In response to the recently published UNICEF report on child injury deaths Ramsay asks “Do international comparisons help?” and concludes that provided countries occupying low positions are not stigmatised the comparison serves a purpose if only to raise awareness of child injury death. While increased awareness of one’s country’s performance relative to others may be a necessary condition for making progress on reducing injury, it would rarely be sufficient. Both the report and commentators struggle for explanations. They struggle since they lack the necessary information to, at least crudely, test their hypotheses. This article discusses some of the information that would greatly assist in this respect: more detailed analysis of deaths; details on person time exposure to hazards; information on safety behaviour; and information on engineering, legislation, enforcement, and education.

A closer look at selected injury deaths

The report highlights the fact that overall 41% of the deaths are due to motor vehicle traffic crashes. Accordingly it compares countries in terms of the motor vehicle traffic fatality rates. Unfortunately the report does not delve further into these rates for clues as to where countries may differ. For example, is the risk of crash in New Zealand relative to other countries similar for all classes of road users? To answer this some help is offered by previous papers in this journal that describe the fatal injury burden for England and Wales, New Zealand, Australia, and the United States. This group of countries includes one with the best record, England and Wales, and one with the worst, New Zealand.

Unintentional motor vehicle traffic crashes made the following contributions to each country’s total injury death burden—New Zealand 43%, Australia 39%, United States 35%, and England and Wales 35%.

These reports show that occupants of cars and pedestrians contribute most to the motor vehicle traffic fatality rates for all four countries. Table 1 shows the rates and risks, relative to England and Wales, for all motor vehicle traffic victims combined, and for occupants and pedestrians separately.

New Zealand’s rates is 2.7 times that of England and Wales but the extent of New Zealand’s poor performance differs by type of road user. For occupants the relative risk doubles to 5.4 but for pedestrians it is reduced by two thirds, to 1.7. Conversely, although England and Wales has the best overall rate, Australia and United States have pedestrian rates nearly half that of England and Wales.

For each country the rates across the three age specific groups for occupant deaths are similar. For pedestrian deaths, however, New Zealand has a particularly poor performance for 1–4 year olds, relative to older age groups.

Astute readers may wonder why Mexico has not been included in the analyses presented here, given that comparable data has recently been published in the journal and that unlike the others it is not a high income country.

The explanation is that its road specific figures published are not reliable. A total of 660 out of 1749 deaths (37%) due to unintentional motor vehicle traffic crashes presented are not reliable.
Table 2: Unintentional drowning, and fire and flame fatalities: numbers, relative risk ratios, by age groups

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No</th>
<th>Rates (per 100,000)</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–4 years</td>
<td>125</td>
<td>5.8</td>
<td>5.9 to 6.6</td>
</tr>
<tr>
<td>5–9 years</td>
<td>44</td>
<td>1.7</td>
<td>1.5 to 2.0</td>
</tr>
<tr>
<td>10–14 years</td>
<td>39</td>
<td>1.5</td>
<td>1.3 to 1.8</td>
</tr>
<tr>
<td>1–14 years</td>
<td>208</td>
<td>2.8</td>
<td>2.6 to 3.0</td>
</tr>
</tbody>
</table>

**Drownings**
- New Zealand (1984–93): 125 deaths, RR = 5.8, 95% CI: 5.9 to 6.6
- Australia (1994): 44 deaths, RR = 1.7, 95% CI: 1.5 to 2.0
- United States (1993): 39 deaths, RR = 1.5, 95% CI: 1.3 to 1.8
- England and Wales (1992): 208 deaths, RR = 2.8, 95% CI: 2.6 to 3.0

**Fire and flames**
- New Zealand (1984–93): 40 deaths, RR = 1.9, 95% CI: 1.3 to 1.4
- Australia (1994): 13 deaths, RR = 1.0, 95% CI: 0.7 to 1.0
- United States (1993): 90 deaths, RR = 0.5, 95% CI: 0.3 to 0.8
- England and Wales (1992): 62 deaths, RR = 0.9, 95% CI: 0.7 to 1.0

CI = confidence interval; RR = relative risk.

Vehicle traffic crashes for those aged 1–14 years had the road user classified as “unspecified”. The comparable percent for the United States was 10% and that for other countries presented in Table 1 negligible. Given the size of the “unspecified” road users for Mexico one cannot have a high degree of confidence in the estimates for “identified” road users.

Unintentional drownings were the second leading contributor to injury death—New Zealand 17%, Australia 20%, United States 13%, and England and Wales 9%. The first thing to note from these percentages is the large differences. Table 2 shows that New Zealand performs very poorly overall, and this is the same across the three age specific groups. Within each country, drowning rates for 1–4 year olds are consistently three to four times those for the older age groups.

Fire and flame deaths were, with one exception, the third leading contributor to injury deaths—New Zealand 5%, Australia 8%, United States 12%, and England and Wales 12%. Relative to England and Wales, the United States has the worst total rate and this is equally true for each of the three age groups.

**Exposure**

The rates used in the UNICEF report are per capita. While these rates provide a useful measure of the degree to which injury affects the populations they do not address person-time engaged in activities that produce a risk of injury. Since motor vehicle traffic crashes are the leading cause of unintentional injury deaths for all the countries I used these data to illustrate the point.

Exposure to motor vehicles is obviously necessary for fatal motor vehicle crashes to occur. Thus a partial explanation for the differences in the mortality rates discussed in the report may be differences in distance driven per capita. Reference to the International Road Traffic and Accident Database illustrates the effect of using this and other measures of exposures.

For 1998 the number of road traffic deaths (for all ages) per 100,000 person years for the United States was 2.6 times that for Sweden (15.3 vs 6.0). However, for the same year the number of deaths per billion km driven in the United States was only 1.2 times that for Sweden (9.8 vs 7.9). This suggests that while the United States has a major problem relative to Sweden it is largely explained by increased exposure, in this instance more driving.

Road user mix is another important consideration. The UNICEF report highlights the fact that the majority of children who die on the road are not occupants but pedestrians and cyclists. Clearly for most pedestrian and cyclists deaths to occur one needs vehicles to be driven and pedestrians and cyclists to use the roads.

Roberts and others have reported large international differences in the extent to which children walk and cycle in major cities in Australia, New Zealand, Canada, Sweden, and the United States and suggest that these differences are likely to be an important contributor to international differences in injury rates. Nevertheless Roberts et al point out that Sweden’s low pedestrian injury rate cannot be explained by fewer children walking to school or by the number of roads they cross. Instead they suggest the differences may relate to the degree to which children are accompanied.

It also seems reasonable to suggest that differences in other exposures may account, in part, for differences in the total rates. For example, it may be that the hours of exposure to natural bodies of water (for example rivers, seas, lakes) per capita are significantly higher in New Zealand than in Great Britain. Although there are only a few country specific surveys of participation in sport and recreation that provide some insight into exposure to water (for example levels of participation in swimming), variations in definitions and measurement preclude any valid international comparisons.

Information on indirect exposures (for example number of children living beside rivers and streams) is virtually non-existent.

**Safety behaviour**

Differences in exposure as outlined above are unlikely to explain all of the differences between countries. We also need information on the adoption of safety behaviours that have been shown to reduce injury. For example, in comparing countries in terms of cyclist head injury rates per 100,000 km of cycling it would be desirable to have an estimate of the portion of distance travelled in which heads are unprotected by helmets.

To its credit the UNICEF report provides this type of information in the context of automobile crashes. A large variation between...
countries in seat belt use among children aged 11–13 (figure 10) is noted. It would be extremely desirable to have similar measures on a range of other individual behaviours as well as a country’s collective organisational behaviour. This could include the number of children wearing life jackets while boating, the number of adequately fenced swimming pools, the number of homes with functioning smoke detectors and the number with safe hot water temperatures, and schools whose playground equipment complies with the safety standards.

**Beyond exposure and safety behaviour measurement**

While the foregoing exposure and safety behaviour information wish list would provide much greater understanding of differences between countries, in terms of per capita based mortality rates, we need to go beyond simply explaining the differences. Poor performing countries need to know, for example, what combination of engineering, legislation, enforcement, and education has lead to a specific country performing well in a specific area.

The UNICEF report includes a figure (figure 9) which tabulates the extent to which nations have legislated selected safety measures. The report suggests that this can be used as crude measure of a nation’s commitment to the cause of child safety.

The authors acknowledge that such a table provides no insight into the rigour or consistency of applying the legislation. New Zealand is a good case in point. It performs relatively well in the legislation stakes. For two areas identified, smoke detectors and playgrounds, there have also been significant non-legislative achievements through standards, and local authority or school codes of practice. In this context it should be noted that although legislation has an important part to play, high levels of adoption of safety behaviours can be achieved in its absence. For example, helmet wearing rates were very high in New Zealand before the introduction of helmet legislation. In the year to June 2000 81% of New Zealand homes had a smoke alarm installed, and 75% of homes had more than one alarm. Regrettably, health promotion efforts which lead to these relatively high levels of voluntary adoption are rarely adequately documented, let alone in the scientific literature.

In contrast to these two positive examples, New Zealand has had legislation for the fencing of swimming pools since 1987 but a recent study has shown that there are substantial shortcomings with respect to compliance. Similarly, while New Zealand has addressed the cycle helmet wearing issue relatively well, it has a poor track record in providing for a safer cycling road environment.

**Conclusion**

Population based fatality rates are extremely limited for comparing one country’s performance with another. We need to invest more thought and resources into obtaining reliable exposure and safety behaviour indicators. This could be addressed by occasional multicountry population surveys. We also need to adopt statistical models to consider the numerous factors believed to influence the number of fatalities. While these strategies will undoubtedly assist in explaining differences, we need to go beyond this to try to identify what combination of engineering, legislation, enforcement, and education factors bought about the desired change. *Injury Prevention* has an important role in this respect by encouraging the submission of manuscripts that address these issues. If the injury prevention community fails to address these issues more forcefully, 10 years from now commentators will continue to scratch their heads in seeking to explain differences in child injury mortality rates.

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9 (BASt) FHit International Road Traffic and Accident Database (http://www.bast.de/htdocs/fachthemen/irtad/).
International comparisons: we need to know a lot more

J Langley

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