148.2
<b>Females</b>												
Low socio-economic status DAs	86.9	85.3	88.6	54.8	52.7	56.9	81.5	78.8	84.2	144.8	140.8	148.8
High socio-economic status DAs	69.5	62.1	77.7	47.7	37.3	61.1	57.6	46.8	70.9	120.9	104.0	140.7
<b>Males</b>												
Inside CMA/CA	99.6	96.5	102.8	70.7	66.2	75.5	113.5	107.9	119.5	130.5	124.2	137.2
Outside CMA/CA with strong/moderate metropolitan influence	116.4	111.0	122.2	77.3	70.4	84.9	131.0	120.7	142.1	164.8	153.0	177.5
Outside CMA/CA with weak/no metropolitan influence	131.4	128.8	134.0	84.5	81.4	87.8	154.7	149.9	159.6	180.4	174.4	186.7
<b>Females</b>												
Inside CMA/CA	66.7	64.3	69.3	42.7	39.2	46.6	63.1	59.1	67.5	109.3	103.8	115.0
Outside CMA/CA with strong/moderate metropolitan influence	75.6	71.4	80.1	51.8	46.0	58.3	58.4	51.8	65.8	138.4	128.3	149.4
Outside CMA/CA with weak/no metropolitan influence	100.9	98.6	103.2	59.8	57.1	62.6	93.9	90.2	97.8	174.9	168.9	181.0
<b>Low-percentage Aboriginal identity DAs</b>												
<b>Males</b>												
Low socio-economic status DAs	54.1	53.8	54.3	43.0	42.6	43.5	54.1	53.7	54.6	73.9	73.4	74.4
High socio-economic status DAs	43.8	43.6	44.1	37.5	37.1	37.9	42.8	42.4	43.1	56.8	56.4	57.2
<b>Females</b>												
Low socio-economic status DAs	34.3	34.1	34.5	23.6	23.3	24.0	23.1	22.8	23.4	67.9	67.5	68.3
High socio-economic status DAs	28.8	28.6	28.9	20.1	19.8	20.4	18.0	17.8	18.2	58.4	58.1	58.8
<b>Males</b>												
Inside CMA/CA	44.0	43.8	44.2	36.1	35.7	36.4	42.7	42.4	43.0	60.3	59.9	60.6
Outside CMA/CA with strong/moderate metropolitan influence	63.8	63.2	64.4	52.0	51.0	53.0	70.3	69.1	71.5	75.3	74.3	76.2
Outside CMA/CA with weak/no metropolitan influence	81.6	80.7	82.5	67.5	66.2	68.9	91.8	90.2	93.4	91.5	90.3	92.8
<b>Females</b>												
Inside CMA/CA	29.2	29.1	29.3	20.0	19.7	20.2	18.5	18.3	18.7	59.8	59.5	60.0
Outside CMA/CA with strong/moderate metropolitan influence	37.7	37.3	38.2	26.6	25.9	27.4	27.6	26.9	28.3	70.2	69.3	71.0
Outside CMA/CA with weak/no metropolitan influence	47.2	46.6	47.8	34.7	33.7	35.7	36.4	35.4	37.3	82.9	81.9	84.1

CMA = census metropolitan area

CA = census agglomeration

**Notes:** Rates are age-standardized to Aboriginal population's age structure. High-percentage First Nations identity DAs are Dissemination Areas where 33% or more of the total population reported an Aboriginal identity (predominantly North American Indian) on the 2006 Census. Low-percentage Aboriginal identity DAs are those where less than 33% of the total population reported an Aboriginal identity on the 2006 Census.

**Sources:** Discharge Abstract Database 2004/2005 to 2009/2010; 2006 Census of Population.

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major repair. The CWB Index combines these indicators into a single score ranging from 0 (low socio-economic level) to 100 (high socio-economic level). Information on the CWB Index, its validation, and its relevance to First Nations populations is available elsewhere.<sup>29,30</sup>

Microdata from the 2006 Census were used to calculate a CWB Index score for each DA. A CWB Index score was also calculated for each province/territory. To compare injury hospitalization rates of DAs with similar socio-economic conditions, DAs were then classified as relatively “high” or “low” SES. Sample size issues precluded the creation of SES terciles or quintiles. To account for variations in socio-economic conditions across Canada, SES levels were constructed within each province/territory. A DA was classified as low (or high) SES if its CWB Index score was below (equal to or above) its provincial/territorial CWB Index median cut-point value. The majority of DAs in high-percentage First Nations identity areas (1,250 or 97%) were classified as low SES; 38 (3%) were classified as high SES. In low-percentage Aboriginal identity areas, 18,650 DAs (48%) were classified as low SES, and 20,050 (52%) were classified as high SES (Appendix Table A).

The remoteness of a DA relative to an urban core was measured using the Metropolitan Influence Zone indicator. This indicator assigns a category to municipalities outside a census metropolitan area (CMA) or a census agglomeration (CA) based on the percentage of the employed population who commute to work in a CMA/CA. A CMA/CA is an area consisting of one or more neighbouring municipalities situated around a major urban core. The majority of DAs in high-percentage First Nations identity areas (831 or 65%) were located outside a CMA/CA with weak or no metropolitan influence; 114 (9%) were outside a CMA/CA with strong or moderate metropolitan influence; and 343 (27%) were inside a CMA/CA. Few DAs in low-percentage Aboriginal identity areas (3,534 or 9%) were located outside a CMA/CA with weak or no met-

ropolitan influence; 4,565 (12%) were outside a CMA/CA with strong or moderate influence; and 30,601 (79%) were inside a CMA/CA (Appendix Table B).

**Statistical analyses**

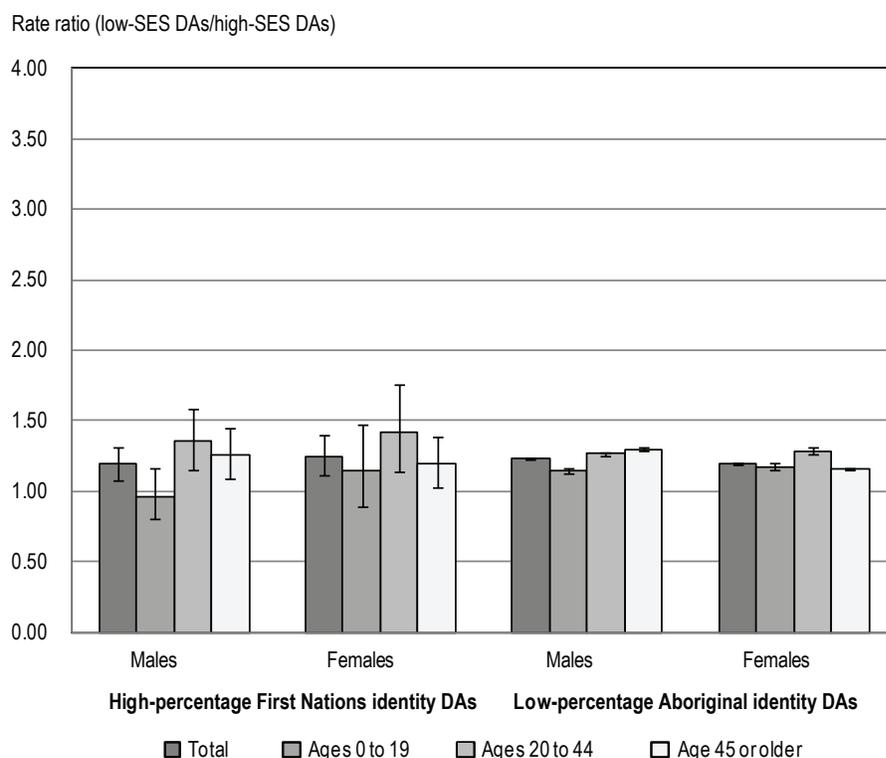
Age-standardized hospitalization rates (ASHRs) for unintentional injury were calculated over the six-year period (2004/2005 to 2009/2010), and were standardized to the age structure of the 2006 Aboriginal identity population in five-year age groups. The denominator used to calculate the rates was from the 2006 Census, which corresponds to the midpoint of the years of hospitalization data, and was multiplied by six to

account for the six years of data. For the small number of DAs that lacked the detailed age and sex data required for age standardization, age and sex were estimated from total population counts or population estimates of incompletely enumerated Indian Reserves.

ASHRs per 10,000 person-years at risk were calculated for three age groups (0 to 19, 20 to 44, and 45 or older), by sex and by selected DA characteristics (SES level and location relative to an urban core) in high-percentage First Nations and low-percentage Aboriginal identity areas.

Four sets of rate ratios (RRs) were calculated. The first set compared rates in low-SES DAs to rates in high-SES

**Figure 2**  
**Rate ratios comparing unintentional injury hospitalization rates in low-SES Dissemination Areas (DAs) with rates in high-SES DAs, by DA Aboriginal identity percentage, age group and sex, Canada (excluding Quebec), 2004/2005 to 2009/2010**



I = 95% confidence interval

SES = socio-economic status

**Notes:** High-percentage First Nations identity DAs are Dissemination Areas where 33% or more of the total population reported an Aboriginal identity (predominantly North American Indian) on the 2006 Census. Low-percentage Aboriginal identity DAs are those where less than 33% of the total population reported an Aboriginal identity on the 2006 Census.

**Sources:** Discharge Abstract Database 2004/2005 to 2009/2010; 2006 Census of Population.

DAs separately for high-percentage First Nations and low-percentage Aboriginal DAs. The second set compared rates in high-percentage First Nations DAs with rates in low-percentage Aboriginal DAs with similar SES. The third set compared rates in urban-core DAs with rates in remote DAs separately for high-percentage First Nations and low-percentage Aboriginal DAs. The fourth set compared rates in high-percentage First Nations DAs with rates in low-percentage Aboriginal DAs with similar location relative to an urban core. All 95% confidence intervals were calculated based on the assumption of log normality.<sup>31</sup> Two rates were considered to differ significantly if their 95% confidence intervals did not overlap.

## Results

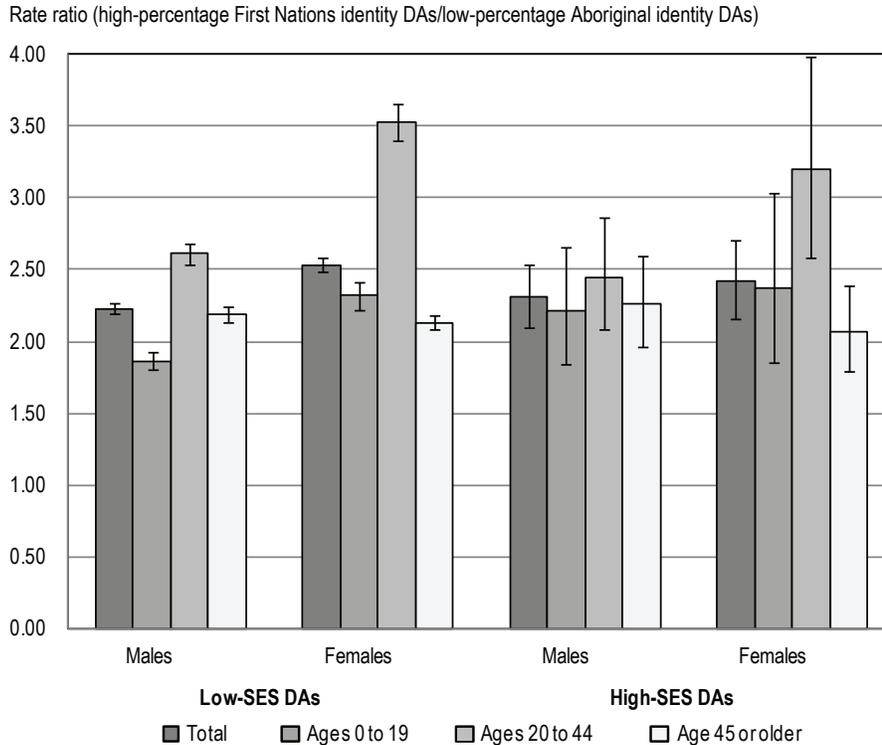
From 2004/2005 through 2009/2010, there were a total of 27,887 hospital separations for unintentional injury among residents of high-percentage First Nations identity areas, and 814,313 among residents of low-percentage Aboriginal identity areas (excluding Quebec). In high-percentage First Nations identity areas, 57% of hospitalizations were for males; 42% were for people aged 45 or older; 34% were for 20- to 44-year-olds; and 24% were for 0- to 19-year-olds. In low-percentage Aboriginal identity areas, 50% of hospitalizations were for males; 66% were for people aged 45 or older; 20% were for 20- to 44-year-olds; and 14% were for 0- to 19-year-olds (Table 1).

## Socio-economic status

Almost without exception, ASHRs for unintentional injury were significantly higher in low-SES DAs, compared with high-SES DAs (Table 2, Figure 2). This was true both for high-percentage First Nations and low-percentage Aboriginal identity DAs. One exception occurred in high-percentage First Nations DAs, where ASHRs for males and females aged 0 to 19 did not significantly differ between high- and low-SES DAs.

When DAs with the same SES were compared, ASHRs in low-SES DAs were 1.9 to 3.5 times greater in high-percentage First Nations identity DAs than in low-percentage Aboriginal identity DAs (Table 2, Figure 3). Trends were similar in high-SES DAs—ASHRs were 2.1 and 3.2 times greater in high-percentage First Nations DAs than in low-percentage Aboriginal DAs. The largest disparity between high-percentage First Nations and low-percentage Aboriginal DAs was among females aged 20 to 44 in low-SES DAs (RR = 3.5).

**Figure 3**  
Rate ratios comparing unintentional injury hospitalization rates in high-percentage First Nations identity Dissemination Areas (DAs) with rates in low-percentage Aboriginal identity DAs, by DA SES, age group and sex, Canada (excluding Quebec), 2004/2005 to 2009/2010



I = 95% confidence interval

SES = socio-economic status

**Notes:** High-percentage First Nations identity DAs are Dissemination Areas where 33% or more of the total population reported an Aboriginal identity (predominantly North American Indian) on the 2006 Census. Low-percentage Aboriginal identity DAs are those where less than 33% of the total population reported an Aboriginal identity on the 2006 Census.

**Sources:** Discharge Abstract Database 2004/2005-2009/2010; 2006 Census of Population.

## Location relative to an urban core

ASHRs for unintentional injuries were significantly higher in remote DAs (outside an urban core with weak or no metropolitan influence) than in urban-core DAs (Table 2, Figure 4) This was true for both high-percentage First Nations and low-percentage Aboriginal identity DAs. This pattern prevailed among all age and sex groups.

Comparisons of similarly located DAs show that ASHRs in remote DAs were 1.3 to 2.6 times greater in high-percentage First Nations identity areas than in low-percentage Aboriginal identity areas (Table 2, Figure 5). As well, ASHRs in urban-core DAs were 1.8 to 3.4 times greater in high-percentage First Nations areas than in low-percentage Aboriginal areas. The widest disparity between high-percentage First Nations and low-percentage Aboriginal identity areas was among women aged 20 to 44 living in urban-core DAs (RR=3.4).

## Discussion

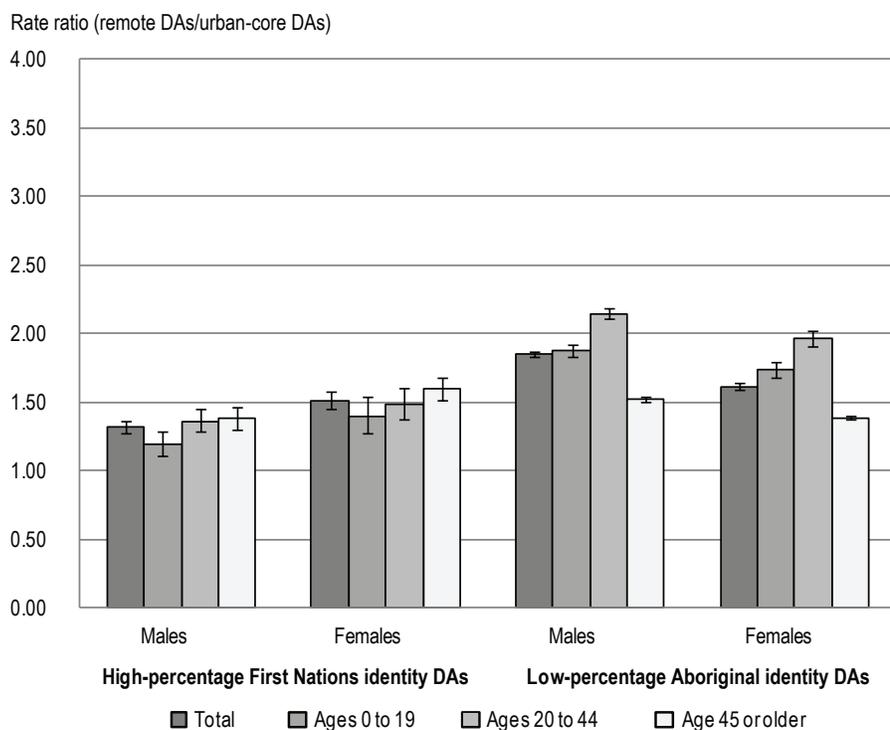
This ecological study uses a geographic approach and national hospital data to describe variations in unintentional injury hospitalization rates based on area SES and location relative to an urban core. Unintentional injury hospitalization rates were higher in DAs with low (rather than high) SES, and in remote rather than urban areas. This was true in both high-percentage First Nations and low-percentage Aboriginal identity areas. These results are consistent with the literature, which shows a socio-economic gradient for many health outcomes including injuries,<sup>14-18</sup> and a difference in exposure to injury risks between urban and rural environments.<sup>1,18,19,20</sup>

However, when DAs with similar SES and location relative to an urban core were compared, the relative risk for unintentional injury hospitalization was greater in those with a high percentage of First Nations identity residents than in DAs with a low percentage of Aboriginal identity residents. This is in line with Carrière et al.,<sup>13</sup> who showed that adjusting for housing conditions and rural location did not entirely eliminate the difference between high- and low-percentage Aboriginal identity DAs for all-cause injury hospitalizations. In the present study, women aged 20 to 44 in high-percentage First Nations identity areas appeared to be at particular risk of unintentional injury hospitalizations in low-SES DAs, and in DAs located inside

an urban core, compared with their counterparts in comparable low-percentage Aboriginal identity areas.

Findings from this study show that SES and remote location accounted for some, but not all, of the differences in unintentional injury hospitalizations between high-percentage First Nations identity and low-percentage Aboriginal identity DAs. Factors not measured in this analysis may play a role in DA-level unintentional injury hospitalization risk. Such factors may include environmental

**Figure 4**  
Rate ratios comparing unintentional injury hospitalization rates in remote Dissemination Areas (DAs) with rates in urban-core DAs, by DA Aboriginal identity percentage, age group and sex, Canada (excluding Quebec), 2004/2005 to 2009/2010



I = 95% confidence interval

**Notes:** High-percentage First Nations identity DAs are Dissemination Areas where 33% or more of the total population reported an Aboriginal identity (predominantly North American Indian) on the 2006 Census. Low-percentage Aboriginal identity DAs are those where less than 33% of the total population reported an Aboriginal identity on the 2006 Census. Remote DAs have weak/no metropolitan influence.

**Sources:** Discharge Abstract Database 2004/2005 to 2009/2010; 2006 Census of Population.

### What is already known on this subject?

- Previous research has shown rates of hospitalization for unintentional injury to be higher in areas with a relatively large percentage of Aboriginal (First Nations, Métis, and Inuit) identity residents, compared with areas with a relatively low percentage of Aboriginal identity residents.
- Few previous area-based studies investigated the role of factors such as SES or remote location that may help explain the elevated injury hospitalization rates in high-percentage Aboriginal identity areas.

### What does this study add?

- Unintentional injury hospitalization rates were, on average, higher in neighbourhoods with lower SES and in the most remote neighbourhoods. This was true in high-percentage First Nations identity and low-percentage Aboriginal identity areas.
- When neighbourhoods with the same SES and location relative to an urban core were compared, the risk of hospitalization due to unintentional injury tended to be greater in high-percentage First Nations identity areas than in low-percentage Aboriginal identity areas.

and behavioural risk factors for injuries<sup>1</sup>, as well as occupational, workplace, and recreational space safety.<sup>15</sup>

## Strengths and limitations

This study fills an important health information gap by investigating associations between DA SES, location relative to an urban core, and hospitalizations due to unintentional injuries in high-percentage First Nations and low-percentage Aboriginal identity areas. The use of six years of hospitalization data and the calculation of hospitalization rates by sex and age group are also notable strengths.

Nonetheless, the results should be interpreted in the context of several limitations. Because individual Aboriginal

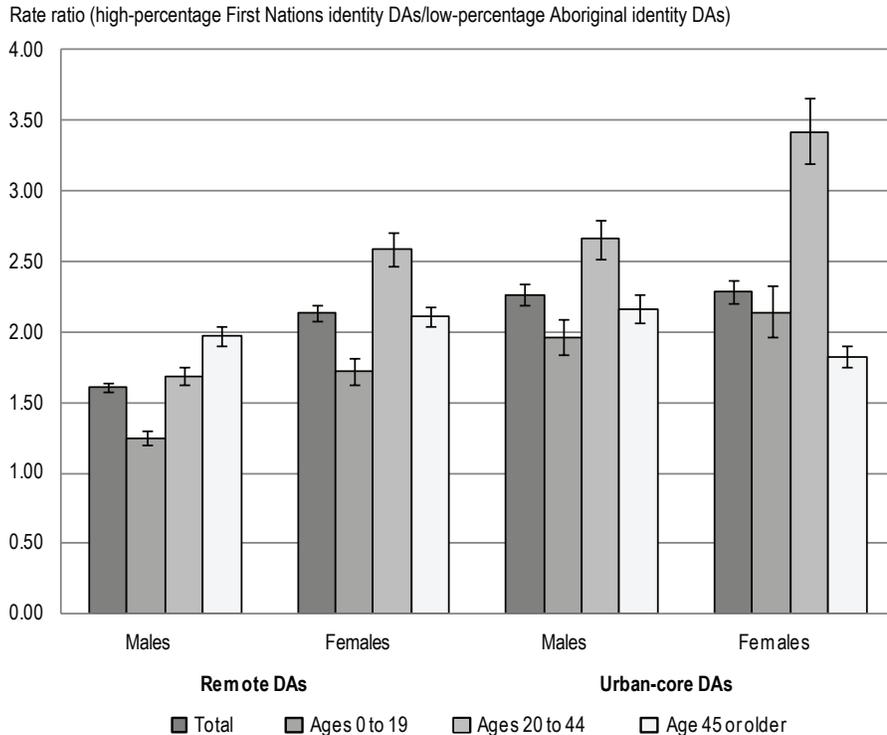
identifiers were not available on hospital records, hospitalizations of Aboriginal people cannot be ascertained. Rather, this is an ecological study reporting results for geographic areas; the associations observed do not necessarily apply at the individual level. Furthermore, the populations of these areas are comprised of Aboriginal and non-Aboriginal identity residents, so the results are not specific to First Nations people but to all residents of those areas. Also, the results cannot be generalized to the First Nations population in Canada, because a portion of this population resides in low-percentage Aboriginal identity areas.

Limitations also stem from the hospitalization data. The data exclude injuries that resulted in death before hospital

admission; people who suffered injuries but did not seek medical care; and individuals presenting to emergency rooms, physicians' offices or clinics. The geographic location where the injury occurred was not available, so the residential postal code was used as a proxy. Assignment of DAs via postal codes is less accurate in rural areas, where residents often use a P.O. box instead of a home address, and a single postal code can span several DAs.<sup>28</sup> Hospital separation records for the province of Quebec were not used in this analysis because they contain only the first three digits of the six-digit postal code.

Other limitations are associated with the DA data. A total of 641 high-percentage First Nations identity DAs and 169 low-percentage Aboriginal identity DAs were excluded from the analysis because of insufficient census information. Sample size and data quality precluded classifying DAs into three or more SES levels; to preserve confidentiality, DAs were dichotomized into high- versus low-SES. Finally, the study included only broad SES indicators at the DA level. Individual-level SES indicators, individual behaviours, and additional area characteristics might have provided a more complete picture, but such measures were not available.

**Figure 5**  
**Rate ratios comparing unintentional injury hospitalization rates in high-percentage First Nations identity Dissemination Areas (DAs) with rates in low-percentage Aboriginal identity DAs, by DA location, age group and sex, Canada (excluding Quebec), 2004/2005 to 2009/2010**



1 = 95% confidence interval

**Notes:** High-percentage First Nations identity DAs are Dissemination Areas where 33% or more of the total population reported an Aboriginal identity (predominantly North American Indian) on the 2006 Census. Low-percentage Aboriginal identity DAs are those where less than 33% of the total population reported an Aboriginal identity on the 2006 Census. Remote DAs have weak/no metropolitan influence.

**Sources:** Discharge Abstract Database 2004/2005 to 2009/2010; 2006 Census of Population.

## Conclusion

This ecological study offers insights into associations between unintentional injury hospitalizations and DA SES and location relative to an urban core in high-percentage First Nations and low-percentage Aboriginal identity DAs. Research is needed to identify other factors contributing to the higher risk of unintentional injury hospitalization in areas with a high percentage of First Nations identity residents. ■

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## Appendix

**Table A**  
**Provincial/Territorial median Community Well-Being (CWB) Index scores and number of Dissemination Areas (DAs) below and above above median, by DA Aboriginal identity percentage and province/territory, Canada (excluding Quebec), 2006**

	Median CWB Index score	High-percentage First Nations identity DAs		Low-percentage Aboriginal identity DAs	
		Below provincial/territorial median CWB Index score (low SES)	Above provincial/territorial median CWB Index score (high SES)	Below provincial/territorial median CWB Index score (low SES)	Above provincial/territorial median CWB Index score (high SES)
Newfoundland and Labrador	73.7	13	0	487	510
Prince Edward Island	78.9	4	0	141	145
Nova Scotia	78.5	29	0	780	809
New Brunswick	77.7	28	0	675	705
Ontario	82.8	173	4	9,318	9,497
Manitoba	79.8	180	3	805	1,029
Saskatchewan	79.3	225	7	776	1,070
Alberta	83.3	121	2	2,475	2,623
British Columbia	82.1	427	12	3,179	3,602
Yukon Territory	82.6	21	2	13	35
Northwest Territories	79.3	29	8	1	25
<b>Total</b>	...	<b>1,250</b>	<b>38</b>	<b>18,650</b>	<b>20,050</b>
<b>Percent (%)</b>	...	<b>97</b>	<b>3</b>	<b>48</b>	<b>52</b>

SES = socio-economic status  
 ... not applicable

**Notes:** High-percentage First Nations identity DAs are Dissemination Areas where 33% or more of the total population reported an Aboriginal identity (predominantly North American Indian) on the 2006 Census. Low-percentage Aboriginal identity DAs are those where less than 33% of the total population reported an Aboriginal identity on the 2006 Census.

**Source:** 2006 Census of Population.

**Table B**  
**Number of Dissemination Areas (DAs) located inside and outside census metropolitan area/census agglomeration (CMA/CA), by DA Aboriginal identity percentage and province/territory, Canada (excluding Quebec), 2006**

	High-percentage First Nations identity DAs			Low-percentage Aboriginal identity DAs		
	Inside CMA/CA	Outside CMA/CA with strong or moderate metropolitan influence	Outside CMA/CA with weak or no metropolitan influence	Inside CMA/CA	Outside CMA/CA with strong or moderate metropolitan influence	Outside CMA/CA with weak or no metropolitan influence
Newfoundland and Labrador	1	6	6	412	245	340
Prince Edward Island	2	1	1	148	116	22
Nova Scotia	12	3	14	977	201	411
New Brunswick	10	2	16	781	378	221
Ontario	28	20	129	16,267	2,067	481
Manitoba	53	11	119	1,290	240	304
Saskatchewan	75	42	115	980	275	591
Alberta	17	6	100	3,835	587	676
British Columbia	138	23	278	5,845	456	480
Yukon Territory	3	0	20	41	0	7
Northwest Territories	4	0	33	25	0	1
<b>Total</b>	<b>343</b>	<b>114</b>	<b>831</b>	<b>30,601</b>	<b>4,565</b>	<b>3,534</b>
<b>Percent (%)</b>	<b>27</b>	<b>9</b>	<b>65</b>	<b>79</b>	<b>12</b>	<b>9</b>

**Notes:** High-percentage First Nations identity DAs are Dissemination Areas where 33% or more of the total population reported an Aboriginal identity (predominantly North American Indian) on the 2006 Census. Low-percentage Aboriginal identity DAs are those where less than 33% of the total population reported an Aboriginal identity on the 2006 Census.

**Source:** 2006 Census of Population.