The following is a presentation of the detailed findings by the four countries represented in this review: Australia, Canada, New Zealand and the United States. The core publication is available at: Primary Care Provider https://www.ihs.gov/provider/includes/themes/newihstheme/display_objects/documents/2010_2019/PROV0816.pdf

**FINDINGS BY COUNTRY**

Findings from the review showed that falls are the leading cause of injury for older adults in indigenous communities - a pattern also found among non-indigenous elderly. The 34 articles reviewed provide information on incidence and prevalence (n= 24) and fall prevention and related risk factors (n= 10). Summaries of the findings sorted by country are in Tables 1-4.

Most articles reporting falls incidence and prevalence used the International Classification of Diseases (ICD) data. A variety of ICD versions were used, including ICD-9 [16, 17, 18, 19] and ICD-9-Clinical Modification (CM), [20, 21, 22, 23, 24] the newer ICD-10 [25, 26, 27] and ICD-10-Australian Modification (AM) [28, 29, 30] One study used both ICD-9 and -10 [16] as their data bridged the transition date from ICD-9 to ICD-10. Due to variations in ICD versions, reference populations, age ranges and morbidity and mortality topics, few direct comparisons can be made. In eight studies, data other than ICD coding were used, including hospital records and primary research data. Four of these articles examined the rate of falls among a specific population, such as older indigenous people with a chronic disease. [12, 31, 32, 33] The other four studies examined fall-related injury and mortality patterns. [11, 34, 35, 36] All the studies on incidence and prevalence reported three outcome measures: falls, fall-related injuries and fall-related mortality. The following is a synthesis of the findings by the country, followed by a discussion of similarities and differences of falls and prevention among indigenous older adults across the countries.

## Australia

Eleven papers were specific to Australia (Table 1). These articles described incidence and prevalence (n=9) and fall prevention (n=2).

Table 1

| **Australia** | | | |
|---|---|---|---|
| **Author (Year)** | **Country (Region) and Sample** | **Method Related to Falls** | **Key Fall-related Findings for Indigenous Population** |
| Clapham *et al*. (2006)<br><br>25 | Australia (New South Wales)<br>Aboriginal and Torres Strait Islander peoples within NSW population<br>Injury-related mortality (n=10,037), 1999 to 2002; injury-related hospitalizations (n=566,791), 1999 to 2003.<br>All ages. | Retrospective study – secondary data analysis (ICD-10) by age group and Indigenous status. Data presented are for falls all ages and all injury by age group. | *Fall-related mortality, all ages* Indigenous : n=8, rate*[1] = 1.67, Non-Indigenous : n=904, rate* = 3.38, RR (95% CI) =0.44 (0.22-0.88)<br>*All injury types mortality by older age:*<br>1. 45-65: Indigenous : n=38, rate* = 63.62; Non-Indigenous : n=1956, rate* = 35.78; RR (95% CI) = 1.78 (1.29-2.45)<br>2. 65+: Indigenous: n=13, rate* = 97.48; Non-Indigenous: n=3164, rate* = 104.04; RR (95% CI) = 0.94 (0.54-1.62)<br>*All injury hospitalizations:*<br>1. 45-65: Indigenous : n=1653, rate* = 2767.55; Non-Indigenous : n=98336, rate* = 1798.96; RR (95% CI) = 1.54 (1.47-1.61)<br>2. 65+: Indigenous : n=507, rate* = 3801.74; Non-Indigenous : n=150213, rate* = 4939.16; RR (95% CI) = 0.77 (0.71-0.84) |
| Elliott (2002)<br><br>38 | Australia (Shoalhaven)<br>Aboriginal Elders who are residents of Rose Mumbler Retirement Village, North Nowra. | Report on the impetus and overview of Aboriginal Elders Water-based Exercise, program run from Dec 2001–Feb 2002. | Historic data showed that between "1996 to 1998…the most common cause of injury-related hospital separations among Aboriginal Shoalhaven residents were falls" (p. 12).<br>"Water-based exercise programs are an effective means of fall prevention as they address many of the falls risk factors" (p. 13). |
| Government of Western Australia (2010)<br><br>37 | Australia (Western Australia) | Report (program summary) – "Fall Prevention for Aboriginal People – A tool for Aboriginal Health Workers and Aboriginal Communities" | "Among Aboriginal people, one in three people aged over 45 years will fall at least once per year" (p. 4).<br>Components of the *Stay On Your Feet* fall prevention program "may be more specific to Aboriginal people": physical activity, health factors (diabetes, kidney disease, cardiovascular disease), eye health, foot care and safe footwear, nutrition, hazards around the home (p. 5). |

[1] * Rate per 100,000 population of applicable study reference population.

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| Helps & Harrison (2004)<br><br>26 | Australia<br>Aboriginal and Torres Strait Islander people injury mortality. 1997 – 2000. All ages. | Retrospective study – secondary data analysis of Australian Bureau of Statistics mortality database including by age and ethnicity (ICD-10). | Fall-related mortality for all ages (n=46): rate*=5.1.<br>"Falls were most common as a cause of death in old age [60+]" (p. 17).<br>"Most cases of this type of fatal injury occur in the later years of life" (p. 37). |
| Helps & Harrison (2006)<br><br>28 | Australia<br>Aboriginal and Torres Strait Islander people injury morbidity. 2000-02. All ages. | Retrospective study – secondary data from the Australian Institute of Health and Welfare National Hospital Morbidity Database (ICD-10), including by age and ethnicity. | Rate patterns for fall-related hospital separations are higher for indigenous males and females ages 45-64 compared to other Australian males and females, but this reverses after age 65+ when rates for other Australia older adults exceed those of the indigenous populations. Rates for fall injury hospitalizations rise sharply after age 65 for males and females of both groups. |
| Irie *et al*. (2010)<br><br>29 | Australia (Queensland)<br>Aboriginal and/or Torres Strait Islander severe injury hospitalizations (n=38,036), 2003-2005. All ages. | Retrospective study – secondary data from ICD-10 Australia Modification, by Indigenous status. | Among age 40-64, falls from a height of <1m were the leading cause of injury hospitalization for both indigenous and non-indigenous people. Indigenous persons age 40-64 were more likely to experience injury-related mortality (OR=3.0, 95% CI 1.6-5.5, p<0.001) than their non-indigenous counterparts. |
| Jamieson *et al*. (2007)<br><br>30 | Australia<br>Australians age 60 years and older (including indigenous people). Study period 1998/99 to 2004/05. | Retrospective study – secondary data of hospitalized head injury (ICD-10-AM), including by age group and indigenous status, from Australian Institute of Health and Welfare Hospital Morbidity Database. | 81.4% of all head injury (open wound, superficial injury, intracranial injury and fracture) admissions were due to falls. Over 6 years, there were 1,226 head injury hospital separations for indigenous persons age 60+ (rate* = 1,517.3, 95% CI = 1,497.8, 1,536.9). For non-indigenous persons age 60+ there were 163,000 (rate = 716.2, 95% CI = 716.1-716.3). For indigenous people aged 60+, the adjusted (age, sex, urban/rural location) incidence RR = 1.67 (95% CI = 1.57, 1.77) compared to the non-indigenous reference population. |

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|---|---|---|---|
| LoGiuduce (2010)<br><br>12 | Australia (Kimberley)<br>Indigenous men and women ≥ 45. Study period July 2004 – August 2006. | Prospective cross-sectional study – cross-sectional semi-purposeful data collection of sample population (n=363). Self or informant reported falls. | In sample, 31% (n = 113) reported experiencing a fall and 12% (n = 43) reported a fall-related injury. "The odds of falling increased with: poor mobility; drinking alcohol; stroke; epilepsy; head injury; and poor hearing" (p. 7-8). |
| MacIntosh (2001)<br><br>36 | Australia (Cairns)<br>Aboriginal and Torres Strait Islander (ATSI) people admitted to Cairns Base Hospital with diagnosis of hip fracture. Data period November 1997 – July 2000. | Retrospective study – secondary analysis of sample data (n=15). | ATSI hip fractures all due to falls (n=15). Mean age ATSI females = 88; mean age ATSI males =73.7. ATSI patients with ≥ 3 comorbidities: n = 14. "Age-standardised rates per 10,000 people (against the whole Queensland population in the 1996 census) for the indigenous population are 30 and 13 (females and males, respectively) compared with 30 and five for the non-indigenous population (both [study] hospitals)" (p. 129) |
| Peel (2011)<br><br>11 | Worldwide (including all study countries) | Literature review - epidemiology of falls in older people, including by ethnicity. | "For the Indigenous population, which comprises 0.5% of older Australians, the effect of an increasing rate of falls with age is observed from an earlier age for Aboriginal and Torres Strait Islander people than for other Australians. Deaths due to falls are 2½ x higher in this population than for non-Indigenous people" (p. 13). |
| Smith *et al*. (2010)<br><br>33 | Australia (Kimberley region)<br>Aboriginal Australians age 45 years and older (n=363), selected through semi-purposeful sampling. | Retrospective study – secondary analysis of participant and informant reports and medical records examined for dementia status, including fall-related head injury as a risk factor for dementia. | Among sample with dementia (n=45), 20 (44%) had experienced fall(s). From the total sample (dementia and no dementia; n=363), 113 (31%) had experienced fall(s). Falls were associated with the dementia sample, with an odds ratio of 2.7 (95%CI 1.2, 6.1). |

Incidence and Prevalence

Papers that examined the incidence and prevalence showed that the risk of falls and related injuries were similar to the non-indigenous population. For fall-related hospitalizations, hip fracture hospitalization rates among Aboriginal and Torres Strait Islander (ATSI) people were similar to non-indigenous Australians. [36] In addition, a study found that among those aged 45-64, falls from a height of less than one meter were the leading cause of injury hospitalization (for both indigenous and non-indigenous). The incidence of community dwelling aboriginal seniors experiencing a fall is 31%, [12] with higher incidence among those with dementia of 44% [33] – both comparable to Australian studies in the non-indigenous populations. Among persons aged 60 years and older hospitalized for a head injury, indigenous patients had a relative risk of 1.67 compared to those who identified as non-indigenous. [30] Furthermore, another study found TBI rates were higher among indigenous people aged 45-64 compared to the non-indigenous population. [28]

With regard to fall-related mortality rates, Peel [11] found that deaths due to falls among indigenous peoples (all ages) were 2.5 times higher than the non-indigenous Australian population. In another retrospective study by Helps et al., [28] falls were a common cause of mortality for both groups up until the age of 65, where there is a decline in rates for indigenous elderly. Another study contradicted this finding and concluded that the fall-related mortality rate for all ages was in fact lower among indigenous people, with a risk ratio of 0.44. [25]

Prevention

Two papers discussed fall prevention programs specific to indigenous elderly people. A report by the Government of Western Australia [37] highlighted that falls were an important and preventable issue for Aboriginal people age 45 years and older. It describes the 'Stay on Your Feet Program' for Aboriginal health workers and community members. [37] Elliott [38] describes a water-based exercise program for indigenous older adults in Australia. The effectiveness of this program is yet to be evaluated. [38]

**Canada**

Six papers were specific to Canada (Table 2). They described incidence and prevalence (n=3), and fall prevention and related risk factors (n=3).

Table 2

| Canada | | | |
|---|---|---|---|
| **Author (Year)** | **Country (Region) and Sample** | **Method Related to Falls** | **Key Fall-related Findings for Indigenous Population** |
| Barss (1998) 39 | Canada (Quebec) Secondary data from study of Cree people hospitalized for injuries, 1982-1992. | Report – opinion papers | 20% of all injury-related hospitalizations were for falls (p. 2). Author speculates that rates are lower than the general population of urban seniors as "older Cree who are physically active may have stronger bones…" (p. 2). |
| Health Canada (2001) 34 | Canada Aboriginal people 1990-1999. | Report (epidemiological summary) – injury profile, including unintentional falls for aboriginal people in British Columbia (B.C.). | The age-standardized mortality rate from falls for Status Indians in B.C. was almost 3 times the provincial average over 1991-1998 (23 versus 8 for the provincial average). Among Status Indians, 59% of victims were male; the comparable proportion for B.C. as a whole was 47% (p. 12). |
| Leslie (2004) 22 | Canada (Manitoba) First Nations people aged 20 and older (n = 32,692), relevant sub-sample age ≥ 40 (n= 10,743). Analysis period April 1, 1987 – December 31, 1999. | Retrospective case control study – secondary analysis of sample Manitoba administrative health database (ICD-9-CM) for fracture incidence and risk. Each case was matched with 3 non-First Nations controls of same sex and year of birth. | Males: hip fracture rates increase from approx. rate of ~2 fractures per 1000 person-years at age 65 to ~20 per 1000 person-years at age 87, among First Nations, versus rates of ~1 fracture at age 65 to ~11 fractures among non-First Nations males.<br><br>Females: hip fracture rates increase from approx. rate of ~2 fractures per 1000 person-years at age 55 to ~22 per 1000 person-years at age 87, among First Nations, versus rates of ~1 fracture at age 55 to ~25 fractures among non-First Nations females. |
| Office of the Provincial Health Officer (2009) 31 | Canada (British Columbia) Status Indian population. Analysis of period 2004-2005 and 2006-2007. | Report (epidemiological summary) – secondary data from the Medical Services Plan (MSP) and Discharge Abstract Database (DAD) records, including falls among Status Indians. | "The Status Indian population was almost twice as likely to experience a fall as other residents" (rate of 598 versus 336)" (p.181). |
| Reading *et al*. (2011) 41 | Canada Aboriginal Elders | Report (summary) – "Healthy Aging through Fall Prevention Among Older Aboriginal People: From Many Voices to a Shared Vision". | Exploring fall prevention among older aboriginal people, including knowledge translation in aboriginal health, the importance of incorporating many voices and perspectives into a shared vision, and building momentum through dialogue, partnerships and action. |
| Salmon (2006) | Canada | Report (summary) – research | Older aboriginal women are over-prescribed benzodiazepines. |

| | | | |
|---|---|---|---|
| 40 | Aboriginal senior women | and literature summary exploring benzodiazepine use among aboriginal senior women. | "Benzodiazepines have a well-established link to fall-related injuries among seniors" (p. 7). |

Incidence and Prevalence

Canadian literature shows a strong correlation between fall-related mortality and aging. Among Status Aboriginal peoples in the province of British Columbia, the rate of fall-related mortality was nearly three times the provincial average. [34] A retrospective study by Leslie et al. [22] among First Nations people of the province of Manitoba found fall-related hip fracture injury rates were nearly double among the aboriginal cohort, with incidence increasing with age. A report from British Columbia shows that falls are a problem that affects indigenous elderly to a greater extent than other groups and that people with Native Status were twice as likely to fall compared to other residents. [31]

Prevention

No studies were found that examined the outcome of fall prevention strategies among indigenous older adults in Canada. An opinion paper based on retrospective data highlighted the need to assess environmental and equipment-related risks for falls. [39] In a study that established a strong link between benzodiazepine use and falls, it was found that among older aboriginal women [40] potentially inappropriate medications (PIMs) may be associated with an increase in fall risk. The study also suggests that psychoactive medications (such as benzodiazepines) may contribute to increased risk of injury if taken by aboriginal women who are susceptible to fractures.

One report [41] explored fall prevention among older indigenous peoples, including knowledge translation in indigenous health, the importance of incorporating many voices and perspectives into a shared vision, and building momentum through dialogue, partnerships, and action.

**New Zealand**

All studies reviewed that were specific to New Zealand focused on incidence and prevalence (n= 3) (Table 3).

Table 3

| New Zealand | | | |
|---|---|---|---|
| **Author (Year)** | **Country (Region) and Sample** | **Method Related to Falls** | **Key Fall-related Findings for Indigenous Population** |
| Broughton & Langley (2000)<br><br>16 | New Zealand<br>Maori persons with serious injury requiring public hospital inpatient treatment, 1985-1994. All ages. | Retrospective study – secondary statistical analysis of data (ICD-9) on injury by cause and age group. | For all ages, falls were the leading cause of Maori injury (n=16,084; rate per 100,000 person years = 524.8 and 23% of all injury hospitalizations). Among older people age 65+, falls were the leading cause of injury (n=686, rate per 100,000 person years = 767.2 and 51.6% of all injury hospitalizations). |
| Langley *et al*. (2000)<br><br>18 | New Zealand<br>Maori mortality data (n=13,330), 1984-1993. All ages. | Retrospective study – secondary data analysis. Sample data by injury type (ICD-9) and age category. | In the sample data, 12% of Maori deaths were due to injury. Among Maori age 65+, falls were the mechanism of injury in 13 deaths (rate=14.5 per 100,000 person years), second only to motor vehicle-traffic. Among Maori people age 45-64, falls were the cause of 14 deaths (rate=3.6 per 100,000 person years), the third most prevalent cause of injury-related death after motor vehicle-traffic and 'struck by/against'. |
| Norton *et al*. (1995)<br><br>23 | New Zealand (Auckland)<br>Maori/Pacific Islander hospitalizations for hip fracture (n=27; 0.9%) of all hip fractures (n=1804) in Auckland, age ≥ 60 - 1991 – 1994. | Retrospective study - secondary analysis of New Zealand Health Information Service (NZHIS) data (ICD-9-CM). | Age adjusted incidence rates*[2] per 100,000 population (based on 1991 census) for European females = 571.5, males = 314.6; Maori females = 151.6, males = 169.3; Pacific Islander females = 154.5, males = 168.7; other ethnic groups females = 302.3, males = 131.6.<br>Among Maori, only two (12.5%) of the 16 hip fractures sustained by those aged 85+. Pacific Islander, only 1 (9.1%). |

[2] * Rate per 100,000 population of applicable study reference population.

Incidence and Prevalence

One study on fall-related injuries among the Maori people aged 65 and older showed that falls were the leading cause of serious injuries requiring public hospital inpatient treatment and accounted for over half of all the injury-related hospitalizations. [16] Another study reported that fall-related deaths among Maori people aged 65 and older were the second leading cause of injury-related deaths after those related to motor vehicles. [18] While the rates for fall-related hospitalizations and deaths appear high, there are no comparisons given for rates among non-Maori older adults except for a study on hip fractures. Hip fracture rates among those aged 60 years and older were found to be considerably lower among Maori and Pacific Islanders compared to Europeans. [23] These were broken down by gender and ethnic groups with the greatest difference being between European females at 571.5 per 100,000 population compared to 151.6 per 100,000 population for Maori females.

Prevention

There were no studies or reports found that focused on falls or related risk prevention in New Zealand.

**United States**

Fourteen papers examined falls among Native Americans in the United States (Table 4). These articles described incidence and prevalence (n=9), and fall prevention and related risk factors (n=5).

Table 4

| **United States** | | | |
|---|---|---|---|
| **Author (Year)** | **Country (Region) and Sample** | **Method Related to Falls** | **Key Fall-related Findings for Indigenous Population** |
| Adekoya, N. *et al*. (2002)<br><br>20 | United States<br>American Indians/ Alaska Natives nonfatal Traumatic Brain Injury (TBI) hospitalizations (N=4,491); relevant subsample aged 45+ (n=744), 1992 – 1996. | Retrospective study – secondary analysis of hospital data of leading causes TBI by age and sex: Motor Vehicle, Assaults, Falls and Other (ICD-9-CM). | Falls were the leading cause of TBI for ages 45+, with TBI hospitalization rate*[3] of 19.4 (p. 304). |
| Cauley *et al*. | United States | Retrospective study – | Of the AI sample, 8.1% (n=58) had experienced > 2 falls in the year |

[3] * Rate per 100,000 population of applicable study reference population.

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| (2007)<br><br>42 | American Indian (AI) females (n=715), as part of the Women's Health Initiative cohort age 50-79 (n=159,579 females). | secondary data analysis of risk factors for fracture, by ethnicity. | prior to follow-up. "Fall history…suggested an increased risk of fracture, but the results were not significant" (p. 1820).<br>For AI women, hazard ratio for > 2 falls was 1.63.<br>Multivariate analysis of fracture risk: > 2 falls (referenced to ≤ 2 falls) found hazard ratio of 1.38 (95% CI 0.75,2.55). |
| Coronado *et al*. (2011)<br><br>15 | United States<br>American Indian/Alaska Natives (AI/AN) included in data of all traumatic brain injury (TBI)-related mortality January 1, 1997 to December 31, 2007. | Retrospective study – secondary analysis of CDC multiple-cause-of-death public use data files, 1997-1998 (ICD-9) and 1999-2007 (ICD-10). Stratified by age group, ethnicity and mechanism of TBI. | Average annual number, rate*, and (95% CI) for fall-related TBI mortality for older AI/AN, by age group:<br>45-54: 12, 4.0 (2.1-7.0)<br>55-64: 10, 5.5 (2.7-10.2)<br>65-74: 8, 8.4 (3.6-16.5)<br>75-84: 9, 19.7 (9.0-37.4)<br>≥ 85: 5, 34.4 (11.2-80.3)<br>Compared to the total older population, by age group:<br>45-54: 725, 1.8 (1.7-2.0)<br>55-64: 811, 3.0 (2.8-3.2)<br>65-74: 1,256, 6.8 (6.4-7.1)<br>75-84: 2,697, 21.3 (20.5-22.1)<br>≥ 85: 2,424, 53.7 (51.6-55.9) |
| Finke, B. (2003)<br><br>44 | United States<br>Native American Elders | Report (guidelines) – overview of applicability of American and British Geriatric Societies' (AGS/BGS) fall prevention guidelines to Native Americans. | Suggested additions to the guidelines:<br>Assessment – history of fall circumstances, include role of alcohol, if any, in the fall. Intervention – referral to substance abuse evaluation and treatment if indicated.<br>Additional Interventions to reduce risk of injury after fall – offer calcium/vitamin D; evaluate risk of osteoporosis and treat accordingly. |
| Garrett Sims, J. *et al*. (2011)<br><br>45 | United States<br>American Indian and Alaska Native (AI/AN) people age ≥ 65. Data analysis of fiscal year 2008. | Retrospective study – secondary data of 10 identified potentially inappropriate medications (PIMs), determined by evidence-based risk for falls. Data from the IHA Notifiable Disease and External Cause of Injury. | Of the sample, 19% (n = 12,836) received ≥ 1 PIM.<br>The most frequently prescribed medications with high fall risk among AI/AN seniors were antihistamines (11.2%), muscle/skeletal relaxants (3.5%) and benzodiazepines (2.8%).<br>The percent of AI/AN older adults receiving prescriptions for PIMs are lower among those aged 65-74 at 20.6%, compared to 18.4% among the 75-84 age group, and 14.7% among the 85+ age group (p. 150). |
| Health Resources | United States | Report (epidemiological | "In general, for individuals age 65 years or older, falls are the leading |

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| and Service Administration (2003) 35 | Native Americans/Alaska Natives with traumatic brain injury (TBI). | summary) – First National Native American Summit on TBI | cause of brain injury; 11 percent result in fatalities" (p. 1). "Indigenous people are over-represented in the category of TBI" (p. 2). |
| Hill *et al*. (2004) 21 | United States (Alaska) Alaska Native (AN) (n=8,356) and white (n=13,117) non-fatal injury data in Alaska, January 1, 1994 to December 31, 1999. | Retrospective study – secondary data from the Alaska Trauma Registry (ICD-9-CM). | Falls for all ages accounted for 26.3% of all injury-related hospitalizations for AN, with a crude rates* of 355 compared to 176 for Whites. The rate of hospitalization for falls was highest among those 80+ for both AN and Whites. Falls were the most frequent cause of non-fatal injury hospitalization among Alaska Natives, accounting for 26% of injuries, 28% of hospital days, and 20% of permanent disabilities. |
| Kuklinski, D. (1998) 17 | United States (Phoenix) American Indian (AI) Elders (age 55 years and older) mortality, 1979-1993. | Retrospective study – secondary analysis of sample data (ICD-9) for injury-related mortality. | Of the injury-related mortality (n=282), injury due to falls accounted for 40 deaths (rate*=28.2) among the AI sample population. The ratio of fall-related deaths among AI Elders to US All-Races Elders was 1.4:1. Elder AI males showed twice the fall-related mortality as Elder AI females. |
| Lindeman, R. (2003) 43 | United States Native American Elders | Report (guidelines) – applicability of American Geriatric Society and British Geriatrics Society (AGS/BGS) fall prevention guidelines for Native American Elders. | Summary of AGS/BGS guidelines. |
| Michaelson-Gambrell, P. *et al*. (2010) 46 | United States Older adults within Indian Health Service jurisdiction. | Report (program summary) – feasibility of tai chi program for older adults in Indian Health Service. | "The most important finding…was that community members were very receptive to tai chi. Many felt it would be beneficial because of its slow, gentle movements; simplicity; and low cost. They liked the idea that tai chi could be performed at home as well as in groups; by frail individuals as well as more active adults. Several community members remarked on how tai chi's spiritual nature – its connection to the flow of inner, vital energies (chi) – resonated with traditional views of health and restoring balance among mind, body, and spirit" (p. 174). |
| Quandt *et al*. (2006) | United States (North Carolina) Native American (NA) elders (n=179; 25.9%) within 691 | Retrospective cross-sectional study – cross-sectional survey of self- | Of the NA elders, 51.4% (n=92) experienced no falls in the previous year; 19% (n=34) had one fall in the previous year; and 29.6% (n=53) experienced two or more falls in the previous year. Multivariate |

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| 32 | community-dwelling persons age 65 years and older with diabetes. | reported falls in the previous year among sample population. | analysis found not statistically significant difference in fall rates between NA vs. African American and NA vs. White older adults. |
| Rutland-Brown *et al*. (2005)<br><br>24 | United States (13 states) American Indian/Alaska Native (AI/AN) hospital discharges of non-fatal traumatic brain injury (TBI) cases, January 1 1997 to December 31 1999. | Retrospective study – secondary analysis administrative data by ethnicity, age group and injury cause (ICD-9-CM). | American Indian/Alaska Native (AI/AN): age groups 45-64 and 65+, 20 falls and 13 falls respectively (rates of 8.7 and 17.1 per 100,000 TBI-related hospital discharges for AI/AN).<br>Incidence and rates of falls not provided for other ethnicities. |
| Stevens *et al*. (2002)<br><br>19 | United States<br>American Indian/Alaska Native (AN/AI) people within overall American mortality data.<br>Analysis of 1990 – 1998 data. | Retrospective study – secondary analysis of fall-related mortality (ICD-9) data from National Center for Health Statistics annual mortality tapes, by cause, age group & ethnicity. | From 1990 – 1998, unintentional fall deaths for AI/AN persons age ≥ 65: male = 111 and female = 100. "Rates were not calculated due to instability of rates based on fewer than 20 deaths annually" (p. 273). |
| Wendelboe *et al*. (2011)<br><br>27 | United States (New Mexico) American Indian mortality due to unintentional falls of New Mexico residents - 1999 to 2005. | Retrospective study – secondary analysis of the state and national vital records for the sample data (ICD-10), including by age and ethnicity. | Of the 1,440 fall-related deaths among American Indians (all ages), 1,337 (92.9%) were from the ≥50 age group.<br>American Indian ethnicity had an elevated risk ratio 2.3 (95% CI = 1.8, 2.8) compared to the US rate. Age group ≥ 50 had an elevated risk ratio of 2.0 (95% CI = 2.0, 2.1) compared to the US rate. |

Incidence and Prevalence

Incidence and prevalence studies mainly focused on fall-related injury rates. Studies emphasized Traumatic Brain Injury (TBI) rates and mortality rates from falls. Falls were the leading cause of TBI for American Indians/Alaska Natives (AI/AN) age 45 years and older, with a hospitalization rate of 19.4/100,000 (ICD-9-CM). [20] Among AI/AN aged 45-60 and 65+, TBI hospitalization rates (ICD-9-CM) were 8.7 and 17.1/100,000 respectively. For all age groups, "fall-related TBI's occurred about 2.5 times more often among "other" races than among AI/AN" for all age groups (Rutland-Brown, 2005), however another study concluded that "elderly (over 65 years) is not a predominant age bracket for [TBI] within Indigenous populations" (HRSA, 2003). However, the authors postulated that the AI/AN elderly may not be surviving post-falls.

There was a high incidence of falls among AI women especially for repeat falls within a year (>3 falls). Compared to women from other races, AI women had an increased risk for falls. [42] In contrast, another study found no significant difference between different racial groups for falls. While race was not a statistically significant contributor, other common risk factors were: number of chronic diseases, length of time with diabetes, poverty status, and quality of life scores. These factors were found to be significantly associated with falls. [32]

Fall-related mortality rates were higher in some age groups. TBI-related deaths from falls [15] among AI/AN elderly aged 45-74 had a higher death rate than the rate for all older people combined, while those aged 75 and older had a lower rate. Wendelboe et al. [27] found that among AI, 92.9% of fall-related deaths occurred among those aged 50 years and older and they had a risk ratio of 2.0 compared to the overall U.S. fall death rate. Another study evaluated all motor vehicle and fall-related deaths that occurred between 1990 and 1998. However, the study was not able to report rates for indigenous elderly aged 65 and older due to small number of fall deaths over this time period. [19]

Both medications and existing medical issues may contribute to falls among indigenous peoples in the United States. Fall rates were higher for Native American elders with diabetes, with 48% reporting one or more falls in the previous year. [32]

Prevention

A summary of American Geriatric Society and British Geriatrics Society (AGS/BGS) guidelines address the gap in knowledge for fall-related studies and AI/AN populations, and that elderly falls are “as significant a problem in Native Americans as in other populations”.[43] Another report suggests additions to AGS/BGS guidelines by including an additional question to ask all seniors (aged 65+) if they have fallen over the last 12 months. [44] As a risk factor, the use of potentially inappropriate medications (PIMs) is high among indigenous older adults, particularly among those aged 65-74. [45]

Studies of fall prevention programs have reported that among indigenous elderly, tai chi exercises and programs are well accepted. [46]

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