Association between the number of home injury hazards and home injury

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Received 5 March 2007; received in revised form 26 September 2007; accepted 5 October 2007

Abstract

Although the home is a major setting for injury morbidity and mortality, there are few proven effective interventions for reducing home injury risk. To inform future research or interventions, this study measures associations between home injury hazards and home injury from a sample of New Zealand households. Logistic regression was used to assess the association between injury hazards identified by a building inspection and injuries requiring medical or associated services that occurred to household members prior to the inspection. There was an estimated increase of 22% in the odds of injury occurrence associated with each additional injury hazard found in the home (with 95% CI: 6–41%). This research suggests that addressing injury hazards in the home may be effective in reducing home injury. There are a number of potentially confounding factors that may affect relationships found between the existence of home hazards and injury occurrence. These need to be taken into account when future evaluations are planned.

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Keywords: Home injury; Home injury hazard; Confounding

1. Background

The home is an important setting for injury. In England and Wales, there were 3.5 thousand deaths from injury in and around the home in 2002 (ONS, 2002), almost 70% of non-transportation deaths; in the US, an estimated 46% of reported medically treated injuries occurred in and around the home in 2004 (National Health Interview Survey, 2004). Although most injury prevention experts would encourage the removal or remediation of environmental injury hazards in the home, there is little reliable research to link the existence of hazards in the home with injury occurrence. A recent Cochrane review of studies investigating the effects of home environment modification on injury occurrence identified no studies that found a reduction in injury rates that could be reasonably attributed to the interventions used (Lyons et al., 2003). The authors ascribed this lack of positive evidence to a combination of factors, including problems with study design, poor uptake of interventions by the groups studied and insufficient sample sizes. The U.S. Department of Housing and Urban Development published a report considering the state of knowledge regarding residential injury hazards, with a particular focus on the safety of children (Ashley et al., 2006). Although the authors considered that there were well-established links between home injury hazards and home injury occurrence (including burns and other fire-related injuries, falls, suffocation, drowning, and poisoning), in terms of hazard mitigation, they found evidence of effectiveness only for lead hazard mitigation, smoke alarms, home sprinklers, and fencing around pools and hot tubs (ibid).

Nevertheless, there have been studies showing promising results from programmes with interventions that address both extrinsic and intrinsic injury risk factors for particular at-risk groups (e.g., Day et al., 2002). Gill et al. (2000) studied a sample of just over a thousand older people and found positive – though generally non-significant statistically – associations between enumerated home trip or slip hazards in different areas of the house and self-reported falls occurring in these areas. Hazards identified were throw rugs, any mat without a rubber

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or skid-free backing, carpet folds, cluttered and crowded pathways, including furniture that crowded or narrowed the walking path.

Given the paucity of robust evidence supporting home hazard reduction, there is a need for studies of the association between home hazards and home injury. The study described here gathered detailed housing data that were thought to have an impact on the health and safety of the residents, trialling a method for assessing houses and approaches to linking aspects of housing quality to health and safety. Processes involved in accessing data on injuries, hospitalisations and visits to GPs (in some cases) by the residents of these houses were also trialled.

2. Method

From a stratified random sample, a total of 102 houses were recruited for the study from the Lower Hutt Valley (the northern part of the city of greater Wellington, New Zealand). These houses were sampled using city council databases to ensure a spread of the sample across strata based on expert advice regarding the different design eras of houses. The strata were defined by: the age of the house; level of deprivation of the city block or immediate neighbourhood; and geographic location. Discussions (described in Bierre et al., submitted) with a wide range of stakeholders helped to ensure the project developed in such a way that the research met the needs of a range of groups with an interest in housing and health. Included in the sample were 39 households with Māori occupants and 20 households with Pacific occupants.

The sampled houses were evaluated in terms of health-relevant features. This evaluation used a Healthy Housing Index (HHI) questionnaire which included a battery of observations covering features of the house thought to be associated with its healthiness and safety (specifically: warmth, dryness, injury hazards, adequacy of services and facilities, and freedom from mould and toxins). The instrument used for the house inspection was informed by other work in this area, in particular the British HHSRS (Office of the Deputy Prime Minister, 2002), the Building Research Association New Zealand’s House Condition Survey (Clark et al., 2005), and the New Zealand Standard NZS 4102:1996 (Standards New Zealand, 1996). The residents of these houses were asked to consent to have their health outcomes collected for up to 2-years immediately preceding the housing inspection and for a short period subsequently. When a house refused to participate in the study, the neighbouring house was approached. We did not collect precise information on the refusal or non-contact rates for the sampling process, but the participation rate was probably as low as 20%.

Injury outcomes were assessed using data from the New Zealand Accident Compensation Corporation (ACC), a state compulsory accident insurer whose coverage is based on “no fault” principles (see www.acc.co.nz). These data were considered to provide a good record of injury resulting in medical intervention as such medical services are fully subsidised by ACC creating a strong financial incentive for the attending medical practitioner to submit a claim for each episode. A study linking injury statistics from ACC with hospital data found that 99% of reported medically treated injuries were identified by ACC data, with the remaining 1% identified from hospital discharge data (Statistics NZ, 2004). This same study found that 90% of the reported injuries were of a minor nature, requiring medical treatment only (ibid).

For the present study, ACC claims were extracted for the consenting participants for the period January 2002 to December 2004. House inspections took place in late 2004.

The principal research question addressed by the analysis described in this paper is whether there is a relationship between the number of injury hazards (or lack of safety features) in the home and the occurrence of injury in the home. Not all injury hazards or safety features identified during the house inspection were considered relevant to this research question as some were considered to have an association with injury occurrence in a negative direction. For example, as discussed above, the presence of grab rails or grab bars is a safety feature that is likely to have injury preventing characteristics, but their very presence in the house may signal that a person with severely impaired balance is resident. Such an association may lead to seemingly increased injury occurrence associated with the presence of this safety feature.

The dependent variable in the analysis was whether or not the subject had an injury in their home recorded by ACC via a claim made for medical or related services in relation to the injury. Such claims are supported by forms and resultant data files that do not necessarily identify the hazard involved (if in fact a hazard contributed to the injury). For this reason, the analysis could not estimate risk associated with hazards in the particular room or area of the house where the injury occurred, as was done in the study by Gill et al. (2000).

Independent variables analysed included: the number of injury hazards in the house, as described above; age of the subject in three levels, 0–4, 5–59 and 60 plus; sex; deprivation levels of neighbourhood, measured by NZDep quintiles (Salmond et al., 1998). The quintiles of NZDep classify houses according to Census-collected information on the immediate neighbourhood of the house and indicate deprivation levels from 1 (least deprived) to 5 (most deprived). These deprivation levels are evaluated for the area where the house is located rather than for particular households or individuals and are based on neighbourhood levels of unemployment, household income, home ownership, education levels, levels of crowding and access to communication and transport (ibid). The division of age into the three groups used was based firstly on the limitations of the data, which were too sparse to allow analysis by fine aggregations of age, and secondly on rates of injury by age group, which show that these three groups have quite different rates of home injury: high for the under-fives and over-60s and relatively low for the ages in between. A contributing factor is likely to be the large amount of time members of these age groups spend in the home according to time use survey data (Bierre et al., submitted).

To ensure that the exposure levels were relatively similar for all subjects included in the model, people resident in the inspected house for less than 2 years were excluded. The hazards identified are listed in the appendix, and include items such as...
as inadequate handrails for stairs, unsafe electrical wiring, steep or slippery outdoor paths, etc.

A logistic model was fitted to describe the probability that a person was injured as a function of the explanatory variables. The data (at the person level) were clustered according to the house where they lived. The generalised estimation equation method is an extension of logistic regression that is valid for such clustered data (Zeger and Liang, 1992). This method was put into effect using the SAS procedure GENMOD (SAS Institute, 1998) using the REPEATED statement and an exchangeable correlation structure, which has been used to model injury risk for similarly clustered data (Hutchings et al., 2003). This technique calculates empirical standard errors using a “sandwich” or “robust” variance estimator. The number of explanatory variables able to be included in the model needed to be restricted to ensure that reliable estimates of the parameters could be obtained. Peduzzi et al. (1996) suggested a rule-of-thumb that at least 10 events (here, injured people) should be available for each parameter estimated. As there were only 13 people defined as being injured in the study, of those who had been resident in the house for at least 2 years, clearly only one parameter could be estimated reliably based on this criterion. Nevertheless, as age, gender and deprivation level are all potential confounders of injury risk, a second model was also fitted including these variables along with the number of home injury hazards. This was done in an attempt to identify potential effects of these variables on the association between injury occurrence and exposure to injury hazards, although the results of this second model are indicative only and need to be treated with caution.

There was no evidence of problems with the fit of the initial model: the scaled deviance and scaled Chi-square were both less than one. Using SAS, diagnostic plots of the statistics DFBETA (the standardized differences in the parameter estimates due to deleting an individual observation), DIFDEV (the change in the deviance due to deleting an individual observation) and DIFCHISQ (the change in the Pearson Chi-square statistic for the same deletion) identified two unusual observations. However, there was little change in the estimated parameters following the omission of the two observations from the regression, meaning that the estimation was probably quite robust to outlying or unusual data. These two observations did not seem to have errors in the data recorded and they were retained in the final analysis.

3. Results

The piloting of the home assessment instrument, the Healthy Housing Index questionnaire, showed that this house inspection process was a feasible approach to gathering data on health and safety-related features of a house. It was found that the inspection process required inspectors capable of climbing ladders, crawling under houses and assessing technical features that demanded a background in the building profession, or a related profession (Keall et al., 2007). Linking health outcome data with individual participants and their houses by participants’ names, dates of birth and addresses proved to be straightforward. One issue of concern was the low cooperation rate by houses approached

Table 1
General characteristics of the study

<table>
<thead>
<tr>
<th>Study period</th>
<th>January 2002–December 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of houses</td>
<td>102</td>
</tr>
<tr>
<td>Number of household members</td>
<td>255</td>
</tr>
<tr>
<td>Age range of subjects</td>
<td>0–88</td>
</tr>
<tr>
<td>Common safety issues identified: number of houses (%)</td>
<td></td>
</tr>
<tr>
<td>Pathway problems (e.g., too steep, slippery, overgrown)</td>
<td>33 (32%)</td>
</tr>
<tr>
<td>Internal stair hazards (e.g., insecure carpeting)</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>Structurally unsafe external steps</td>
<td>3 (3%)</td>
</tr>
</tbody>
</table>

Fig. 1. Distribution of sampled houses by the number of hazards identified in the house for all houses and for houses in which a reported home injury occurred.
Table 2
Study population resident in house for at least 2 years, with numbers injured in their home and odds of injury by characteristics of subjects and number of identified hazards in their home

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Number injured</th>
<th>Number not injured</th>
<th>% Injured</th>
<th>Crude odds ratios (relative to first value)</th>
<th>Odds ratios adjusted for clusteringa</th>
<th>95% CI for odds ratios adjusted for clusteringa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–4</td>
<td>2</td>
<td>20</td>
<td>9.1</td>
<td>1.0</td>
<td>1.0</td>
<td>(0.1, 2.4)</td>
</tr>
<tr>
<td>5–59</td>
<td>10</td>
<td>174</td>
<td>5.4</td>
<td>0.6</td>
<td>0.6</td>
<td>(0.1, 2.4)</td>
</tr>
<tr>
<td>60 pl</td>
<td>1</td>
<td>32</td>
<td>3.0</td>
<td>0.3</td>
<td>0.3</td>
<td>(0.1, 2.4)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>5</td>
<td>104</td>
<td>4.6</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>8</td>
<td>116</td>
<td>6.5</td>
<td>1.4</td>
<td>1.5</td>
<td>(0.4, 6.0)</td>
</tr>
<tr>
<td>NZDep quintileb</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>27</td>
<td>10.0</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>37</td>
<td>5.1</td>
<td>0.5</td>
<td>0.5</td>
<td>(0.1, 2.8)</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>18</td>
<td>10.0</td>
<td>1.0</td>
<td>0.8</td>
<td>(0.1, 6.9)</td>
</tr>
<tr>
<td>4 and 5</td>
<td>6</td>
<td>142</td>
<td>4.1</td>
<td>0.4</td>
<td>0.3</td>
<td>(0.1, 1.5)</td>
</tr>
<tr>
<td>Number hazards (tertiles)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–5</td>
<td>1</td>
<td>81</td>
<td>1.2</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>6–7</td>
<td>5</td>
<td>73</td>
<td>6.4</td>
<td>5.5</td>
<td>5.2</td>
<td>(0.6, 47)</td>
</tr>
<tr>
<td>8 Plus</td>
<td>7</td>
<td>73</td>
<td>8.8</td>
<td>7.8</td>
<td>7.6</td>
<td>(0.9, 64)</td>
</tr>
<tr>
<td>Number of hazardsc</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.22</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>227</td>
<td>5.4</td>
<td></td>
<td></td>
<td>(1.06, 1.41)</td>
</tr>
</tbody>
</table>

a Adjustment for clustering of subjects was achieved using GEE analysis.
b NZDep quintile classifies the respondent’s neighbourhood from 1 (least deprived) to 5 (most deprived).
c Per one unit increase in the number of home hazards, measured on a continuous scale.

The study population resident in house for at least 2 years, with numbers injured in their home and odds of injury by characteristics of subjects and number of identified hazards in their home.

The data show a pattern expected from the literature, even though these are generally not statistical significantly different from 1 (the value set for the referent level). The low odds of injury estimated for respondents from the most deprived areas (NZDep quintiles 4 and 5) were unexpected. A 1-sided Cochran–Armitage trend test gave indicative evidence of a decreasing trend in injury occurrence with increasing NZDep (p = 0.09). The average number of injury hazards did not appear to be decreasing with increasing NZDep. These two results hint that the association between the odds of injury and the number of home hazards may be attenuated unless potentially confounding effects of deprivation, as measured by NZDep, are accounted for. Table 2 combines NZDep levels 4 and 5 for computational reasons (as adjusted odds could not be computed for NZDep level 4 by itself). The second-to-last row of Table 2 shows the results of the model fitted to the data, with the number of home injury hazards treated as a continuous variable, estimating the odds of injury occurrence associated with each additional hazard identified.

Table 2 shows that the relative odds generally follow a pattern expected from the literature, even though these are generally not statistical significantly different from 1 (the value set for the referent level). The low odds of injury estimated for respondents from the most deprived areas (NZDep quintiles 4 and 5) were unexpected. A 1-sided Cochran–Armitage trend test gave indicative evidence of a decreasing trend in injury occurrence with increasing NZDep (p = 0.09). Fig. 2 shows that the average number of injury hazards did not appear to be decreasing with increasing NZDep. These two results hint that the association between the odds of injury and the number of home hazards may be attenuated unless potentially confounding effects of deprivation, as measured by NZDep, are accounted for. Table 2 combines NZDep levels 4 and 5 for computational reasons (as adjusted odds could not be computed for NZDep level 4 by itself). The second-to-last row of Table 2 shows the results of the model fitted to the data, with the number of home injury hazards treated as a continuous variable, estimating the odds of injury occurrence associated with each additional hazard identified. This shows an estimated increase of 22% in the odds of injury associated with each additional hazard identified. This resulted in a larger estimated increase in the odds of 26%, also significantly greater than zero.

4. Discussion

This study shows that as the number of identified home hazards increases, the odds of injury requiring medical attention also increase, even after adjusting for confounding factors. Assuming this finding is replicated in larger studies, it provides good support for using a hazard-rating tool to quantify injury risk in houses and to guide remediation action to remove the more important hazards.

With readily modifiable hazards, there is always the possibility that the characteristics of the resident of the house may confound these associations. For example, in a study by Gill et al. (2000), an odds ratio less than one was estimated for the presence of grab rails/bars in the bathroom and slips/trips in the...
bathroom. If the presence of such a safety feature is a marker of a resident with balance problems, then such confounding could explain this almost-significant finding. Likewise, a more infirm older person may foster uncluttered pathways in their homes because of their need for clear walking areas. This could mean that the presence of clutter in pathways may signal the presence of a healthier resident who is less likely to fall, even in the presence of these hazards. It is always a criticism of observational studies, as opposed to randomised controlled trials, that other factors are liable to confound any associations identified.

Although it initially appears a simple concept to develop an injury hazards inventory and a resultant index that provides an assessment of the potential for the house to be injurious to its occupants, there are obvious limitations of this approach. One example is that of children's play areas. From a public health perspective, an area adjacent to the house where children can play is evidently a good thing. The children can obtain enjoyment and exercise, beneficial to their health and development, while being at home. The alternative is that children have to play in a restricted indoor space, or they play on the street or at a nearby park. Paradoxically, because of the way that injury is traditionally coded, a home is likely to appear more hazardous if it has an outside area where children play. This is because children's play is liable to be the setting of an injury from time to time, which is attributed to the dwelling of that child. Children playing in the street, which is more hazardous because of the presence of motor vehicles, will have any motor vehicle-related injuries coded as occurring on the road, not at the dwelling. Overall, the child with facilities to play outdoors at home will have a lower injury rate than the child compelled to play on the street. But that child's home will paradoxically appear more hazardous because of the injury events coded as occurring at that location.

An example of an injury hazard that may vary according to the characteristics of the occupants is the presence of internal stairs. The pilot study showed that a relatively small proportion of families with small children lived in houses with internal stairs. This has implications both for the evaluation of injury rates associated with hazards within the house, but also for any evaluation of safety features such as stair gates. If a population study were carried out to evaluate the effectiveness of stair gates for the prevention of injuries on stairs for young children, a very large sample would be required to find a reasonable number of families with young children living in houses with internal stairs. Although the current study was small and subject to non-response bias, meaning that the characteristics of this sample do not necessarily reflect the general population, it is probable that New Zealand families with young children are less likely to live in houses with stairs. If this proportion is as low as 5%, as was found in this relatively small sample, then a population study, even one that was able to sample just families with young children, would be a very inefficient study design for the evaluation of stair gate effectiveness as only one in twenty such houses would have the potential to benefit from stair gates.

There are several important differences between the current study and that reported by Gill et al. (2000) that may explain the stronger associations obtained in our study than in their larger study. Firstly, there were differences in the analytical approach. Our study related injury occurrence anywhere in the home with hazards anywhere in the home, mainly because of the inability to identify any hazard particularly associated with the injury event from the data available. Gill and colleagues related self-reported falls occurring in a given room with hazards identified in that room. As most of the associations they identified were for increased odds of a fall in the presence of fall hazards, it is possible that their analysis would have found a significant association if they had looked for association between falls anywhere in the house with counts of total home hazards, even though their room-by-room associations failed to be statistically significant. Of course, the disadvantage of this approach is that the ability to infer a causal association is weakened by not accounting properly for the etiological link between the hazard and the injury. A second important difference is with the injury hazards identified. Gill et al. (2000) focused on fall hazards that were generally readily modifiable (such as mats that were trip hazards or clutter that reduced space for walking). Our study focused on more structural features of the house that were less likely to be adapted in response to perceptions of risk (see Appendix A, below). It is therefore possible that our study was relatively free from the potential confounding that can arise when people adapt their surroundings to reduce their perceived risk, and adapt the surroundings more when their own liability to fall increases. As discussed above, such a mechanism can lead to a seeming increase in injury (due to problems with balance or frailty) associated with a decrease in injury hazards (removed or modified to reduce perceived risk).

To ensure that the duration of exposure was similar for all subjects included in the model, people resident in the inspected house for less than 2 years were excluded. This does not necessarily mean that all were exposed to a similar degree to the injury hazards enumerated: some people were resident in the house for between 2 and 4 years, but the precise date was often unknown due to the manner of recording duration of residency. Also, no account was taken of the reduced period of exposure to the home environment for children born during the study period. Although the injury hazards were identified at one point in time, at the latter end of the period for which home injuries were monitored, most are not particularly remediable and are therefore less likely to have been modified than the injury hazards identified in the study by Gill et al. (2000).

There are several limitations to this study. Most importantly, the sample size of just 100 households limited possible analyses. As with any observational study without an intervention, the associations observed are subject to various sorts of confounding. Socioeconomic factors appear to be one such confounder, although they appear to attenuate the association between injury hazards and injury occurrence in the data, leading to more conservative estimates. In studies from the US, higher child injury risk has been found to be associated with sociodemographic factors (e.g., Scholer et al., 1999). Further, Black and Native Americans have significantly higher rates of home injuries than other ethnic groups (studies cited in Ashley et al., 2006). An important improvement to the current study would be an increase in sample size to allow the inclusion of such potentially
important variables as ethnicity and socioeconomic status (e.g., NZDep) in the estimation of injury risk.

The results of this study may also be affected by temporal ambiguity in that the injuries events considered mainly occurred before the identification of injury hazards via the home inspection. Therefore, it is possible that injury hazards may have been addressed by the residents in response to an injury event to reduce the risk of future injury. This form of bias may not be a serious concern in this study as it would lead to an underestimation of the association between the presence of injury hazards and injury occurrence: the injury event would lead to a reduction in the number of injury hazards following the remediation. Nevertheless, it would have been desirable to interview the residents about any hazard remediation that may have occurred over the period during which injury events were monitored.

The low cooperation rate achieved was not a concern for another objective of the study, which was to trial the use of the Healthy Housing Index as a tool for measuring health and safety aspects of the home. However, the sample cannot be considered as properly representative of the population surveyed because of the high refusal rate. If particular vulnerable populations are overrepresented, there is always the possibility that injury rates may be overestimated. For the achieved sample, 9% were aged under 5 years old and 13% aged 60 plus. From the point of view of this age categorisation as a means of identifying potentially high injury rate groups, these percentages do not indicate an overrepresentation of high risk groups: according to the 2006 Census, 7% of the NZ population were aged under five and 17% aged 60 plus (Statistics New Zealand, 2007). Nevertheless, the low cooperation rate remains a limitation of the study.

A potential variation to the current study would be to include the self-report of the use of safety features, which has been shown to be quite reliably reported in some studies (e.g., Hatfield et al., 2006). Nevertheless, care would need to be taken that such self-reports were not affected by injury occurrence or near misses, as misleading associations could thus be generated.

5. Conclusions

Based on a study of a sample of New Zealand households, consisting of an inspection of the dwelling and an analysis of home injuries occurring for the occupants, there was found to be an estimated increase of 22% in the odds of injury occurrence associated with each additional injury hazard found in the home (with 95% CI: 6–41%). This result suggests that addressing injury hazards in the home may be effective in reducing home injury. There are a number of potentially confounding factors that may affect relationships found between the existence of home hazards and injury occurrence. These need to be taken into account when future evaluations are planned.

Based on the positive findings from this research we plan to repeat this study using a much larger sample size. Assuming these findings are replicated, then that would provide good support for using a hazard-rating tool to quantify injury risk in houses more generally. Such information could be used to guide remediation action to remove the more important hazards.

Aggregate data from the use of such a rating tool would also provide a useful method for assessing progress towards creating a safer domestic environment at a local and eventually national level.

Acknowledgements

Thanks to the organisations that have provided support to the Healthy Housing Index development project, and the participants for opening their homes for the study. Thanks also to two anonymous referees for their constructive and helpful comments on an earlier draft. This study was partially funded by the Hutt Valley District Council, Accident Compensation Corporation, Building Research, and the Lower Hutt Valley District Health Board. The Housing and Health Research Programme is funded by the NZ Health Research Council. The opinions expressed in this paper are the authors’ and not necessarily those of the funding organisations.

Appendix A

Injury hazards included in the index:

- Bathroom floor uneven/slippery/sloped.
- Shower/bath with slippery surface.
- Inadequate space around bath/shower.
- In rest of house (apart from bathroom) floor uneven/slippery/sloped.
- Unsafe electrical wiring.
- Hot water thermostat temperature et to >60° or measured >55° at tap.
- Internal stairs present
- Stair handrail in disrepair/too high or too low/not continuous.
- Landing balustrade in disrepair/too low/too wide/insufficient strength.
- Stair risers uneven/too low/too high.
- Stairs slippery.
- Stairs not adequately lit.
- Stairs too steep.
- Stair treads too wide or narrow or uneven.
- Steps between bedroom and toilet.
- Insecure carpet on steps.
- Steps between kitchen and dining area.
- Mirrors or glass doors adjacent to stairs.
- No storage area in each of bathroom/kitchen/laundry available protected from young children.
- Outdoor pathway poorly lit/slippery/too steep/uneven/window opens onto pathway in hazardous way.
- Handrail on external steps in poor condition.
- Handrail on external steps needed but not provided.
- External steps structurally unsafe.
- External steps treads and risers of different heights.
- External steps flights of less than three steps grouped together.
- External steps with missing treads.
- External steps necessary (steep pathway).
- External steps slippery.
- External steps poorly lit/difficult to see.
References


