ORIGINAL ARTICLE

UNINTENTIONAL INJURIES AMONG CHILDREN AND ADOLESCENTS IN ABORIGINAL AND NON-ABORIGINAL COMMUNITIES, NEWFOUNDLAND AND LABRADOR, CANADA

Reza Alaghehbandan 1,2, Khokan C. Sikdar 1,2, Don MacDonald 1,2, Kayla D. Collins 1,2, Annette M. Rossignol 3

1Research and Evaluation Department, Newfoundland and Labrador Centre for Health Information, St. John’s, Canada
2Faculty of Medicine, Memorial University of Newfoundland, St. John’s, Canada
3Department of Public Health, Oregon State University, Corvallis, USA

Received 13 February 2009; Accepted 28 August 2009

ABSTRACT

Objectives. To compare epidemiologic characteristics of unintentional injuries among children and adolescents in Aboriginal and non-Aboriginal communities in the Province of Newfoundland and Labrador (NL), Canada.

Study design. A comparative population-based study of unintentional injuries among individuals 0–19 years was conducted among Aboriginal and non-Aboriginal communities in NL.

Methods. The provincial hospital discharge and mortality data were analyzed for a 6-year period, April 1995 to March 2001. Rates and rate ratios related to hospital discharge and mortality due to unintentional injuries were calculated to assess variation of rates. The 2-independent sample binomial proportion test was used to compare rates between Aboriginal and non-Aboriginal communities.

Results. The overall hospital discharge rates of unintentional injury in Aboriginal and non-Aboriginal communities were 3.0 and 6.0 per 100,000 population, respectively (p<0.001). For both Aboriginal and non-Aboriginal communities, the rate among males was higher than that of females (p<0.001). The mortality rate was found to be higher in Aboriginal communities than non-Aboriginal communities (84.3 vs. 10.2 per 100,000 population) (p<0.001).

Conclusions. The rate of unintentional injury among children and adolescents in Aboriginal communities is higher than non-Aboriginal communities. Sex (male) and place of residence (Aboriginal communities) were strong predictors of unintentional injury in NL.

(Int J Circumpolar Health 2010; 69(1):61-71)

Keywords: unintentional injury, Aboriginal communities, children, Newfoundland and Labrador, Canada
INTRODUCTION

Injury is the most common cause of preventable morbidity and mortality among children and adolescents in North America (1–3). Unintentional injuries, often referred to as accidents, are those for which there is no intent to harm, either from the victim or someone else, and can be preventable. Unintentional injuries cost Canadians more than $8.7 billion per year, of which approximately $4.2 billion is spent on health care, and the remaining $4.5 billion representing loss of productivity associated with disability and premature death (4). In 1999, unintentional injuries cost Atlantic Canada (the Provinces of Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland and Labrador) $1.2 billion in direct and indirect costs or $489 per person (5). In Newfoundland and Labrador, the total cost of unintentional injuries was $213 million ($394 per person) (5). In the U.S. in 2000, injuries to children ages 10 and under resulted in an estimated $5.7 billion in direct medical expenditures, with total costs of more than $12,700 per child (6). Further, among children ages 14 and under, falls account for the largest share of unintentional injury-related costs (31%), followed by motor vehicle occupant injuries, poisonings, and burn injuries (6).

Injury has been found, even in economically developed countries, to disproportionately affect the most marginalized members of society such as Aboriginal people (7). Aboriginal people in Canada are considered to be particularly at risk, and data show increased patterns of injury morbidity and mortality in this population (8). Although intentional injuries have been relatively well studied among the Aboriginal population in Canada, there is a limited body of research examining characteristics of unintentional injuries among this population.

In this study, we employed a population-based approach using administrative health databases to determine and compare epidemiologic characteristics of unintentional injuries among children and adolescents in Aboriginal and non-Aboriginal communities in Newfoundland and Labrador. Findings of this study along with other information can contribute to strategies aiming to reduce childhood unintentional injuries.

MATERIAL AND METHODS

The Province of Newfoundland and Labrador consists of 2 major geographical areas, the island of Newfoundland and the mainland section of Labrador (Figure 1). The island is the easternmost extension of Canada, while Labrador is the most north-easterly coastal region of the Canadian mainland and of continental North America. The province has a population of 505,000 (2006) and encompasses an area of 405,720 km². Labrador comprises 72% of the land area of the province, but makes up only 5% of the population. Most residents of Newfoundland and Labrador are of European descent, but there are also a significant number of Aboriginal people who mainly live in Labrador. The total population in Labrador is 27,765, of which 9,700 (~35%) identified themselves as Aboriginal (2001 census population).

This study is a comparative population-based study of hospitalization and mortality due to unintentional injuries among children and adolescents aged 0–19 years in Aboriginal communities (Innu, Inuit and Métis) in
Aboriginal childhood unintentional injury

Labrador and non-Aboriginal communities in the island portion of the province. Hospital and mortality data over a 6-year period from April 1995 to March 2001 were obtained from the provincial hospital discharge data and the Mortality Surveillance System (MSS), respectively.

Provincial governments in Canada have varying capacities to extract and analyze data on Aboriginal people through their administrative health databases; three provinces (British Columbia, Alberta and Manitoba) specifically identify Aboriginal people in their databases (9). Since provincial administrative databases
Aboriginal childhood unintentional injury

in Newfoundland and Labrador currently do not identify Aboriginal status, the study groups were defined based on information regarding a community’s proportion of its Aboriginal population provided through the 2001 national census data. For the purpose of this study, Innu, Inuit and Métis communities in Labrador with more than 60% Aboriginal population were selected. These communities are historically well-known in Labrador and have predominant Aboriginal populations. Two Innu (Sheshashiu and Davis Inlet [currently Natuashish]), 5 Inuit (Nain, Makkovik, Rigolet, Postville and Hopedale), and 6 Métis (Cartwright, Charlottetown, Mary’s Harbour, Port Hope Simpson, St. Lewis and Division No. 10 – Subdivision B) communities in Labrador comprised the Aboriginal group, while all remaining communities on the island portion of the province, excluding Conne River (the Samiajij Miawpukek First Nation), comprised the non-Aboriginal group. In this study, the average percentage of persons with Aboriginal identity in Aboriginal communities was more than 92%, compared to <5% in non-Aboriginal communities (2001 census population). The total population of children and adolescents aged 0–19 in Aboriginal and non-Aboriginal groups were 2,768 and 133,624, respectively. For the purpose of this study, Innu, Inuit and Métis communities were combined in some parts of the analyses, mainly because of their small numbers. We acknowledge that Innu, Inuit and Métis communities in this study may be different from each other in a number of factors, including access to health care, demographics, health status, as well as in different stages of acculturation with different rates of change in lifestyle. In this study, the 2001 census population data were used to identify the proportion of the Aboriginal population in communities, and the 1998 population estimate data (mid-year study period) were used in corresponding denominators.

Hospital data

Hospital data included age, sex, place of residence and diagnosis code using the International Classification of Diseases, Ninth Revision (ICD-9). Only hospital separations for which the ICD-9 code reflected the “Injury and Poisoning” chapter (E-code) were included. Within this chapter, we did not consider those “injuries” having ICD-9 codes E870–879 (misadventures to patients during surgical and medical care), E929 (late effect of accidental injury), E930-949 (drugs, medicaments and biological substances causing adverse effects in therapeutic use), E959, E969, E977, E989 and E999 (i.e., late effects). We also excluded intentional injuries (E950–E959) from the study. The reliability and validity of the hospital data have been previously documented (10–11).

We considered a number of injuries based on the assumption that a child would be unlikely to have a similar injury within a given time period from the onset of an injury. Consistent with Lestina et al. (12), we included all hospital separations with similar diagnoses codes for which the time interval between hospitalizations for the same injury type was less than 180 days. For example, a child could be hospitalized for the first time at day “0” \( t_0 \) and be hospitalized again at \( t_{32} \), \( t_{128} \) and \( t_{56} \), and, because the time interval between visits was <180 days, all these hospital separations would constitute one
episode. A second child having visits at \( t_0 \) and \( t_{181} \) would be considered as having 2 episodes. This would reduce the number of false injury counts due to the severity of some injuries.

Hospital discharge rates were calculated as the number of injury events requiring hospitalization divided by the corresponding estimated population, multiplied by 100,000. The 1998 Canadian population estimate (children age 0–19 years) for the communities under study was used in the denominator.

**Mortality data**
Mortality data included demographic information and cause of death, which has been coded using both ICD-9 (for years 1995 to 1999) and ICD-10 (for years 2000 onward) codes. ICD-9 codes for the “Injury and Poisoning” chapter (E-code) were included except for the following codes: E870–879 (misadventures to patients during surgical and medical care), E929 (late effect of accidental injury), E930–949 (drugs, medicaments, and biological substances causing adverse effects in therapeutic use), E950–E959 (intentional injuries), E959, E969, E977, E989 and E999 (i.e., late effects). Additionally, ICD-10 codes V01.xx–Y36.xx were used to identify deaths due to unintentional injuries for 2000 to 2001. Complications of medical and surgical care (Y40–Y84), sequelae of external causes of injuries (Y85–Y89) and injuries due to suicide (X60–X84) were excluded.

Mortality rates were calculated as the number of deaths due to unintentional injuries divided by the corresponding estimated population (children age 0–19 years), multiplied by 100,000. The 1998 Canadian population estimate for the communities under study was used in the denominator.

**Statistical analysis**
Age-sex specific hospital discharge rates were derived by dividing the number of annual hospitalizations by the 1998 post-censal population estimates for respective age-sex groups. The injury-related hospital discharge rates were separately derived for children and adolescents living in Aboriginal and non-Aboriginal communities. Injury-related mortality rates among Aboriginal and non-Aboriginal communities were calculated using the number of death events due to unintentional injury following a similar manner used in calculating hospital discharge rates. Hospitalization and mortality rates due to unintentional injury were also calculated for specific injury types and causes.

The 2-independent sample binomial proportion test was used to compare the hospitalization/mortality rates between Aboriginal and non-Aboriginal communities. Rate ratios in terms of hospitalization rates and mortality rates were calculated by dividing the respective rate in Aboriginal communities by that in non-Aboriginal communities. As comparisons between rates may reflect random variation rather than real differences, 95% CIs were calculated to assess the variation in hospitalization/mortality rates. The level of significance was set at 0.05. Comparisons of rates were presented by age-group and sex to observe how these demographic factors can explain the magnitude of injury-related hospitalization and mortality in Aboriginal and non-Aboriginal communities. Analyses were performed using SPSS statistical software (SPSS Inc., Chicago, IL) and SAS (SAS Institute Inc., Cary, NC).

The study was approved by the Human Investigation Committee of Memorial University of Newfoundland.
RESULTS

Hospitalization
The overall hospital discharge rate of unintentional injury in Aboriginal communities was nearly twice that (Rate Ratio [RR] 1.84, 95% CI 1.59–2.13) of non-Aboriginal communities, with annual rates of 1,132.0 and 614.2 per 100,000 population, respectively. Among Aboriginal communities, the hospital discharge rates for Innu, Inuit and Métis communities were 1329.2, 972.1 and 1142.3 per 100,000 population, respectively. The rates of unintentional injuries among Inuit communities was lower than the rate for all Aboriginal communities combined (972.1 vs. 1132.0 per 100,000 population) (p<0.04), while Innu communities had a higher rate of unintentional injuries than all Aboriginal communities combined (1329.3 vs. 1132.0 per 100,000 population) (p=0.02).

The hospital discharge rates of unintentional injuries for both males and females in Aboriginal communities were higher than those for non-Aboriginal communities (for males: 1322.9 vs. 801.1 per 100,000 population, p<0.001; for females: 933.4 vs. 417.5 per 100,000 population, p<0.001). The hospital discharge rate in Aboriginal communities was higher for males than females (1322.9 vs. 933.4 per 100,000, p=0.01). Similar patterns between males and females were found for Inuit communities, whereas no statistically significant difference was observed between males and females in both Innu and Métis communities (Table I).

The hospital discharge rate of unintentional injuries was higher among Aboriginal communities than non-Aboriginal communities in every age category (Table II), increasing with age in both groups. In Aboriginal communities, the rate of hospitalization due to unintentional injury was significantly higher among males than females for age group 10–14 (p<0.001); no significant differences were found between males and females in other age groups (Table III). Males in all age groups in non-Aboriginal communities had higher rates than females of unintentional injury requiring hospitalization (p<0.001) (Table III).

The three leading causes of hospitalization due to unintentional injuries (falls, transportation and “struck by” injuries) in Aboriginal communities accounted for more than 55% of all injury events (Table IV). The hospital discharge rates due to all types of unintentional injuries were higher among Aboriginal communities than non-Aboriginal communities, except for injuries resulting from cutting. The difference between rates of unintentional injuries among Aboriginal and non-Aboriginal groups was particularly evident for burn and poisoning-related injuries, with each being higher among the Aboriginal group (Table IV).

Mortality
In this study, a total of 14 and 82 children died due to unintentional injuries in Aboriginal and non-Aboriginal communities, representing mortality rates of 84.3 and 10.2 per 100,000 population, respectively (p<0.001). Among Aboriginal communities, 42.4% (14/33) of deaths were due to unintentional injuries compared to 23.5% (82/349) for non-Aboriginal communities (p=0.02). In Aboriginal communities, burns (n=7) (42.1 per 100,000 population) were the most common cause of death, whereas transportation (n=40) (5.0 per 100,000 population) and drowning (n=16) (2.0 per 100,000 population) were the leading causes of death in non-Aboriginal communities.
### Table I. Annual rate of childhood unintentional injuries requiring hospitalization among Aboriginal and non-Aboriginal communities by sex, Newfoundland and Labrador.

| Communities  | Male | Female | Total | Male Rate per 100,000 | Female Rate per 100,000 | Total Rate per 100,000 (95% CI) | p-value* |
|--------------|------|--------|-------|-----------------------|-------------------------|---------------------------------|----------|
| Aboriginal   | 112  | 76     | 188   | 1322.9                | 933.4                   | 1132.0 (971.1-1292.9)           | 0.01     |
| Innu         | 39   | 26     | 65    | 1612.9                | 1051.8                  | 1329.2 (1008.3-1650.2)          | 0.08     |
| Inuit        | 41   | 21     | 62    | 1272.5                | 665.4                   | 972.1 (731.3-1212.9)            | 0.01     |
| Métis        | 32   | 29     | 61    | 1132.3                | 1153.5                  | 1142.3 (857.3-1427.4)           | 0.94     |
| Non-Aboriginal| 2933 | 1631   | 4924  | 801.1                 | 417.5                   | 614.2 (597.1-631.3)             | <0.001   |

* Comparing rates between males and females within each group.

### Table II. Age-specific rate of childhood unintentional injury requiring hospitalization among Aboriginal and non-Aboriginal communities, Newfoundland and Labrador.

| Age group (year) | Aboriginal communities | Non-Aboriginal communities | Rate Ratio (95% CI) |
|------------------|-------------------------|-----------------------------|---------------------|
|                  | No. | Rate/100,000 | No. | Rate/100,000 | |
| 0-4              | 39  | 1014.0       | 887 | 569.0        | 1.78 (1.30-2.45) |
| 5-9              | 40  | 842.8        | 975 | 520.7        | 1.62 (1.18-2.22) |
| 10-14            | 50  | 1167.1       | 1393| 639.5        | 1.83 (1.38-2.42) |
| 15-19            | 59  | 1580.9       | 1669| 693.1        | 2.28 (1.76-2.95) |
| Total            | 188 | 1132.0       | 4924| 614.2        | 1.84 (1.59-2.13) |

### Table III. Age- and sex-specific rate of childhood unintentional injury requiring hospitalization among Aboriginal and non-Aboriginal communities, Newfoundland and Labrador.

| Age group (year) | Aboriginal communities | Non-Aboriginal communities | p-value |
|------------------|-------------------------|-----------------------------|---------|
|                  | Male (n) | Female (Rate) | Male (Rate) | Female (Rate) | Male (Rate) | Female (Rate) |         |
| 0-4              | 17       | 22 | 848.3 | 1194.4 | 0.27 | 511 | 376 | 635.0 | 498.6 | <0.001 |
| 5-9              | 25       | 15 | 1057.5 | 629.7 | 0.10 | 609 | 366 | 633.7 | 401.7 | <0.001 |
| 10-14            | 37       | 13 | 1713.0 | 612.1 | <0.001 | 962 | 431 | 863.4 | 405.0 | <0.001 |
| 15-19            | 33       | 26 | 1702.8 | 1449.3 | 0.52 | 1211 | 458 | 984.2 | 389.0 | <0.001 |

### Table IV. Causes of childhood unintentional injury hospitalization among Aboriginal communities and non-Aboriginal communities, Newfoundland and Labrador.

| Cause of injury | Aboriginal communities | Non-Aboriginal communities | Rate Ratio (95% CI) |
|-----------------|------------------------|-----------------------------|---------------------|
|                 | n | Rate/100,000 | n | Rate/100,000 |         |
| Falls           | 53 | 319.1        | 1516 | 189.1        | 1.69 (1.28-2.22) |
| Transportation  | 46 | 277.0        | 1271 | 158.5        | 1.75 (1.30-2.34) |
| Struck by       | 26 | 156.6        | 761 | 94.9         | 1.65 (1.12-2.44) |
| Burns           | 14 | 84.3         | 152 | 19.0         | 4.44 (2.57-7.69) |
| Poisoning       | 13 | 78.3         | 286 | 35.7         | 2.19 (1.26-3.82) |
| Cut/pierce      | 6  | 36.1         | 263 | 32.8         | 1.10 (0.49-2.47) |
ABORIGINAL CHILDHOOD UNINTENTIONAL INJURY

DISCUSSION

While there is a general consensus that Aboriginal people in Canada have a greater need for health care services than other Canadians, the evidence to support this is often limited to mortality (7,8,13). There is a lack of documented evidence to enable a comparison of the health status of Aboriginal and non-Aboriginal populations through a summary measure of both mortality and morbidity outcomes. The use of both mortality and hospital data to investigate epidemiologic characteristics of severe unintentional injuries among children and adolescents presented unique opportunities for this study team.

We found that children and adolescents in Aboriginal communities had nearly a twofold higher rate of unintentional injuries requiring hospitalization compared to non-Aboriginal communities. An injury requiring hospitalization in a remote community may be different than in an urban community. In this study, most of the Aboriginal communities located in Labrador are difficult to access by road, and many do not have any local health care centres. As a result, many residents of these communities have to be airlifted to the nearest hospital when they require medical attention. As well, a child and his/her parent (if one is able to accompany the child) would be less likely to be treated as an outpatient when accommodations have been arranged in a hostel to accommodate the patient/family travelling for treatment to the health centre. These factors may have led to higher rates of hospitalization in Aboriginal communities in this study.

One of the important findings of this study was that the rate of childhood unintentional injuries was higher for Innu communities than both the Inuit and Métis communities, suggesting that not all Aboriginal groups are affected by injury to the same extent. In Manitoba, injury hospitalization rates among First Nations peoples were found to be three times that of the provincial average, while in Saskatchewan, First Nations children had the highest rates of hospitalization due to injuries (14). In this study, males in Innu, Inuit and non-Aboriginal communities had higher rates of unintentional injuries than females, which may reflect gender stereotypes that influence behaviour patterns (14–17).

Although the distribution of unintentional injury hospitalizations within Aboriginal communities is similar to the overall pattern on the island portion of the province (i.e., non-Aboriginal group), the rates of injuries were significantly higher in Aboriginal communities. Falls, transportation and “struck by” injuries accounted for the majority of the cases of severe unintentional injuries in both populations. A similar pattern was observed among the First Nations population in Saskatchewan during 1990–1991 to 2001–2002 (18).

In this study, the hospital discharge rate due to burn injury was six times higher for Aboriginal communities than non-Aboriginal communities. Data from Manitoba showed that in 1996–1997, the hospitalization rate due to burn injuries was four times higher for First Nations peoples compared to the general Manitoba population (0.8 vs. 0.2 per 1,000 population) (14). A study among children admitted with burns to a large tertiary care hospital in Winnipeg found that Aboriginal people were disproportionately admitted, accounting for almost half (48%) of all admissions, even though the area had an Aboriginal population of less than 15% (14,19).
Similar to hospital trends, mortality rates due to unintentional injuries among Aboriginal communities was significantly higher than non-Aboriginal communities. One of the important findings of this study was that, unlike hospitalization, the mortality profile of childhood unintentional injuries among Aboriginal communities differ from the non-Aboriginal group. Burns and firearm-related injuries were found to be the most frequent causes of death due to unintentional injuries in Aboriginal communities, while transportation-related injuries were the leading cause of mortality in non-Aboriginal communities. Burn injury was the leading causes of death in Aboriginal communities (age 0–19), while transportation-related injury was found to be the most frequent cause of death in non-Aboriginal communities. Among Aboriginal communities, 42.4% of deaths were due to unintentional injuries compared to 23.5% for non-Aboriginal communities. Among the First Nations people of British Columbia, 28% of deaths were due to injury compared to 7.6% for the province as a whole during 1991–1998 (14). This may reflect social, environmental and cultural differences between the 2 populations. This finding may also be related to the fact that non-Aboriginal communities in this study were located in both urban and rural areas, whereas all Aboriginal communities were located in rural areas in Labrador, most of them in remote areas. Resultant differences were found not only in social, environmental and cultural factors but also in access to health care services, particularly trauma services. The existing literature supports this finding that epidemiologic characteristics of injuries may be different between urban and rural areas (20–23).

In the mid-1990s, the injury death rate among First Nation infants was almost four times higher than that of the total Canadian population (63.0 vs. 17.0 per 100,000) (14,20). It was more than five times higher in preschoolers (83.0 vs. 15.0), and more than three times higher in teenagers between the ages of 15 and 19 (176.0 vs. 48.0) (14,24). Our findings showed that young children (0–4 years) in Aboriginal communities had a higher mortality rate due to unintentional injuries, particularly burn injuries. It has been reported that almost one-third of all deaths due to burn injuries in the Aboriginal population occur among children younger than 14 years, compared to an average of 16% in the total Canadian population (14). Trends in First Nations mortality show that, although death due to burn injuries decreased by 44%, it increased among infants (14). Firearm-related injuries were the second leading cause of mortality in Aboriginal communities, particularly among adolescents. This may be attributed, in part, to easy access to firearms in these communities. The hunting lifestyle increases the risk of injuries due to firearms in Aboriginal communities as well.

Although there have been major improvements in reducing injury rates among Aboriginal people in Canada, the rates of unintentional injuries in Aboriginal communities remain high relative to non-Aboriginal communities. Reasons for the high rates of unintentional injuries among Aboriginal communities are multifactorial. It has been suggested that the rapid change in lifestyle may be one of the most important factors, although the extent of this change is not fully understood (25). Other possible explanations include isolated communities, physical environment, crowded and
dilapidated housing conditions, lifestyle and poor social conditions (25). Access to, and availability of, health care facilities is limited compared with non-Aboriginal communities. The lack of roads makes travel by snowmobile or ATV a necessity. Although investigating the causes for high rates of unintentional injuries is not in the scope of this study, our findings can be used as a foundation for future studies investigating risk factors and causes of unintentional injuries at the community level.

This study faced some limitations. First, since the hospital discharge database does not contain Aboriginal identity, the place of residence and the proportion of Aboriginal population in a community were considered in order to define the study populations. Secondly, population-based administrative database research is highly generalized, as the data are limited in clinical detail. Given that the hospital discharge database does not contain information on most related risk factors of injuries, such as socio-economic and lifestyle factors, we were not able to study these factors at the individual level. Thirdly, we did not study those cases with less severe injuries that were treated as outpatients or may never have sought care. Fourthly, small Aboriginal populations in this study may present a sampling bias (not stable rates). Fifthly, the criteria used in this study to define Aboriginal group may have excluded communities in Labrador that had a smaller proportion of Aboriginal people. Sixthly, variations in access to health care for Aboriginal communities may lead to differences in rate of unintentional injuries requiring hospitalization, which may not be based on clinical criteria alone. Finally, Innu, Inuit and Métis communities were combined in some parts of the analyses, although we acknowledge that Innu, Inuit and Métis communities are different from one another.

In conclusion, hospitalization and mortality rates due to unintentional injuries are higher in Aboriginal communities compared to non-Aboriginal communities. The rate of childhood unintentional injuries was higher for Innu communities than Inuit and Métis communities, suggesting that not all Aboriginal groups are affected by injury to the same extent. Sex (male) and place of residence (Aboriginal communities) were strong predictors of unintentional injury in NL. The distribution of unintentional injury hospitalizations within Aboriginal communities is similar to the overall pattern in the non-Aboriginal group, with falls and transportation injuries accounting for the majority of the cases of severe unintentional injuries in both populations. Risk factors for severe unintentional injuries need to be better understood in order to implement interventions that can reduce the incidence and burden of injury in this population.

Acknowledgements

We would like to thank all the staff at the Newfoundland and Labrador Centre for Health Information, particularly Mrs. Rosalie Haire, Health Information Management Consultant, Mr. Neil Gladney, Epidemiologist, and Ms. Heather Watkins, Research Analyst, for their valuable assistance throughout the study. This work was presented at the Community Health Research in Labrador: Listening, Learning, and Working Together in Happy Valley-Goose Bay, NL, Canada (16–18 May 2006) and the Canadian Public Health Association 97th Annual Conference in Vancouver, BC, Canada (28–31 May 2006).
REFERENCES

1. Laupland KB, Kortbeek JB, Findlay C, Hameed SM. A population-based assessment of major trauma in a large Canadian region. Am J Surg 2005 May;189(5):571–575.

2. Airey CM, Chell SM, Rigby AS, Tennant A, Connelly JB. The epidemiology of disability and occupation handicap resulting from major traumatic injury. Disabil Rehabil 2001 Aug;23(12):509–515.

3. Demetriades D, Murray J, Sinz B, et al. Epidemiology of major trauma and trauma deaths in Los Angeles County. J Am Coll Surg 1998 Oct;178(4):373–383.

4. Herbert M. The Economic Burden of Unintentional Injury in Canada [Internet]. Public Health Agency of Canada; 2009 [cited 2009 Feb 2]. Available from: http://www.phac-aspc.gc.ca/injury-bles/ebuic-febnc/.

5. Albert T, Cloutier E. The economic burden of unintentional injury in Atlantic Canada. Atlantic Network for Injury Prevention (ANIP); 2003. 61 p.

6. National SAFE KIDS Campaign (NSKC). Childhood Injury Fact Sheet [Internet]. Washington (DC): NSKC; 2004 [Cited 2009 June 2]. Available from: http://www.USA.safeKids.org/tier3_cd.cfm?folder_id=540&content_item_id=1030.

7. Cass A. Health outcomes in Aboriginal populations. CMAJ 2004 Sep;171(6):597-598.

8. Tookenay VF. Improving the health status of aboriginal people in Canada: new directions, new responsibilities. CMAJ 1996 Dec;155(11):1581–1583.

9. Health Canada, First Nations and Inuit Health Branch. Statistical profile on the health of First Nations in Canada. Ottawa: Health Canada; 2003. 54 p.

10. Williams JI, Young W. A summary of studies on the quality of health care administrative databases in Canada. In: Goel V, Williams JI, Anderson GM, Blackstien-Hirsch P, Fooks C, Naylor CD, editors. Patterns of health care in Ontario, the ICES Practice Atlas. Ottawa: Canadian Medical Association; 1996. p. 341–342.

11. Hwang SW, Agha MM, Creatore MI, Glazier RH. Age- and sex-specific income gradients in alcohol-related hospitalization rates in an urban area. Ann Epidemiol 2005 Jan;15(1):56–63.

12. Lestina DC, Miller TR, Smith GS. Creating injury episodes using medical claims data. J Trauma 1998 Sep;45(3):565–569.

13. Karmali S, Laupland K, Harrop AR, et al. Epidemiology of severe trauma among status Aboriginal Canadians: a population-based study. CMAJ 2005 Apr;172(8):1007–1011.

14. Unintentional and Intentional Injury Profile for Aboriginal People in Canada [Internet]. Community Health Programs Directorate, First Nations and Inuit Health Branch: Health Canada; 2001 [cited 2009 Feb 2]. Available from: http://www.hc-sc.gc.ca/fniab-spni/alt_formats/fnihb-dgsnp/pdf/pubs/injury-bless/2001_trauma-eng.pdf

15. Soubhi H, Raina P, Chong M, et al. Unintentional injuries in British Columbia: trends and patterns among children and youth 1987-1996 [Internet]. B.C. Injury research and prevention unit; 1999 [cited 2009 Feb 2]. Available from: http://www.injuryresearch.bc.ca/Publications/Reports/Child%20and%20Youth%20Rep%20info/pdf/1999_Youth.pdf

16. Agran PF, Winn D, Anderson C, Trent R, Walton-Haynes L. Rates of pediatric and adolescent injuries by year of age. Pediatrics 2001 Sep;108(3):E45.

17. Spady DW, Saunders DL, Schopflocher DP, Svenson LW. Patterns of injury in children: a population-based approach. Pediatrics 2004 Mar;113(3 Pt 1):522–529.

18. Prettyshield K, Johnson K. Injury morbidity in the First Nations population of S askatchewan 2005. Canadia

19. Hwang HC, Stallones L, Keefe TJ. Childhood injury deaths: rural and urban differences, Colorado 1980–8. Inj Prev 1997 Mar;3(1):35–37.

20. Boland M, Staines A, Fitzpatrick P, Scallan E. Urban-rural variation in mortality and hospital admission rates for unintentional injury in Ireland. Inj Prev 2005 Feb;11(1):38–42.

21. Hwang HC, Stallones L, Keefe TJ. Childhood injury deaths: rural and urban differences, Colorado 1980–

22. Kmet L, Macarthur C. Urban-rural differences in motor vehicle crash fatality and hospitalization rates among children and youth. Accid Anal Prev 2006 Jan;38(1):122–127. Epub 2005 Aug 31.

23. Zwerling C, Peek-Asa C, Whitten PS, Choi SW, Sprince NL, Jones MP. Fatal motor vehicle crashes in rural and urban areas: decomposing rates into contributing factors. Inj Prev 2005 Feb;11(1):24–28.

24. MacMillan HL, MacMillan AB, Offord DR, Dingle JL. Aboriginal health; review. CMAJ 1996 Dec;155(11):1569–1578.

25. Saylor K. Injuries in Aboriginal children. Paediatr Child Health 2004;9(5):312–314.

Reza Alaghehbandan, MD
Research and Evaluation Department
Newfoundland and Labrador Centre for Health Information
St. John’s, NL A1B 2C7
CANADA
Email: reza.alaghehbandan@nlchi.nl.ca