

International comparison of injury deaths: Falls

a report to the

New Zealand Injury Prevention Strategy Secretariat

Prepared by

**Jennie Connor
John Langley
Colin Cryer**

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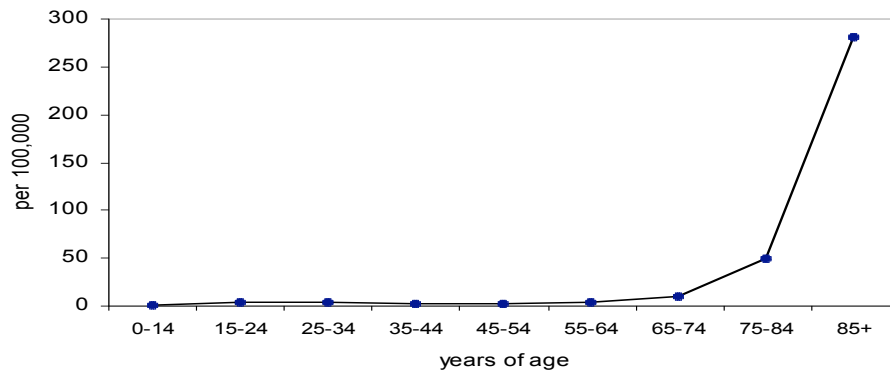
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1. Introduction

In New Zealand, falls are a common cause of hospitalisation in children (peaking in the 5-9 year age group) and in adults over 65, increasing sharply at older ages. However relatively few falls sustained by young people result in death. The crude mortality from falls in 2000-2002 was 8 per 100,000 but this was largely due high rates of fatal falls at older ages, as seen in Figure 1. Most fall-related deaths result from complications of a hip fracture sustained in a fall by a person with age-related osteoporosis.

Figure 1: Age-specific mortality due to falls in New Zealand, per 100,000 population (2000-2002 aggregated data)

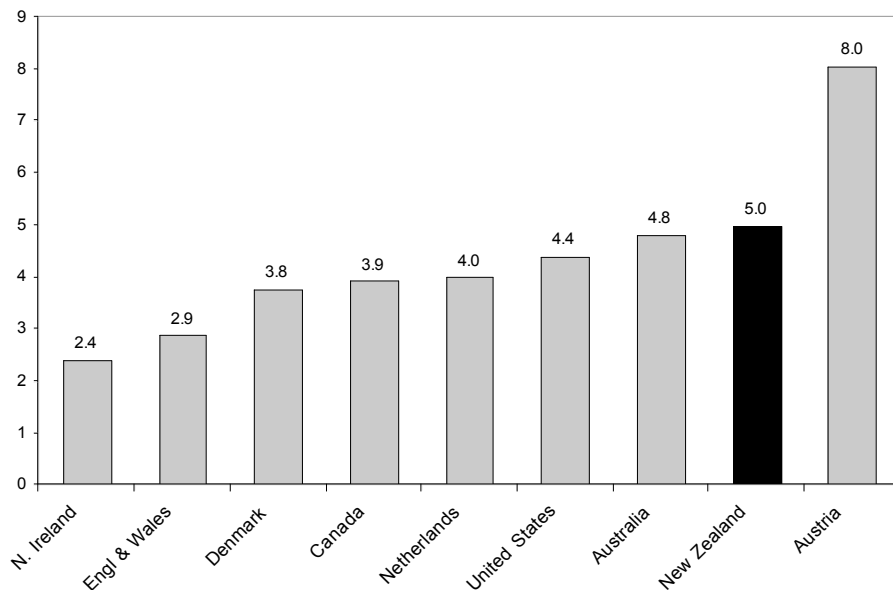


Source: New Zealand Health Information Service

2. Recent international comparisons

Figure 2 shows rates of deaths from falls in a selection of countries, adjusted for differences in the age structure of the populations.

Figure 2: Fatal falls per 100,000 population, age-standardised rates (2000-2002 aggregated data)



Source: International Collaborative Effort on Injury Statistics

These data originate from the International Collaborative Effort on Injury Statistics through Lois Fingerhut (personal communication). Rates for the US and Australia have been adjusted for known differences in coding practice. No other sources of age-standardised or age specific data were identified that would allow comparison between New Zealand and a range of other countries.

3. Data and definition problems

Age standardisation, or adjustment for differences in the age makeup of the populations, is important to the validity of all international comparisons. However, since fall deaths occur mainly amongst older adults and the rates increase rapidly over 65 years of age, crude rates of fall deaths are strongly influenced by the proportion of the population in these groups and are not suitable for making even the most cursory comparisons between countries. Within countries, the proportion of people in the oldest age groups is increasing rapidly enough to make time trends in crude death rates unreliable. Since determinants and circumstances of falls in the young and the old are so different, age-specific rates of fatal falls are the most useful for making international comparisons. Considering that women make up an increasing proportion of the population with increasing age, and have higher rates of fall-related hip fractures than men, it is most appropriate to consider rates in men and women separately or to standardise populations for sex distribution as well.

Ascertainment of deaths is likely to be very high in most high income countries. However, the identification of the death as fall-related is less certain, and varies from one country to another. One reason is that coding practices may differ. For example in France a much greater proportion of injury deaths are coded to “unspecified causes” than other countries¹. Thus there may be cases missing from the rates of fall deaths when making international comparisons. In addition to this, with the updating of the International Classification of Diseases (ICD) system from version 9 to version 10 there has been a change in the way that some injury deaths are coded when their circumstances are unclear. Deaths that were classified as “fracture unspecified” and assumed to be due to falls in ICD-9, are coded as “cause unspecified” and not counted as falls in ICD-10². This means that trends in fall deaths over the period of transition from ICD-9 to ICD-10 will be unreliable, and also that data from countries using ICD-9 will not be strictly comparable to those countries using ICD-10. One solution to this is to remove the “fracture unspecified” category from ICD-9 coded data when making comparisons with ICD-10. This may then result in some undercounting of fall deaths.

Another important reason why fatal fall rates may not be comparable between countries relates to the way that death certificates are completed and cause of death assigned. As

¹ Smith G, Langlois J, Rockett I. International comparisons of injury mortality: Hypothesis generation, ecological studies and some data problems. Proceedings of the International Collaborative Effort on Injury Statistics, Vol 1. 1995;13:1-15

² ICD-9 and ICD-10 are revisions of the WHO’s International Classification of Diseases. The system includes a classification for the circumstances of injuries both by intent (intentional, unintentional) and by mechanism (fall, burn etc) within one code (eg. accidental poisoning)

briefly described in the overview paper³, many fall-related deaths in older people do not occur immediately, but from a complication such as pneumonia. Variation, within and between countries, in attributing such deaths to the fall rather than the ‘terminal event’ could therefore have a considerable impact on rates of fatal falls. We are aware of only one study that has investigated these issues.⁴ In research that carefully compared injury death rates of older people in New Zealand and the United States, the overall injury death rate in people over 65 was found to be 34% higher in New Zealand than the US. However, out of six injury categories NZ death rates were only higher for falls (almost 3 times as high as the US), and it was found that this was due to differences in the way that death certificates were completed in the two countries. In the US, people who died were much more likely to be recorded as dying from the terminal illness rather than the fall which caused it. Major under-reporting of falls as a cause of death in the US made the New Zealand rate seem very high, even though the incidence of falls was similar in the two countries. The difference in recording of cause of death was thought to be partly due to the longer hospital stays of New Zealand patients increasing the likelihood that death would occur in the hospital setting and therefore more likely to be attributed to the fall.

4. Differences in exposure and other determinants

If differences in fatal fall rates are found when comparable data sources are available from different countries, they warrant investigation for differences in causal factors and also the type and level of prevention activity. In the case of fatal falls, the relevant exposures and causes will differ for the younger age groups and the over 65 year olds.

Children and young adults: In children, the physical environment and level of supervision plays an important role, along with the safety culture of the community. Amongst young adults, alcohol use and therefore alcohol policy will also be important, along with exposure to hazards such as ladder use and climbing on roofs, common in countries with a DIY culture but not in all. Living in high rise accommodation also increases exposure to risk.

Older adults: When looking at differences in fall death rates amongst older people consideration must be given to the reasons for falling, the reasons that hip fractures occur when people fall and what determines the likelihood of dying if a person sustains a hip fracture. The reasons that older people fall more often than younger adults include loss of strength and mobility, cognitive impairment, failing eyesight, and the use of multiple medications, leading to poorer balance. The physical environment may also contribute, including ice and snow, and the availability of supervision and assistance. In New Zealand, the rate of falls and hip fractures is higher amongst older people living in institutions than at home.⁵ If an older person falls, it is their underlying osteoporosis, or bone thinning, that predisposes them to a hip fracture, as well as how much physical padding they have. In Caucasian populations the incidence of hip fracture in women is

³ Connor J, Langley J, Cryer C. International comparison of injury deaths: Overview. Report to the NZIPS Secretariat, June 2006

⁴ Langlois J, Smith G, Baker S, Langley J. International comparisons of injury mortality in the elderly. Issues and differences between New Zealand and the United States. *International Journal of Epidemiology* 1995;24:136-43

⁵Norton R, et al. Residential status and the risk of hip fracture. *Age and Ageing* 1999;28:135-9

about twice the rate in men, due to more falls and more osteoporosis⁶. The prevalence of hip fracture varies between ethnicities, both within and between countries. In New Zealand there are much lower hip fracture rates in Maori and Pacific peoples than in Europeans.⁷ While this has been partly attributed to greater bone mass in some ethnicities (Maori, Pacific, African Americans), the Chinese population in Hong Kong has both lower bone mass and lower rates of hip fracture, with only 40-50% of Caucasian rates⁸. Nevertheless, there appear to be a range of anthropometric characteristics (height, average weight, muscle mass etc) in addition to bone density that contribute to the large differences in fracture rates by ethnicity. The ethnic mix that makes up national populations will therefore affect risk of fall-related deaths in a way that is not simple to adjust for. Osteoporosis is also accelerated by cigarette smoking and therefore fall death rates in people over 65 will be affected by smoking prevalence in the preceding decades. Once a hip fracture has occurred, medical and surgical options for treatment have an impact on the case-fatality rate, and the chance of recurrence. Variation in these and other determinants between countries will explain some of the variation in the rate of deaths from falls.

5. Differences in extent of intervention

Strategies have been identified that address a number of the risk factors for fall-related death. Their effectiveness and the extent to which they are adopted in different countries will make a contribution to differences in fall fatality rates. Interventions include primary prevention strategies for fall reduction in all ages such as public safety education, modifications to the physical environment (including building regulations), and alcohol policy and enforcement. There is also a range of fall-reduction interventions specifically for older people⁹. Secondary prevention of hip fractures in the event of an older person falling relies on prevention, diagnosis and treatment of osteoporosis (including calcium and vitamin D intake, smoking reduction, exercise promotion and medication), and in some circumstances the use of hip protectors¹⁰. Some reduction in mortality from hip fractures has been achieved through surgical fixation, early mobilisation, and pulmonary embolism prevention¹¹. “Best practice” rehabilitation services help prevent recurrences and their associated high mortality.

6. Conclusion

Few data are available to make direct comparisons of fatal fall rates, particularly by age group. The overall age-standardised rates are heavily influenced by the rates in the oldest groups in the population. In international comparisons these rates are likely to be affected by differences in coding and assignment of cause of death, as well as genetic differences,

⁶ Cummings SR, Melton III LJ. Epidemiology and outcomes of osteoporotic fractures. *Lancet* 2002;359:1761

⁷ Norton R, et al. Hip fracture incidence among older people in Auckland: a population-based study. *N Z Med J.* 1995;108:426-8

⁸ Ho SC. Body measurements, bone mass, and fractures. Does the East differ from the West? *Clin Orthop Relat Res.* 1996 Feb;(323):75-80

⁹ NZ Guidelines Group. Prevention of hip fracture amongst people aged 65 years and over. June 2003

¹⁰ *ibid*

¹¹ Collins R et al. PEP trial. *Lancet* 2000;355:1295-302

different levels of exposure to risk, susceptibility to injury, and interventions to reduce mortality when falls occur. There is a large literature on the causes of falls in the over 65 age group and effective means of preventing them, and on interventions to prevent fractures when falls occur. There is evidence of effectiveness of multi-factorial interventions although they are challenging to implement at a population level.