

## **Web Annex E**

### **Report of the systematic review on the relationship between hazards in the home and injuries**

**Soumyadeep Bhaumik, Claire Allen, Saurabh Gupta, Ramona  
Ludolph and Mike Clarke**

**In:**

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## Introduction

This report assesses the relationship between hazards in the home and injuries. We conducted a systematic review of this topic to support the development of the World Health Organization's (WHO) Housing and health guidelines. The aim of this systematic review was to provide the best available evidence from existing research to contribute to the deliberations of the WHO Guideline Development Group (GDG). It provides information that will help to answer questions around whether people living in homes with fewer hazards have fewer injuries than those living in homes with more hazards. This report is a substantial update of the preliminary version submitted in May 2015, to take account of more extensive searching and input from members of the GDG.

The structure of this report is as follows:

- Background: provides a brief contextualization of the relationship between the home environment and injury.
- Eligibility criteria and population, exposure, comparator, outcomes (PECO): outlines the PECO for this systematic review, and provides detailed inclusion and exclusion criteria.
- Search strategies and checking of articles: presents the process of searching and identifying articles.
- Extraction of information, preparation of narrative summaries, evidence profiles and summary of findings tables: provides the process of data extraction, quality assessment, and outcomes and findings presentation.
- Findings: summarises the results.
- Discussion: discusses the findings.
- Comprehensive appendices 1–23 present detailed information in relation to this systematic review.

## Background

Housing conditions affect the health status of the inhabitants. There is a need to understand the evidence base for various aspects of housing on health outcomes. Unintentional injuries at home contribute a significant burden of mortality and morbidity (National Safety Council 2003), as well as to emergency department (ED) visits (Runyon 2005), particularly among children and the elderly (WHO 2008). While there are many factors, which contribute to residential injuries, structural issues in the home itself are an important factor. Falls (including fractures), electrocutions and burns are common injuries occurring in the home. This systematic review, which is a part of a series of systematic reviews conducted for the WHO Housing and health guidelines, examines the relationship between hazards in the home and injuries.

## Methodology

### Research question

The final research question that was agreed on, in discussion with the WHO, is:

*Do residents in homes with fewer hazards have fewer injuries than those living in homes with more hazards?*

### Eligibility criteria and PECO

The eligibility criteria were designed with the intent to understand a variety of housing safety hazards and their effect on the incidence of injuries. The final eligibility criteria as agreed through discussion with the GDG is shown in Table 1. The review also sought to understand the effect of inequities in relation to the research question.

**Table 1 Inclusion and exclusion criteria for the review**

	Inclusion criteria	Exclusion criteria
Context	Domestic houses or flats in the community setting, regardless of household tenure Because gardens, yards, and common (shared) building spaces such as staircases, elevators, basement rooms etc. are part of standard residential use, studies were eligible if they investigated the relationship between design parameters of these and injury prevention.	Old age or nursing homes Homeless shelters Residential schools/colleges Orphanages or residential children's homes Hotels
Participants	All populations were eligible, with special attention to subgroups that may be more vulnerable to particular hazards. These sub-populations relate to: Age (old-aged persons and children) Gender Persons with different abilities	

	Inclusion criteria	Exclusion criteria
Exposures	<p>The following exposures related to housing structure were considered for this review:</p> <ul style="list-style-type: none"> <li>• Uneven floor surface</li> <li>• Changes of floor levels</li> <li>• Steep stairs</li> <li>• Variation in stair geometry</li> <li>• Lack of guarding of stairs, landings and balconies</li> <li>• Unsafe windows</li> <li>• Unsafe doors</li> <li>• Kitchen layout</li> <li>• Lack of smoke/carbon monoxide detectors</li> <li>• Unvented gas/solid fuel burning stoves</li> <li>• Unsafe electric installation</li> <li>• Open fires</li> <li>• Unprotected hot surfaces (which could include open fires, solid fuel stoves etc.)</li> <li>• No grab-rails or handles to baths/showers</li> </ul>	
Comparison	Absence of the relevant exposure	
Outcomes	<p>The review focused on the top five health outcomes identified by the GDG:</p> <ul style="list-style-type: none"> <li>• Electrocution</li> <li>• Broken or fractured bones</li> <li>• Mortality due to injuries</li> <li>• Burns or scalds</li> <li>• Hospitalization (outpatient or inpatient) due to injuries</li> </ul>	<p>Outcomes that are not related to health or social elements of participants</p> <p>Outcomes that are measured jointly from home accessibility features and participants' health or social changes</p>
Study type	<p>Experimental studies :</p> <ul style="list-style-type: none"> <li>• Randomized trials</li> <li>• non-randomized controlled trials, controlled before and after (CBA) studies (i.e. studies with a concurrent control group which have data collected on outcome measures at baseline and follow-up),</li> <li>• pre-post designs, and interrupted time series (ITS),</li> </ul> <p>Observational studies</p> <ul style="list-style-type: none"> <li>• case-control studies,</li> <li>• cohort studies, and</li> <li>• cross-sectional studies</li> </ul>	
	Systematic reviews were sought and are presented in the report separately but not included in the review.	

Randomized trials are the most robust study design to assess the effects of interventions, and may have been used to assess the effects of interventions to reduce hazards, such as the use of fireguards or smoke or carbon monoxide detectors. However, we expected that randomized trials comparing different levels of hazard in the home would be rare, particularly because of the difficulties of conducting research comparing housing designs and collecting long-term follow-up data. Therefore, it was agreed that experimental studies as well as observational research would be eligible for inclusion in this review.

## Search strategies and checking of articles

The constraints of time and resources involved in the conduct of this systematic review meant that it was not possible to explore all potential sources of information that might be drawn upon in a more comprehensive systematic review. As such, extensive searching for unpublished studies and for studies reported in the grey literature or published in journals that are not well-indexed in the major bibliographic databases was not conducted.

In 2015, search strategies were prepared and delivered by an experienced information specialist, in consultation with the review team (Appendices 1-8), and formed the basis of the preliminary report to the GDG. The following databases were searched:

- MEDLINE
- Embase
- Cochrane Library
- PsychInfo
- Global Health from CABI
- Web of Science
- CINAHL
- Clinicaltrials.gov

We had intended to search the WHO ICTRP database, but its interface does not allow for the complex searches required for a review with as wide a scope as this, and, so, we did not search it. We therefore relied on the search of clinicaltrials.gov to identify prospectively registered trials.

After further discussion within the review team, Evidence Aid and the GDG, a highly sensitive supplementary search was designed (Appendix 9) with the intention of increased sensitivity. This retrieved more than 22 000 records for screening, which included the reports suggested by the members of GDG. The intention was to avoid missing any pivotal study, which had reported the health outcomes that had been identified as most important for this review and which might transform the overall findings of the systematic review or the conclusions to be drawn from the findings. No language, geographic or study design restrictions were applied in the search strategy.

Considering the time available for the review, we restricted the study to those published during and after 2004. Further, only studies conducted after 1998 were included in the systematic review. Setting date limits for publication and conduct allowed us to exclude the few studies that are published a long time after they were done. Table 2 shows the number of records that were identified in the initial searches and supplementary search for the periods before and after 1998.

**Table 2** Number of records retrieved for articles published outside the time-period for this systematic review using the searches in Appendices 1–9 for original search in 2015.

Database	1998–2003	Pre 1998	Total
MEDLINE (Ovid) (Appendix 1)	897	1 492	2 389
Embase (Ovid) (Appendix 2)	288	981	1 269
Cochrane Library (Appendix 3)	79	62	141
PsycInfo (Ovid) (Appendix 4)	866	1 328	2 194
CABI Global Health (Ovid) (Appendix 5)	381	1 787	2 168
Web of Science (SSCI/SCI) (Appendix 6)	512	384	896
CINAHL (Ebsco) (Appendix 7)	335	225	560
ClinicalTrials.gov (no date limits) (Appendix 8)	n/a	n/a	1 024
Supplementary search (Appendix 9)	5 561	6 866	12 247

In order to bring the systematic review up-to-date, new searches for eligible studies were done in April 2018 to identify articles published since 30 January 2015. The updated search covered the same databases that were searched in 2015 and the highly sensitive supplementary search was also re-run. Detailed search strategies for the update are presented in Appendices 10–18.

Two reviewers independently screened records retrieved from the bibliographic databases based on their title and abstracts to identify potentially relevant articles. This assessment was performed in accordance with the inclusion and exclusion criteria developed *a priori*, after the WHO had confirmed all criteria. Any disagreements were resolved by consensus.

For the original search in 2015, the 13 508 search results from the databases were combined (except those from ClinicalTrials.gov, which was treated separately) and then de-duplicated in EndNote; 316 duplicates were removed by automatic detection and manual checking. The remaining 13 192 records were uploaded to an online screening system (Rayyan), which allows simultaneous independent screening to indicate decisions made about potential inclusion versus exclusion by the reviewers, using a cloud-computing platform. After manually screening for duplicates in Rayyan, 12 425 unique records remained. Two reviewers screened the records identified in the clinical trials registry independently, and their files were merged to check for any disagreements, which were resolved through consensus. The sensitive supplementary search identified 22 965 records and after de-duplication, 22 215 records remained. We did not merge the results of the original and supplementary searches until the

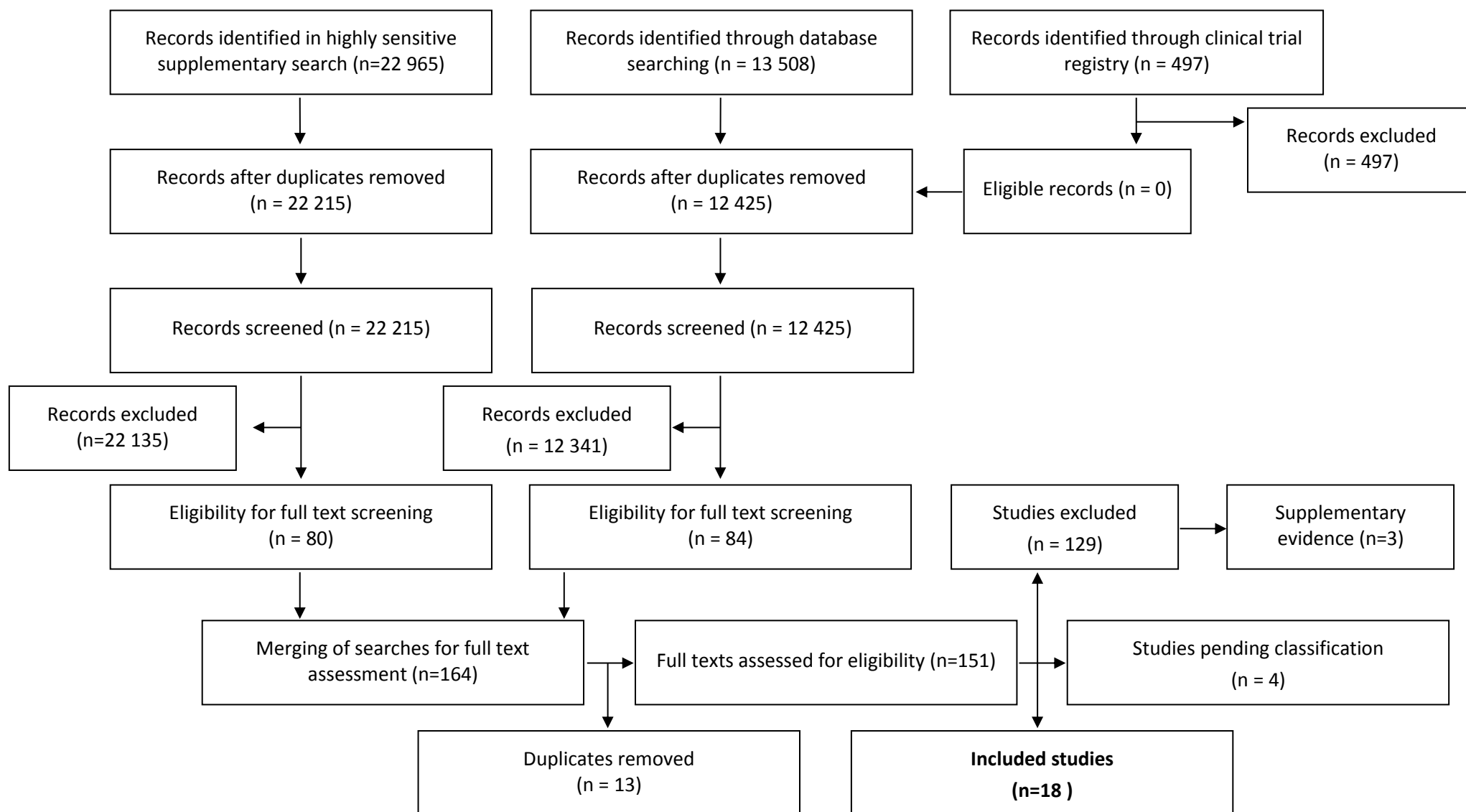
full text stage for pragmatic reasons. Figure 1a outlines the screening process in a PRISMA flow diagram for the 2015 search.

For the 2018 update, 19 513 records were retrieved from electronic database searching. 2107 duplicates were removed and 17 406 were screened. Eighteen full text articles were assessed for eligibility but only two were finally found to be eligible for inclusion. This has been outlined in Figure 1b.

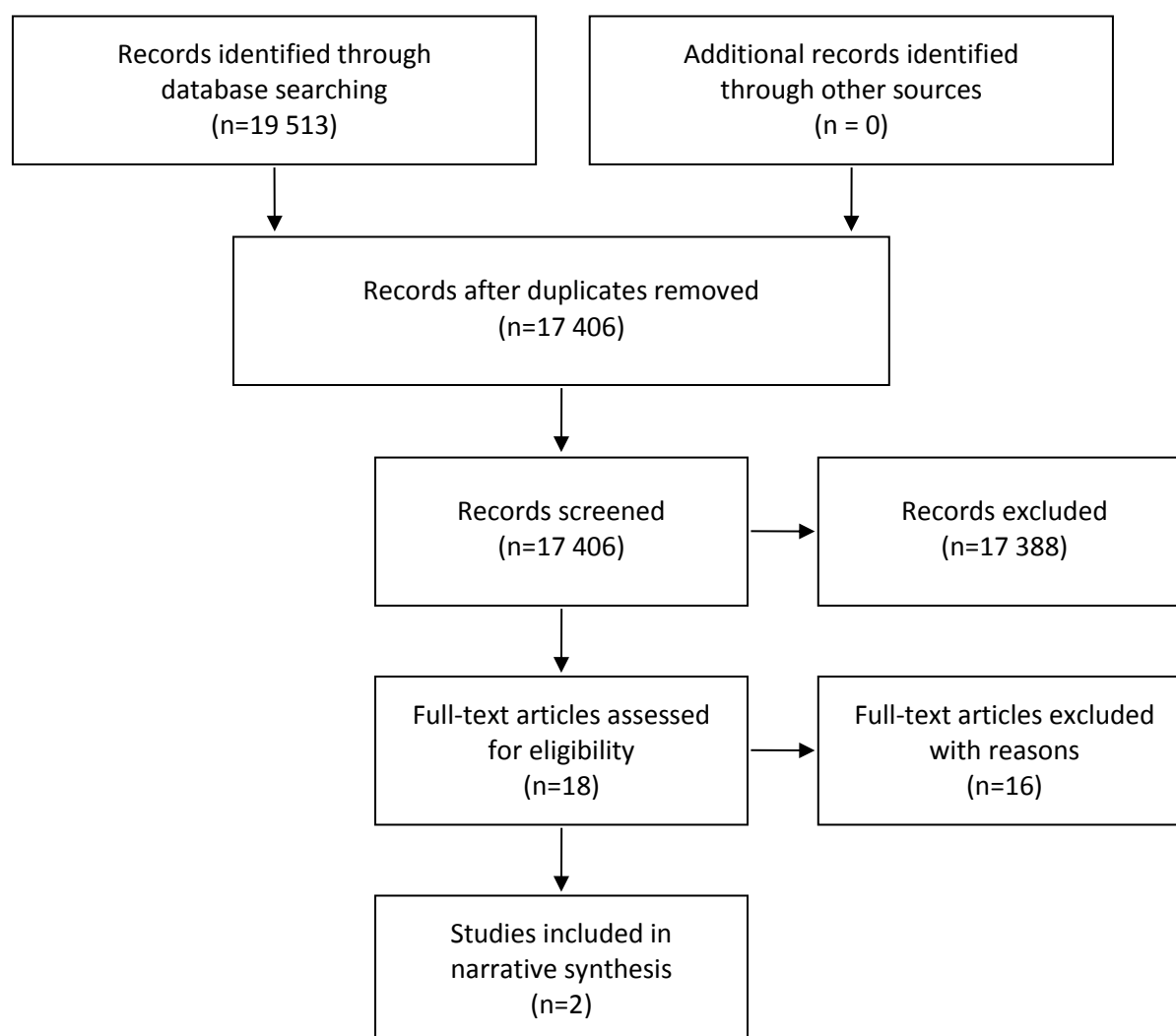
As expected when the searches were designed for maximum sensitivity, most of the retrieved records were not relevant to this systematic review and this was obvious from scrutiny of their title and abstract. Given the large number of such reports, reasons for the early exclusion of each of these several thousand records were not recorded.

A list of the studies that were excluded after full text review and the reason for their exclusion and studies that are awaiting classification are shown in Appendix 18.

**Figure 1a** Flow diagram for identification of studies



**Figure 1b** Flow diagram for identification of studies in 2018 update



### Extraction of information, preparation of narrative summaries, evidence profiles and summary of findings tables

Full text articles were obtained for all studies that were identified as potentially eligible after the first round of screening. Data was extracted to determine if they should be included, using a piloted data extraction form. The first section of this form had information necessary to make a decision on inclusion. If studies were considered ineligible, the remaining sections of the form were not completed. The second section of the form was completed for included studies only. The following data were extracted, where available (Appendix 19 shows the characteristics of included studies):

- Study details: location, year, contextual information.
- Methods: study design, total duration of study, study location, study setting, risk of bias information, withdrawals, and period of conduct of study.
- Participants: number, mean age or age range, gender, diagnostic criteria if applicable, inclusion criteria, and exclusion criteria.

- Exposure and comparison: description of exposure, comparison, duration, intensity, content of both exposure and control condition, and any co-exposures or co-interventions.
- Outcomes: description of outcomes specified and collected, and the time points at which they were measured.
- Other information: funding for the study and any reported conflicts of interest of authors.

We assessed the Risk of Bias (RoB) and other features of the quality of each study to allow the completion of an evidence profile for each study. The RoB checklists were chosen based on the study design and the results of the RoB assessment of included studies are presented in Appendix 20. Evidence was narratively synthesised and evidence summaries and standard summary of findings were prepared for presentation to the GDG.

## Results

### Results of the search

Twenty studies were included. There were six interventional studies, five of which were randomized trials (Campbell 2005; Fitzharris 2010; Phelan 2011; Keall 2015; Kamei 2015) and one used a pre-post design (Chamania 2015). Fourteen observational studies were included. Six of these were cohort studies (one of which was the control group from a randomized trial) (Kendrick 2005; Keall 2008; Leclerc 2010; Pearce 2012; Harvey 2013; Istre 2014), seven were case-control studies (LeBlanc 2006; Mashreky 2010; Taira 2011; Sadeghi Bazargan 2012; Othman 2013; Kendrick 2015; Stewart 2016) and one study was a retrospective analysis of cross-sectional data (Pressley 2005). All five randomized trials were from high income countries: two from New Zealand (Campbell 2005; Keall 2015) and one each from the United States of America (Phelan 2011), Australia (Fitzharris 2010) and Japan (Kamei 2015). The interventional study with pre-post design was from a rural India (Chamania 2015). Among the observational studies, most studies were also conducted in high income countries: four from the United Kingdom (Kendrick 2005; Pearce 2012; Kendrick 2015; Stewart 2016); three from the USA (Pressley 2005; Taira 2011; Istre 2014); two from Canada (LeBlanc 2006; Leclerc 2010) and one each from Australia (Harvey 2013) and New Zealand (Keall 2008). Three observational studies were from low and middle income countries: Bangladesh (Mashreky 2010), the Islamic Republic of Iran (Sadeghi-Bazargan 2013) and Iraq (Othman 2013). Further characteristics of the included studies are detailed in Appendix 19.

### Populations

The studies included a range of participants, with some studies focusing on children under five years of age, older children, caregivers of children, community dwelling older adults, older adults with visual impairments, patients presenting to an emergency department, and patients in a burns registry. One study recruited visually impaired adults over the age of 75 years (Campbell 2005), and none of the other studies targeted differently-abled individuals living in the community.

## Types of interventions

This review includes evidence with regard to several interventions and exposures that were specified in the PECO (Table 1):

- Seven studies investigated the effect of a fire or smoke alarm or a carbon monoxide detector: one randomized trial (Phelan 2011) where the installation of a smoke alarm could follow a home safety assessment in those allocated to this intervention, three cohort studies (Kendrick 2005; Harvey 2013; Istre 2013) and three case-control studies (LeBlanc 2006; Taira 2011; Othman 2013).
- Two studies reported on the effects of stairway or safety gates or doors: one cohort study (Kendrick 2005) and two case-control studies (Mashreky 2010; Stewart 2016).
- One analysis of cross-sectional data (Pressley 2005) investigated the effect of window guard legislation on outcomes of interest to this review.
- Two studies investigated the effects of fireguards: one case-control study (Taira 2011) and one cohort study (Pearce 2012).
- Five studies investigated the effect of unvented gas, fuel burning stoves or unprotected hot surfaces: four case-control studies (LeBlanc 2006; Mashreky 2010; Sadeghi Bazargan 2012; Othman 2013) and one pre-post interventional study (Chamania 2015).
- Five randomized trials studied the effect of home safety assessment and modification programs (Campbell 2005; Fitzharis 2010; Phelan 2011; Keall 2015; Kamei 2015).
- Three studies showed a relationship between the number of home hazards and the need for medical consultations or visits to healthcare services, such as emergency departments (Keall 2008, Leclerc 2010; Pearce 2012).

## Effect of exposures or interventions on outcomes

Some of the studies were related to the assessment or modification of hazards generally, while others related to specific interventions (such as fire or smoke alarms or stair gates). In general, the evidence was unclear for the effects of general programs but there were clear benefits for some interventions, such as fire and smoke alarms. Evidence profiles to summarise the evidence and its certainty are presented in Appendix 21.

### *Fire, smoke or carbon monoxide detector*

Properly installed and functioning smoke alarms were found to reduce the incidence of burn injuries. A randomized trial in the USA found that smoke alarms and carbon monoxide detectors at baseline and at 12 and 24 months' follow-up prevented burns and fires in the homes (Phelan 2011). A Canadian case-control study found an increased risk of burns and scalds in children if their house did not have a smoke alarm (LeBlanc 2006). A case-control study from Iraq found an increased risk of burns in children if their house did not have a smoke alarm (Othman 2013). Another study, in the United Kingdom, reported that among children seeking primary care, admitted to hospital, or presenting to the emergency department, those with burn injuries were less likely to have working smoke alarms in the home (Kendrick 2005). However, another case-control study, in the USA, reported that burn cases had similar rates of smoke alarm usage and use of carbon monoxide detectors (Taira 2011).

The evidence that smoke alarms reduce the risk of hospitalization is supported by two cohort studies. One found that the introduction of legislation for compulsory smoke alarm ownership in an Australian state decreased hospitalization rates by 36.2% annually (Harvey 2013). The other found that fire-related death and injury were lower in the population with an installed smoke alarm than in the population without a smoke alarm (Istre 2014).

### *Stair and safety gates or doors*

Three studies reported on the effects of stair or safety gates on injury in children. One cohort study in the United Kingdom found that among children under 5 years of age, those who lived in homes that had been fitted with stair safety gates were less likely to be admitted to hospital, to attend primary care or to access the accident and emergency department (Kendrick 2005). A case-control study in Bangladesh found that children living in homes where the kitchen did not have a door were more likely to sustain burns (Mashreky 2010). This finding is supported by a case-control study from the United Kingdom, in which not using safety gates was associated with a significant increase in scalds (Stewart 2016).

### *Window guards*

One cross-sectional study from the USA assessed the effect of window guard legislation. Window guards were found to be twice as effective in preventing falls than windows without guards (Pressley 2005).

### *Home safety assessment and modification programme*

Five randomized trials studied the effect of home safety assessment and modification programmes on injuries (Campbell 2005; Fitzharris 2010; Kamei 2015; Keall 2015; Phelan 2011). These had mixed results depending on the comparator for the home safety assessment and modification programmes, some of which are effective interventions for, for example, reducing falls. However, in general, people living in homes in which hazards had been reduced were less likely to sustain injuries than those who received no injury prevention interventions. For example, a randomized trial in New Zealand of adults over 75 years who had severe visual impairments found that there were fewer falls in the group of participants in the home safety programme, compared with those who did not receive this programme (Campbell 2005). Similarly, a randomized trial in the USA showed that the rate of medically attended injuries was reduced in children who had the programme compared with controls who did not (Phelan 2011). This is supported by Keall 2015 who found that medically treated falls were rarer for the group of dwellings that had been assessed and modified for safety. In addition, a randomized trial from Japan found that falls occurring in the home one year after introducing a home hazard modification programme were reduced more in the intervention group than in the control group (Kamei 2015). In contrast, a randomized trial of older adults in the United Kingdom found that the home modification programme did not reduce the incidence of falls (Fitzharris 2010).

### *Association between the number of hazards in the home and the incidence of injuries*

Four case-control studies found a dose-response relationship between the number of home hazards and the need for medical consultations or visits to health care services. The New Zealand study reported an estimated increase of 22% in the odds of injury occurrence associated with each additional home injury hazard (Keall 2008). A Canadian study of adults

aged 65 years and over found that an increase in the number of home hazards was associated with an increased risk of a second fall-related medical visit (Leclerc 2010). However, a study of children (aged 9 months to 3 years) in the United Kingdom found that those who lived in homes without any of the four hazards measured (fire guard, safety gate, smoke alarms and electric socket covers) were approximately 20% less likely to have been injured than those with all four hazards (Pearce 2012).

### Supplementary evidence from individual studies

Three studies were identified, which do not meet the eligibility criteria but which might be particularly useful for the development of the guideline (Johnston 2011; Phillips 2011; Clouatre 2013). Detailed information about these is presented in Appendix 22. In summary, Johnston 2011 is a case-control study in which windows rather than children were identified as the cases for comparison with controls. This study might be informative because it identifies various design related parameters associated to falls from windows. Clouatre 2013 studied the effect of a legislation requiring all new or renovated residential buildings to lower the maximum setting of their hot water heaters to 49°C (120°F) by installing anti-scalding mixer valves. This intervention was not listed in the original criteria but might be important because of its potential impact on scalds. Phillips 2011 is an economic evaluation conducted alongside a randomized trial, which also studied the effect of anti-scalding thermostatic mixer valves (delivered as a part of a multi-factorial intervention) on scalds. No quality appraisal of primary studies included as supplementary evidence was conducted.

The searches further found several recent studies, which showed that specific home hazards were associated with increased injuries:

- A case-control study of 88 residents in a high fall rate building (n=48) and a low fall rate building (n=40) found a mean of 15.29 (SD: 1.58) environmental hazards in the high fall rate building, compared to 10.38 (SD: 1.76) in the low fall rate building (Kim 2018).
- A case-control study of 582 children (<5 years) with a medically attended fall injury occurring at home matched with 2460 controls found that injured children were significantly less likely to live in a household without furniture corner covers (aOR: 0.72, 95% CI: 0.55-0.95) or without rugs and carpets firmly fixed to the floor (aOR: 0.76, 95% CI: 0.59-0.98) (Benford 2015).
- A case-control study of 501 adults (≥60 years) in Kerala in India found increased injuries with slippery floor (aOR: 2.37, 95% CI: 1.31-4.32) and door threshold (aOR: 1.52, 95% CI: 1.01–2.29) (Ravindran 2016).
- A case-control study of 892 stroke survivors and 892 controls (>65 years) in the USA (where the main purpose was to compare stroke survivors with non-stroke survivors) found that tripping hazards were associated with increased falls (PR: 1.26, 95% CI: 1.03-1.56) (Wing 2017).
- A cross-sectional study of 200 households with 637 children (<18 years) in Kumasi in Ghana found that burn injury was more common for children of families that cooked outside the house (OR: 1.13, 95% CI: 0.60-2.14) or who lived in uncompleted accommodation (OR: 11.29, 95% CI: 1.48-86.18) (Gyedu 2016).

- A cross-sectional study of 350 adults ( $\geq 80$  years) in Brazil found significant associations with increased falls for main entrance steps (aPR: 1.82, 95% CI: 1.03-3.21), uneven floor (aPR: 5.54, 95% CI: 2.26-13.55), absence of anti-slip kitchen loose throw rugs (aPR: 3.02, 95% CI: 1.82-4.99), absence of anti-slip bedroom loose throw rugs (aPR: 1.84, 95% CI: 1.08-3.14) and lack of grab bars in the shower (aPR: 4.69, 95% CI: 1.46-15.07) (Pereira 2017).

On the other hand, the searches also found recent studies that did not demonstrate a link between home hazards and injuries:

- A cohort study of 566 children ( $< 5$  years) in Australia that examined hazardous structural features of the home and safe practices found that children living in homes with the least injury risk compared to those in high risk homes were more likely to suffer injury (RR: 1.90, 95% CI 1.15-3.14). However, families in the lowest risk homes were more likely to be socioeconomically disadvantaged than families in the highest risk homes (more sole parents, lower maternal education levels, younger maternal age and lower income). When demographic and socioeconomic factors were adjusted for, the relationship between home risk and injury was no longer statistically significant (RR: 1.60, 95% CI: 0.96-2.66) (Osborne 2016).
- A cross-sectional study of 1489 adults ( $\geq 55$  years) in Malaysia found no significant association between home hazards and falls (Romli 2018).

### Supplementary evidence from related systematic reviews

A summary of evidence available from related systematic reviews is presented in Appendix 23. In summary, we found seven systematic reviews (Kendrick 2012; Turner 2011; McClure 2005; DiGuesseppe 2001; Gates 2008; Neyens 2011; Change 2004) related to the research question. No quality appraisal of systematic reviews included as supplementary evidence was conducted.

## Discussion

In general, there is a lack of robust high quality evidence on the effect of home safety modifications on health related outcomes due to the paucity of high quality studies. There is some evidence available on the effect of smoke, fire alarms or carbon monoxide detectors on various injury-related health outcomes. However, it is important to keep smoke and fire alarms or carbon monoxide detectors in good working condition. The review further identified evidence from randomized controlled trials on the effectiveness of home safety assessment and modification programs in decreasing the number of injuries needing medical attention. There is also some consistent evidence available that with an increase in the number of home hazards, the needs of medical care or consultations increase. The evidence base is largely from high-income countries. The few studies conducted in low-income settings are primarily on the prevention of burns, while none of them study the role of fire or smoke alarms, or carbon monoxide detectors as interventions or exposures.

Several studies were excluded because they reported slips or falls as an outcome measure but none of the health-related outcomes of interest to our review. It is important to note that most falls do not need medical attention or lead to either fractures or hospitalization. For example, Rubenstein found that only 1 in 20 falls led to either fractures or hospitalization

(Rubenstein 2001). Therefore, future studies should assess the impact on health-related outcomes such as need for medical attention, fractures and hospitalizations and need to be large enough to have adequate power.

The reviewers undertook a comprehensive search of various databases and was broad in scope. The reviewers did not undertake any searches for grey literature such as evidence contained in reports, policy documents and other monographic material found in the publications of organizations working in the domain. Considering the resource intensiveness of accessing and searching the grey literature that is often accompanied by a very low yield, it was decided to focus on electronic databases only. Besides, this review was conducted with the aim to inform the guideline development process. Reflecting the complex nature and multi-factorial issues the domain of injury prevention involves, it took several re-iterations to finalize the scope of the review.

The systematic review concludes that there is a lack of high quality evidence of the listed interventions to modify injury-related health outcomes. Injuries in the home are a result of a multitude of factors. There is a general paucity of evidence for most exposures and interventions but there is some moderate quality evidence available for smoke and fire alarms as well as home safety assessment and modification programs. Given the obvious benefits of some interventions or exposures such balcony guards or unsafe electrical installation, experimental research might appear superfluous to understand their effects and it would be unethical to randomize people to control groups posing an obvious health threat.

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John Evers (Independent information specialist) designed and implemented the search strategies. Declan Bradley, Alex Nevitte, Lizzie Fletcher-Wood and Ambrish Singh supported the screening of articles in the 2015 supplementary search.

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## Appendices

### Appendix 1 Search strategy for Ovid MEDLINE – original search conducted in 2015

**Ovid MEDLINE(R) in-process and other non-indexed citations, Ovid MEDLINE(R) Daily, Ovid MEDLINE(R) and Ovid OLDMEDLINE(R) <1946 to present>**

Searched: 29 January 2015

- 1 housing/ or housing for the elderly/or assisted living facilities/ or public housing/or gardening/ (17243)
- 2 (((domestic or public or private) adj2 (housing or house or houses or household\* or residential or residence\* or home or homes or dwelling\* or accommodation or abode\* or habitation or garden\* or backyard\* or "back yard\*")) or slum or slums or shanty\* or shanties).ti,ab. (5569)
- 3 1 or 2 (22159)
- 4 Accidents, Home/ (4009)
- 5 Accidental Falls/ (15957)
- 6 accident prevention/ or safety/ or "hazard analysis and critical control points"/ (39505)
- 7 environmental exposure/ or inhalation exposure/ or hazardous substances/ (70052)
- 8 (accident\* or hazard\* or safety).ti,ab. (503184)
- 9 or/4-8 (595961)
- 10 exp "Wounds and Injuries"/ec, ep, et, mo, pc [Economics, Epidemiology, Etiology, Mortality, Prevention & Control] (207628)
- 11 Hospitalization/ or Office Visits/ (78473)
- 12 (injury or injuries or fracture\* or lacerat\* or contus\* or concuss\* or amputat\* or dislocat\* or broken or ligament\* or burn or burns or scald\* or sprain\* or cuts or electrocut\* or "electric shock\*" or bruise\* or abrasion\* or mortality or death\* or morbidity or hospital\* or outpatient\* or out-patient\* or in-patient\* or inpatient\* or ((doctor\* or physician\* or medical officer\* or practitioner\* or gp or clinician\*) adj2 (visit\* or consult\*))).ti,ab. (3397898)
- 13 10 or 11 or 12 (3502845)
- 14 exp Animals/ (17625035)
- 15 Humans/ (13645983)
- 16 14 not (14 and 15) (3979052)
- 17 3 and 9 (2789)
- 18 17 not 16 (2769)

- 19 3 and 13 (3694)
- 20 19 not 16 (3639)
- 21 18 or 20 (5716)
- 22 exp Nursing Homes/ (32330)
- 23 Homes for the Aged/ (11247)
- 24 residential facilities/ or group homes/ or halfway houses/ or orphanages/ or poverty areas/ (11232)
- 25 schools/ or schools, nursery/ (22735)
- 26 Universities/ (26042)
- 27 (((("old age\*" or elderly or nursing or universit\* or college\* or school\*) adj3 (shelter\* or hostel\* or home\* or housing or residen\*)) or orphanage\* or hotel\*).ti,ab. (36818)
- 28 or/22-27 (114813)
- 29 21 not 28 (4823)
- 30 limit 29 to yr="2004 -Current" (2434)
- 31 limit 29 to yr="1998 -2003" (897)
- 32 limit 29 to yr="1860 – 1997" (1492)

## Appendix 2 Search strategy for Embase – original search conducted in 2015

### EmbaseClassic+Embase 1947 to 2015 Week 04(Ovid)

Searched: 30 January 2015

- 1 (((domestic or public or private) adj2 (housing or house or houses or household\* or residential or residence\* or home or homes or dwelling\* or accommodation or abode\* or habitation or garden\* or backyard\* or "back yard\*")) or slum or slums or shanty\* or shanties).ti,ab. (6707)
- 2 \*housing/ or \*assisted living facility/ or home environment/ or \*household/ or \*"construction work and architectural phenomena"/ or \*architectural barrier/ or \*vulnerable population/ or \*poverty/ (28897)
- 3 1 or 2 (34688)
- 4 (accident\* or hazard\* or safety).ti,ab. (729303)
- 5 \*electric accident/ or \*electrocution/ or \*explosion/ or \*falling/ or home accident/ or \*structure collapse/ or accident prevention/ or accident proneness/ or \*falling/ (28251)
- 6 home safety/ or \*child safety/ or \*hazard/ or \*electric hazard/ or \*hazard assessment/ or \*health hazard/ or \*inhalation/ or \*fire protection/ (16316)
- 7 or/4-6 (757392)
- 8 exp \*injury/ep, et, pc, rh [Epidemiology, Etiology, Prevention, Rehabilitation] (150883)
- 9 \*hospitalization/ or \*consultation/ (34497)
- 10 (injury or injuries or fracture\* or lacerat\* or contus\* or concuss\* or amputat\* or dislocat\* or broken or ligament\* or burn or burns or scald\* or sprain\* or cuts or electrocut\* or "electric shock\*" or bruise\* or abrasion\* or mortality or death\* or morbidity or hospital\* or outpatient\* or out-patient\* or in-patient\* or inpatient\* or ((doctor\* or physician\* or medical officer\* or practitioner\* or gp or clinician\*) adj2 (visit\* or consult\*))).ti,ab. (4703413)
- 11 7 or 8 or 9 or 10 (5190511)
- 12 3 and 11 (6842)
- 13 exp animal/ (20234900)
- 14 human/ (15387804)
- 15 13 not (13 and 14) (4847096)
- 16 12 not 15 (6735)
- 17 nursing home/ or nursing home patient/ (45232)
- 18 home for the aged/ (11412)
- 19 residential home/ (5929)

- 20    halfway house/ (1264)
- 21    orphanage/ (799)
- 22    school/ or college/ or community college/ or high school/ or kindergarten/ or medical school/ or middle school/ or nursery school/ or primary school/ or university/ (261148)
- 23    (((("old age\*" or elderly or nursing or universit\* or college\* or school\*) adj3 (shelter\* or hostel\* or home\* or housing or residen\*)) or orphanage\* or hotel\*).ti,ab. (47613)
- 24    or/17-23 (337432)
- 25    16 not 24 (5930)
- 26    limit 25 to embase (3299)
- 27    limit 26 to yr="2004 -Current" (2030)
- 28    limit 26 to yr="1998 – 2003" (288)
- 29    27 or 28 (2318)
- 30    26 not 29 (981)

## Appendix 3 Search strategy for Cochrane Library – original search conducted in 2015

### Cochrane Library

Searched: 30 January 2015

- #1 MeSH descriptor: [Housing] this term only
- #2 MeSH descriptor: [Housing for the Elderly] this term only
- #3 MeSH descriptor: [Public Housing] this term only
- #4 MeSH descriptor: [Building Codes] this term only
- #5 MeSH descriptor: [Vulnerable Populations] this term only
- #6 MeSH descriptor: [Poverty] this term only
- #7 MeSH descriptor: [Assisted Living Facilities] this term only
- #8 MeSH descriptor: [Poverty Areas] this term only
- #9 MeSH descriptor: [Gardening] this term only
- #10 (((domestic or public or private) near/2 (housing or house or houses or home or homes or indoor or dwelling\* or accommodation or abode\* or residential or residence\* or habitation or domicile or household\*)) or slum or slums or shanty\* or shanties):ti,ab
- #11 {or #1-#10}
- #12 MeSH descriptor: [Accidents, Home] this term only
- #13 MeSH descriptor: [Accidental Falls] this term only
- #14 MeSH descriptor: [Accident Prevention] this term only
- #15 MeSH descriptor: [Safety] this term only
- #16 MeSH descriptor: [Hazard Analysis and Critical Control Points] explode all trees
- #17 MeSH descriptor: [Environmental Exposure] this term only
- #18 MeSH descriptor: [Inhalation Exposure] this term only
- #19 MeSH descriptor: [Hazardous Substances] this term only
- #20 (accident\* or hazard\* or safety):ti,ab
- #21 MeSH descriptor: [Wounds and Injuries] explode all trees and with qualifier(s): [Economics – EC, Epidemiology – EP, Etiology – ET, Mortality – MO, Prevention & control – PC]
- #22 MeSH descriptor: [Hospitalization] this term only

#23 MeSH descriptor: [Office Visits] this term only

#24 (injury or injuries or fracture\* or lacerat\* or contus\* or concuss\* or amputat\* or dislocat\* or broken or ligament\* or burn or burns or scald\* or sprain\* or cuts or electrocut\* or "electric shock\*" or bruise\* or abrasion\* or mortality or death\* or morbidity or hospital\* or outpatient\* or out-patient\* or in-patient\* or inpatient\* or ((doctor\* or physician\* or medical officer\* or practitioner\* or gp or clinician\*) near/2 (visit\* or consult\*))) :ti,ab

#25 {or #12-#24}

#26 #11 and #25 Publication Year from **2004 to 2015 [280 hits]**

#27 #11 and #25 Publication Year from **1998 to 2003 [79 hits]**

#28 #11 and #25 **All years [421 hits]**

#29 #26 or #27

#30 #28 not #29 **Pre-1998 [62 hits]**

## Appendix 4 Search strategy for PsycINFO – original search conducted in 2015

### PsycINFO 1806 to January Week 4 2015 (Ovid)

Searched: 30 January 2015

- 1 (((domestic or public or private) adj2 (housing or house or houses or household\* or residential or residence\* or home or homes or dwelling\* or accommodation or abode\* or habitation or garden\* or backyard\* or "back yard\*")) or slum or slums or shanty\* or shanties).ti,ab. (2851)
- 2 \*housing/ or \*assisted living/ or \*retirement communities/ or architecture/ or built environment/ or \*at risk populations/ or \*poverty areas/ or \*poverty/ (29602)
- 3 1 or 2 (31812)
- 4 (accident\* or hazard\* or safety).ti,ab. (68550)
- 5 \*accidents/ or \*falls/ or home accidents/ or accident prevention/ or accident proneness/ or \*hazardous materials/ or \*hazards/ or exp \*injuries/ or \*safety/ (26353)
- 6 fire prevention/ (127)
- 7 \*hospitalization/ or \*hospital admission/ (5188)
- 8 \*professional consultation/ (6786)
- 9 (injury or injuries or fracture\* or lacerat\* or contus\* or concuss\* or amputat\* or dislocat\* or broken or ligament\* or burn or burns or scald\* or sprain\* or cuts or electrocut\* or "electric shock\*" or bruise\* or abrasion\* or mortality or death\* or morbidity or hospital\* or outpatient\* or out-patient\* or in-patient\* or inpatient\* or ((doctor\* or physician\* or medical officer\* or practitioner\* or gp or clinician\*) adj2 (visit\* or consult\*))).ti,ab. (378611)
- 10 or/4-9 (436560)
- 11 3 and 10 (4855)
- 12 limit 11 to yr="2004 -Current" (2661)
- 13 limit 11 to yr="1998–2003" (866)
- 14 12 or 13 (3527)
- 15 11 not 14 **Pre-1998 (1328)**

## Appendix 5 Search strategy for Global Health – original search conducted in 2015

### Global Health 1910 to 2015 Week 04 (Ovid)

Searched: 30 January 2015

- 1 (((domestic or public or private) adj2 (housing or house or houses or home or homes or indoor or dwelling\* or accommodation or abode\* or residential or residence\* or habitation or domicile or household\*)) or slum or slums or shanty\* or shanties).ti,ab. (4279)
- 2 housing/ or dwellings/ or homes/ or public housing/ or rural housing/ or households/ or living conditions/ (28299)
- 3 poverty/ or deprivation/ or economically disadvantaged/ or low income groups/ (14115)
- 4 structural design/ or architecture/ or buildings/ or building construction/ or building controls/ (5484)
- 5 or/1-4 (47788)
- 6 (accident\* or hazard\* or safety).ti,ab. (127540)
- 7 accidents/ or falls/ or accident prevention/ or electrocution/ or safety/ (37191)
- 8 safety/ or electrical safety/ or home safety/ (29549)
- 9 hazards/ or fire danger/ or health hazards/ (14459)
- 10 injuries/ or bruising/ or heat injury/ or abrasion/ or wounds/ or electrocution/ or burns/ or fractures/ or bone fractures/ or scald/ (17373)
- 11 hospital admission/ or "health care utilization"/ (7126)
- 12 (injury or injuries or fracture\* or lacerat\* or contus\* or concuss\* or amputat\* or dislocat\* or broken or ligament\* or burn or burns or scald\* or sprain\* or cuts or electrocut\* or "electric shock\*" or bruise\* or abrasion\* or mortality or death\* or morbidity or hospital\* or outpatient\* or out-patient\* or in-patient\* or inpatient\* or ((doctor\* or physician\* or medical officer\* or practitioner\* or gp or clinician\*) adj2 (visit\* or consult\*))).ti. (133416)
- 13 or/6-12 (275471)
- 14 5 and 13 (5289)
- 15 limit 14 to yr="2004 -Current" (3121)
- 16 limit 14 to yr="1998-2003" (381)
- 17 15 or 16 (3502)
- 18 14 not 17 **Pre-1998 (1787)**

## Appendix 6 Search strategy for Web of Science – original search conducted in 2015

### Web of Science (SCI/SSCI)

Searched: 31 January 2015

10      384 [1970–1997]      #6 AND #3

Indexes=SCI-EXPANDED, SSCI Timespan=1970–1997

# 9      512 [1998–2003]      #6 AND #3

Indexes=SCI-EXPANDED, SSCI Timespan=1998–2003

# 8      2617 [2004 to Current]      #6 AND #3

Indexes=SCI-EXPANDED, SSCI Timespan=2004–2015

# 7      3513      #6 AND #3

Indexes=SCI-EXPANDED, SSCI Timespan=1970–2015

# 6      1 737 387      #5 OR #4

Indexes=SCI-EXPANDED, SSCI Timespan=1970–2015

# 5      1 407 064

TI=(injury or injuries or fracture\* or lacerat\* or contus\* or concuss\* or amputat\* or dislocat\* or broken or ligament\* or burn or burns or scald\* or sprain\* or cuts or electrocut\* or "electric shock\*" or bruise\* or abrasion\* or mortality or death\* or morbidity or hospital\* or outpatient\* or out-patient\* or in-patient\* or inpatient\* or "office visit\*" or ((doctor\* or physician\* or "medical officer\*" or practitioner\* or gp or clinician\*) NEAR/2 (visit\* or consult\*)))

Indexes=SCI-EXPANDED, SSCI Timespan=1970–2015

# 4      353 911

TI=(accident\* or fall or falls or safety or hazard\* or exposure)

Indexes=SCI-EXPANDED, SSCI Timespan=1970–2015

# 3      66 027      #2 OR #1

Indexes=SCI-EXPANDED, SSCI Timespan=1970–2015

# 2      56 087

TS=("assisted living" or poverty or (vulnerable NEAR (group\* or population\* or people)))

Indexes=SCI-EXPANDED, SSCI Timespan=1970–2015

# 1      10 800

TS=(((domestic or public or private) NEAR/2 (housing or house or houses or home or homes or indoor or dwelling\* or accommodation or abode\* or residential or residence\* or habitation or domicile or household\*)) or slum or slums or shanty\* or shanties)

Indexes=SCI-EXPANDED, SSCI Timespan=1970–2015

## Appendix 7 Search strategy for CINAHL – original search conducted in 2015

### CINAHL Plus (Ebsco)

Searched: 31 January 2015

S27	S16 NOT S24	Limiters – <b>exclude MEDLINE records</b>	
Database	CINAHL Plus with full text	<b>46 [Pre-1998]</b>	
S26	S15 NOT S24	Limiters – <b>exclude MEDLINE records</b>	
Database	CINAHL Plus with full text	<b>102 [1998-2003]</b>	
S25	S14 NOT S24	Limiters – <b>exclude MEDLINE records</b>	
Database	CINAHL Plus with full text	<b>407 [2004 onwards]</b>	
S24	S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23		
Database	CINAHL Plus with full text		55 662
S23	(MH "hotels")	Limiters – published date: 20040101-20151231	
Database	CINAHL Plus with full text		375
S22	TI (((("old age*" or elderly or nursing or universit* or college* or school*) N3 (shelter* or hostel* or home* or housing or residen*)) or orphanage* or hotel*) OR AB (((("old age*" or elderly or nursing or universit* or college* or school*) N3 (shelter* or hostel* or home* or housing or residen*)) or orphanage* or hotel*)	Limiters – published date: 20040101-20151231	
Database	CINAHL Plus with full text		13 017
S21	(MH "Schools") OR (MH "Colleges and Universities+") OR (MH "Schools, Elementary") OR (MH "Schools, Middle") OR (MH "Schools, Nursery") OR (MH "Schools, Secondary") OR (MH "Schools, Special")	Limiters – published date: 20040101-20151231	
Database	CINAHL Plus with full text		33 933
S20	(MH "Orphans and Orphanages")	Limiters – published date: 20040101-20151231	
Database	CINAHL Plus with full text		706
S19	(MH "Residential Facilities")	Limiters – published date: 20040101-20151231	
Database	CINAHL Plus with full text		2 260
S18	(MH "Halfway Houses")	Limiters – published date: 20040101-20151231	
Database	CINAHL Plus with full text		72
S17	(MH "Nursing Homes")	Limiters – published date: 20040101-20151231	
Database	CINAHL Plus with full text		11 258
S16	S3 and S12	Limiters – published date: 18000101-19971231	
Database	CINAHL Plus with full text		225
S15	S3 and S12	Limiters – published date: 19980101-20031231	
Database	CINAHL Plus with full text		335
S14	S3 and S12	Limiters – published date: 20040101-20151231	
Database	CINAHL Plus with full text		1 731
S13	S3 AND S12		
Database	CINAHL Plus with full text		2 291
S12	S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11		
Database	CINAHL Plus with full text		713 202

S11	TI ( (injury or injuries or fracture* or lacerat* or contus* or concuss* or amputat* or dislocat* or broken or ligament* or burn or burns or scald* or sprain* or cuts or electrocut* or "electric shock*" or bruise* or abrasion* or mortality or death* or morbidity or hospital* or outpatient* or out-patient* or in-patient* or inpatient* or ((doctor* or physician* or "medical officer*" or practitioner* or gp or clinician*) N2 (visit* or consult*))) OR AB ( (injury or injuries or fracture* or lacerat* or contus* or concuss* or amputat* or dislocat* or broken or ligament* or burn or burns or scald* or sprain* or cuts or electrocut* or "electric shock*" or bruise* or abrasion* or mortality or death* or morbidity or hospital* or outpatient* or out-patient* or in-patient* or inpatient* or ((doctor* or physician* or "medical officer*" or practitioner* or gp or clinician*) N2 (visit* or consult*)))	
Database	CINAHL Plus with full text	587 395
S10	(MH "Office Visits")	3 124
Database	CINAHL Plus with full text	
S9	(MH "Hospitalization")	
Database	CINAHL Plus with full text	18 213
S8	(MH "Wounds and Injuries+/EC/EP/ET/MO/PC/RF")	
Database	CINAHL Plus with full text	59 666
S7	(MH "Inhalation Exposure") OR (MH "Environmental Exposure") OR (MH "Air Pollution, Indoor")	
Database	CINAHL Plus with full text	12 689
S6	(MH "Safety") OR (MH "Child Safety") OR (MH "Electrical Safety") OR (MH "Fire Safety") OR (MH "Home Safety")	
Database	CINAHL Plus with full text	21 784
S5	(MH "Accidental Falls") OR (MH "Accidents, Home") OR (MH "Accidents")	
Database	CINAHL Plus with full text	16 212
S4	TI (accident* or hazard* or safety) OR AB (accident* or hazard* or safety)	
Database	CINAHL Plus with full text	105 885
S3	S1 OR S2	Search Screen – Advanced Search
Database	CINAHL Plus with full text	12 619
S2	(MH "Housing") OR (MH "Public Housing") OR (MH "Housing for the Elderly") OR (MH "Assisted Living")	
Database	CINAHL Plus with full text	10 890
S1	TI (((domestic or public or private) N2 (housing or house or houses or home or homes or indoor or dwelling* or accommodation or abode* or residential or residence* or habitation or domicile or household*)) or slum or slums or shanty* or shanties) OR AB (((domestic or public or private) N2 (housing or house or houses or home or homes or indoor or dwelling* or accommodation or abode* or residential or residence* or habitation or domicile or household*)) or slum or slums or shanty* or shanties)	
Database	CINAHL Plus with full text	2 053

## **Appendix 8 Search strategy for ClinicalTrials.gov – original search conducted in 2015**

### **ClinicalTrials.gov**

Searched: 31 January 2015

(housing OR house OR home OR indoor OR household OR dwelling) AND (accident OR hazard OR safety) AND (injuries OR fractures OR lacerations OR contusions OR concussion OR amputations OR dislocation OR broken OR ligaments OR burns OR fall OR falls) – 268 hits

(housing OR house OR home OR indoor OR household OR dwelling) AND (accident OR hazard OR safety) AND (scalds OR sprains OR cuts OR electrocution OR "electric shock" OR bruises OR abrasion OR mortality OR death OR morbidity) – 259 hits

(housing OR house OR home OR homes OR indoor OR household OR households OR dwelling OR dwellings) AND (accident OR accidents OR accidental OR injury) – 497 hits

## **Appendix 9 Search Strategy for highly sensitive supplementary search – original search conducted in 2015**

**C1 – Database: Ovid MEDLINE(R) in-process and other non-indexed citations, Ovid MEDLINE(R) Daily, Ovid MEDLINE(R) and Ovid OLDMEDLINE(R) <1946 to present>**

### **Search strategy:**

- 1 housing/ or housing for the elderly/ or assisted living facilities/ or public housing/ or gardening/ or building codes/ (18 103)
- 2 (housing or house or houses or household\* or residential or residence\* or home or homes or dwelling\* or accommodation or abode\* or habitation or garden\* or backyard\* or "back yard\*" or slum or slums or shanty\* or shanties).ti,ab. (355 646)
- 3 1 or 2 (362 600)
- 4 accidents, home/ (4057)
- 5 accidental falls/ (16 460)
- 6 accident prevention/ or safety/ or "hazard analysis and critical control points"/ (40 123)
- 7 environmental exposure/ or inhalation exposure/ or hazardous substances/ (71 926)
- 8 (accident\* or hazard\* or safety).ti,ab. (526 879)
- 9 (floor\* or stairs or stairway\* or staircase\* or step or steps or ((stair or fire or scald or door or rail) adj guard) or fireguard\* or stove\* or electricity or electric or socket\* or "grab rail\*" or "hand bar\*" or handbar\* or handrail\* or "hand rail\*" or shower or balcon\* or veranda\* or terrace\* or portico\* or window\* or door or doors or doorway\* or gate or gates or gateway\* or (home adj2 "structur\* modif\*") or ((smoke or fire or CO or carbon) adj (detector or alarm\*))).ti,ab. (565 453)
- 10 or/4-9 (1 169 011)
- 11 exp animals/ (18 012 515)
- 12 humans/ (13 964 868)
- 13 11 not (11 and 12) (4 047 647)
- 14 3 and 10 (40 642)
- 15 14 not 13 (39 085)
- 16 exp nursing homes/ (32 944)
- 17 homes for the aged/ (11 445)
- 18 group homes/ or halfway houses/ or orphanages/ or poverty areas/ (6792)
- 19 schools/ or schools, nursery/ (23 451)

- 20 Universities/ (26 831)
- 21 (((("old age\*" or elderly or nursing or universit\* or college\* or school\*) adj3 (shelter\* or hostel\* or home\* or housing or residen\*)) or orphanage\* or hotel\*).ti,ab. (37 925)
- 22 or/16-21 (113 900)
- 23 15 not 22 (35 392)
- 24 limit 23 to yr="2004 -Current" (22 965)
- 25 limit 23 to yr="1998 -2003" (5561)
- 26 limit 23 to yr="1860–1997" (6866)

## Appendix 10 Search strategy for Medline – update search conducted in 2018

### Ovid MEDLINE(R) Epub ahead of print, in-process and other non-indexed citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) 1946 to present

Searched: 09 April 2018

Comment: Original search strategy included OldMedline, and did not include Medline Epub Ahead of Print. OldMedline is a closed database, containing records from 1946 to 1965. Medline Epub Ahead of Print was not available at the time of the original searches, but has not been included in the standard search option for Ovid Medline.

Searches		Results
1	housing/or housing for the elderly/or assisted living facilities/or public housing/or gardening/	20 346
2	((domestic or public or private) adj2 (housing or house or houses or household* or residential or residence* or home or homes or dwelling* or accommodation or abode* or habitation or garden* or backyard* or "back yard*")) or slum or slums or shanty* or shanties).ti,ab.	6 979
3	1 or 2	26 547
4	accidents, home/	4 386
5	accidental falls/	20 373
6	accident prevention/ or safety/ or "hazard analysis and critical control points"/	44 527
7	environmental exposure/ or inhalation exposure/ or hazardous substances/	81 681
8	(accident* or hazard* or safety).ti,ab.	685 123
9	or/4-8	792 465
10	exp "Wounds and Injuries"/ec, ep, et, mo, pc [Economics, Epidemiology, Etiology, Mortality, Prevention & Control]	236 534
11	Hospitalization/ or Office Visits/	97 949
12	(injury or injuries or fracture* or lacerat* or contus* or concuss* or amputat* or dislocat* or broken or ligament* or burn or burns or scald* or sprain* or cuts or electrocut* or "electric shock*" or bruise* or abrasion* or mortality or death* or morbidity or hospital* or outpatient* or out-patient* or in-patient* or inpatient* or ((doctor* or physician* or medical officer* or practitioner* or gp or clinician*) adj2 (visit* or consult*))).ti,ab.	4 235 071
13	10 or 11 or 12	4 349 606
14	exp animals/	21 418 374
15	humans/	16 978 365
16	14 not (14 and 15)	4 440 009
17	3 and 9	3 444
18	17 not 16	3 420

Searches		Results
19	3 and 13	4 483
20	19 not 16	4 407
21	18 or 20	6 985
22	exp nursing homes/	36 183
23	homes for the aged/	12 761
24	residential facilities/ or group homes/ or halfway houses/ or orphanages/ or poverty areas/	12 772
25	schools/ or schools, nursery/	33 602
26	universities/	34 812
27	((("old age*" or elderly or nursing or universit* or college* or school*) adj3 (shelter* or hostel* or home* or housing or residen*)) or orphanage* or hotel*).ti,ab.	44 593
28	or/22-27	144 571
29	21 not 28	5 873
30	limit 29 to yr="2004 -current"	3 479
31	limit 29 to yr="1998 -2003"	897
32	limit 29 to yr="1860–1997"	1 497
33	limit 29 to yr="2015 -current"	917

## Appendix 11 Search strategy for EMBASE – update search conducted in 2018

### Embase 1988 to 2018 Week 15(Ovid)

Searched: 09 April 2018

Comment: The original search strategy searched both EmbaseClassic and Embase thorough Ovid. However, according to the Ovid website, EmbaseClassic only indexes publications between 1947 and 1973. As we limited our search to publications from 2015 and after, we did not search EmbaseClassic.

Searches		Results
1	((domestic or public or private) adj2 (housing or house or houses or household* or residential or residence* or home or homes or dwelling* or accommodation or abode* or habitation or garden* or backyard* or "back yard*")) or slum or slums or shanty* or shanties).ti,ab.	7 172
2	*housing/ or *assisted living facility/ or home environment/ or *household/ or *"construction work and architectural phenomena"/ or *architectural barrier/ or *vulnerable population/ or *poverty/	28 793
3	1 or 2	35 052
4	(accident* or hazard* or safety).ti,ab.	939 308
5	*electric accident/ or *electrocution/ or *explosion/ or *falling/ or home accident/ or *structure collapse/ or accident prevention/ or accident proneness/ or *falling/	25 272
6	home safety/ or *child safety/ or *hazard/ or *electric hazard/ or *hazard assessment/ or *health hazard/ or *inhalation/ or *fire protection/	15 312
7	or/4-6	966 341
8	exp *injury/ep, et, pc, rh [epidemiology, etiology, prevention, rehabilitation]	143 138
9	*hospitalization/ or *consultation/	34 717
10	(injury or injuries or fracture* or lacerat* or contus* or concuss* or amputat* or dislocat* or broken or ligament* or burn or burns or scald* or sprain* or cuts or electrocut* or "electric shock*" or bruis* or abrasion* or mortality or death* or morbidity or hospital* or outpatient* or out-patient* or in-patient* or inpatient* or ((doctor* or physician* or medical officer* or practitioner* or gp or clinician*) adj2 (visit* or consult*))).ti,ab.	5 304 644
11	7 or 8 or 9 or 10	5 852 427
12	3 and 11	7 866
13	exp animal/	19 714 478
14	human/	16 429 310
15	13 not (13 and 14)	3 285 168
16	12 not 15	7 780
17	nursing home/ or nursing home patient/	42 244
18	home for the aged/	7 494

Searches		Results
19	residential home/	5 415
20	halfway house/	569
21	orphanage/	805
22	school/ or college/ or community college/ or high school/ or kindergarten/ or medical school/ or middle school/ or nursery school/ or primary school/ or university/	312 958
23	((("old age*" or elderly or nursing or universit* or college* or school*) adj3 (shelter* or hostel* or home* or housing or residen*)) or orphanage* or hotel*).ti,ab.	49 209
24	or/17-23	383 231
25	16 not 24	6 877
26	limit 25 to embase	3 074
27	limit 26 to yr="2015 -Current"	889

## Appendix 12 Search strategy for Cochrane Library – update search conducted in 2018

### Cochrane Library

Searched: 09 April 2018

Search name:

Date run: 09/04/18 14:21:26.204

Description:

ID	Search	Hits
#1	MeSH descriptor: [Housing] this term only	283
#2	MeSH descriptor: [Housing for the elderly] this term only	42
#3	MeSH descriptor: [Public housing] this term only	61
#4	MeSH descriptor: [Building codes] this term only	2
#5	MeSH descriptor: [Vulnerable populations] this term only	258
#6	MeSH descriptor: [Poverty] this term only	1 268
#7	MeSH descriptor: [Assisted living facilities] this term only	47
#8	MeSH descriptor: [Poverty areas] this term only	256
#9	MeSH descriptor: [Gardening] this term only	27
#10	(((domestic or public or private) near/2 (housing or house or houses or home or homes or indoor or dwelling* or accommodation or abode* or residential or residence* or habitation or domicile or household*)) or slum or slums or shanty* or shanties):ti,ab	319
#11	{or #1-#10}	2 377
#12	MeSH descriptor: [Accidents, home] this term only	100
#13	MeSH descriptor: [Accidental falls] this term only	1 445
#14	MeSH descriptor: [Accident prevention] this term only	188
#15	MeSH descriptor: [Safety] this term only	3 307
#16	MeSH descriptor: [Hazard analysis and critical control points] explode all trees	0
#17	MeSH descriptor: [Environmental exposure] this term only	523
#18	MeSH descriptor: [Inhalation exposure] this term only	164
#19	MeSH descriptor: [Hazardous substances] this term only	26
#20	(accident* or hazard* or safety):ti,ab	130 779
#21	MeSH descriptor: [Wounds and injuries] explode all trees and with qualifier(s): [Economics – EC, Epidemiology – EP, Etiology – ET, Mortality – MO, Prevention and control – PC]	6 310
#22	MeSH descriptor: [Hospitalization] this term only	5 695
#23	MeSH descriptor: [Office visits] this term only	483
#24	(injury or injuries or fracture* or lacerat* or contus* or concuss* or amputat* or dislocat* or broken or ligament* or burn or burns or scald* or sprain* or cuts or electrocut* or "electric shock*" or bruis* or abrasion* or mortality or death* or morbidity or hospital* or outpatient* or out-patient* or in-patient* or inpatient* or ((doctor* or physician* or medical officer* or practitioner* or gp or clinician*) near/2 (visit* or consult*)):ti,ab	382 419
#25	{or #12-#24}	448 870
#26	#11 and #25 publication year from 2015 to 2018	129

## Appendix 13 Search strategy for PsycINFO – update search conducted in 2018

### PsycINFO 1806 to April Week 1 2018 (Ovid)

Searched: 09 April 2018

Searches		Results
1	((((domestic or public or private) adj2 (housing or house or houses or household* or residential or residence* or home or homes or dwelling* or accommodation or abode* or habitation or garden* or backyard* or "back yard*")) or slum or slums or shanty* or shanties).ti,ab.	3 439
2	*housing/ or *assisted living/ or *retirement communities/ or architecture/ or built environment/ or *at risk populations/ or *poverty areas/ or *poverty/	35 181
3	1 or 2	37 857
4	(accident* or hazard* or safety).ti,ab.	88 864
5	*accidents/ or *falls/ or home accidents/ or accident prevention/ or accident proneness/ or *hazardous materials/ or *hazards/ or exp *injuries/ or *safety/	32 180
6	fire prevention/	149
7	*hospitalization/ or *hospital admission/	6 534
8	*professional consultation/	7 341
9	(injury or injuries or fracture* or lacerat* or contus* or concuss* or amputat* or dislocat* or broken or ligament* or burn or burns or scald* or sprain* or cuts or electrocut* or "electric shock*" or bruise* or abrasion* or mortality or death* or morbidity or hospital* or outpatient* or out-patient* or in-patient* or inpatient* or ((doctor* or physician* or medical officer* or practitioner* or gp or clinician*) adj2 (visit* or consult*))).ti,ab.	465 229
10	or/4-9	538 088
11	3 and 10	5 873
12	limit 11 to yr="2015 – current"	879

## Appendix 14 Search strategy for Global Health – update search conducted in 2018

### Global Health 1973 to 2018 Week 13 (Ovid)

Searched: 09 April 2018

Searches	Results
1 (((domestic or public or private) adj2 (housing or house or houses or home or homes or indoor or dwelling* or accommodation or abode* or residential or residence* or habitation or domicile or household*)) or slum or slums or shanty* or shanties) .ti,ab.	4 269
2 housing/ or dwellings/ or homes/ or public housing/ or rural housing/ or households/ or living conditions/	23 833
3 poverty/ or deprivation/ or economically disadvantaged/ or low income groups/	14 912
4 structural design/ or architecture/ or buildings/ or building construction/ or building controls/	3 240
5 or/1-4	42 362
6 (accident* or hazard* or safety).ti,ab.	155 224
7 accidents/ or falls/ or accident prevention/ or electrocution/ or safety/	43 107
8 safety/ or electrical safety/ or home safety/	35 622
9 hazards/ or fire danger/ or health hazards/	21 431
10 injuries/ or bruising/ or heat injury/ or abrasion/ or wounds/ or electrocution/ or burns/ or fractures/ or bone fractures/ or scald/	19 414
11 hospital admission/ or "health care utilization"/	13 406
12 (injury or injuries or fracture* or lacerat* or contus* or concuss* or amputat* or dislocat* or broken or ligament* or burn or burns or scald* or sprain* or cuts or electrocut* or "electric shock*" or bruise* or abrasion* or mortality or death* or morbidity or hospital* or outpatient* or out-patient* or in-patient* or inpatient* or ((doctor* or physician* or medical officer* or practitioner* or gp or clinician*) adj2 (visit* or consult*))).ti.	154 341
13 or/6-12	330 138
14 5 and 13	5 915
15 limit 14 to yr="2015 – current"	1 959

## Appendix 15 Search strategy for Web of Science – update search conducted in 2018

### Web of Science (SCI/SSCI)

Searched: 09 April 2018

# 8	<a href="#">1 518</a>	#6 AND #3 <i>Indexes=SCI-EXPANDED, SSCI Timespan=2015–2018</i>
# 7	<a href="#">5 025</a>	#6 AND #3 <i>Indexes=SCI-EXPANDED, SSCI Timespan=all years</i>
# 6	<a href="#">2 232 003</a>	#5 OR #4 <i>Indexes=SCI-EXPANDED, SSCI Timespan=all years</i>
# 5	<a href="#">1 806 062</a>	TI=(injury or injuries or fracture* or lacerat* or contus* or concuss* or amputat* or dislocat* or broken or ligament* or burn or burns or scald* or sprain* or cuts or electrocut* or "electric shock*" or bruise* or abrasion* or mortality or death* or morbidity or hospital* or outpatient* or out-patient* or in-patient* or inpatient* or "office visit*" or ((doctor* or physician* or "medical officer*" or practitioner* or gp or clinician*) NEAR/2 (visit* or consult*)) <i>Indexes=SCI-EXPANDED, SSCI Timespan=All years</i>
# 4	<a href="#">459 131</a>	TI=(accident* or fall or falls or safety or hazard* or exposure) <i>Indexes=SCI-EXPANDED, SSCI Timespan=all years</i>
# 3	<a href="#">89 251</a>	#2 OR #1 <i>Indexes=SCI-EXPANDED, SSCI Timespan=all years</i>
# 2	<a href="#">76 676</a>	TS=("assisted living" or poverty or (vulnerable NEAR (group* or population* or people))) <i>Indexes=SCI-EXPANDED, SSCI Timespan=all years</i>
# 1	<a href="#">13 721</a>	TS=((domestic or public or private) NEAR/2 (housing or house or houses or home or homes or indoor or dwelling* or accommodation or abode* or residential or residence* or habitation or domicile or household*)) or slum or slums or shanty* or shanties) <i>Indexes=SCI-EXPANDED, SSCI Timespan=all years</i>

## Appendix 16 Search strategy for CINAHL – update search conducted in 2018

### CINAHL (Ebsco)

Searched: 10 April 2018

**Comment:** The original search strategy searched both EmbaseClassic and Embase. We only searched Embase, as Embase Classic has publications only for dates before our cut-off time.

Search ID#	Search terms	Search options		
	S27	S16 NOT S24	<b>Limiters</b> – exclude MEDLINE records <b>Search modes</b> – find all my search terms	(124)
	S26	S15 NOT S24	<b>Limiters</b> – exclude MEDLINE records <b>Search modes</b> – find all my search terms	(462)
	S25	S14 NOT S24	<b>Limiters</b> – exclude MEDLINE records <b>Search modes</b> – find all my search terms	(303)
	S24	S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23	<b>Search modes</b> – find all my search terms	(12 590)
	S23	(MH "hotels")	<b>Limiters</b> – published date: 20150101-20181231 <b>Search modes</b> – find all my search terms	(67)
	S22	TI (((("old age*" or elderly or nursing or universit* or college* or school*) N3 (shelter* or hostel* or home* or housing or residen*)) or orphanage* or hotel*) OR AB (((("old age*" or elderly or nursing or universit* or college* or school*) N3 (shelter* or hostel* or home* or housing or residen*)) or orphanage* or hotel*))	<b>Limiters</b> – published date: 20150101-20181231 <b>Search modes</b> – find all my search terms	(3 949)
	S21	(MH "schools") OR (MH "colleges and universities+") OR (MH "schools, elementary") OR (MH "schools, middle") OR (MH "schools, nursery") OR (MH "schools, secondary") OR (MH "schools, special")	<b>Limiters</b> – published date: 20150101-20181231 <b>Search modes</b> – find all my search terms	(7 226)

Search ID#	Search terms	Search options		
	S20	(MH "orphans and orphanages")	<b>Limiters</b> – published date: 20150101-20181231 <b>Search modes</b> – find all my search terms	(114)
	S19	(MH "residential facilities")	<b>Limiters</b> – published date: 20150101-20181231 <b>Search modes</b> – find all my search terms	(427)
	S18	(MH "halfway houses")	<b>Limiters</b> – published date: 20150101-20181231 <b>Search modes</b> – find all my search terms	(17)
	S17	(MH "nursing homes")	<b>Limiters</b> – published date: 20150101-20181231 <b>Search modes</b> – find all my search terms	(2 295)
	S16	S3 and S12	<b>Limiters</b> – published date: 19980101-20031231 <b>Search modes</b> – find all my search terms	(404)
	S15	S3 and S12	<b>Limiters</b> – published date: 20040101-20150131 <b>Search modes</b> – find all my search terms	(1 728)
	S14	S3 and S12	<b>Limiters</b> – published date: 20150101-20181231 <b>Search modes</b> – Find all my search terms	(530)
	S13	S3 AND S12	<b>Search modes</b> – find all my search terms	(2 910)
	S12	S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11	<b>Search modes</b> – find all my search terms	(1 159 206)

Search ID#	Search terms	Search options		
	S11	TI ( (injury or injuries or fracture* or lacerat* or contus* or concuss* or amputat* or dislocat* or broken or ligament* or burn or burns or scald* or sprain* or cuts or electrocut* or "electric shock*" or bruise* or abrasion* or mortality or death* or morbidity or hospital* or outpatient* or out-patient* or in-patient* or inpatient* or ((doctor* or physician* or "medical officer*" or practitioner* or gp or clinician*) N2 (visit* or consult*))) OR AB ( (injury or injuries or fracture* or lacerat* ...	<b>Search modes</b> – find all my search terms	(1 070 978)
	S10	(MH "office visits")	<b>Search modes</b> – find all my search terms	(2 997)
	S9	(MH "hospitalization")	<b>Search modes</b> – find all my search terms	(16 815)
	S8	(MH "wounds and injuries+/EC/EP/ET/MO/PC/RF")	<b>Search modes</b> – find all my search terms	(52 273)
	S7	(MH "inhalation exposure") OR (MH "environmental exposure") OR (MH "air pollution, indoor")	<b>Search modes</b> – find all my search terms	(11 827)
	S6	(MH "safety") OR (MH "child safety") OR (MH "electrical safety") OR (MH "fire safety") OR (MH "home safety")	<b>Search modes</b> – find all my search terms	(18 942)
	S5	(MH "accidental falls") OR (MH "accidents, home") OR (MH "accidents")	<b>Search modes</b> – find all my search terms	(15 994)
	S4	TI (accident* or hazard* or safety) OR AB (accident* or hazard* or safety)	<b>Search modes</b> – find all my search terms	(125 314)
	S3	S1 OR S2	<b>Search modes</b> – find all my search terms	(12 017)
	S2	(MH "housing") OR (MH "public housing") OR (MH "housing for the elderly") OR (MH "assisted living")	<b>Search modes</b> – find all my search terms	(10 236)

Search ID#	Search terms	Search options		
	S1	TI (((domestic or public or private) N2 (housing or house or houses or home or homes or indoor or dwelling* or accommodation or abode* or residential or residence* or habitation or domicile or household*)) or slum or slums or shanty* or shanties) OR AB (((domestic or public or private) N2 (housing or house or houses or home or homes or indoor or dwelling* or accommodation or abode* or residential or residence* or habitation or domicile or household*)) or slum or slums or shanty* or shanties)	<b>Search modes</b> – find all my search terms	(2 149)

## Appendix 17 Search strategy for ClinicalTrials.gov – update search conducted in 2018

### ClinicalTrials.gov

Searched: 09 April 2018

**Comment:** Searches were done separately, but results were then analysed together.

1. (housing OR house OR home OR indoor OR household OR dwelling) AND (accident OR hazard OR safety) AND (injuries OR fractures OR lacerations OR contusions OR concussion OR amputations OR dislocation OR broken OR ligaments OR burns OR fall OR falls) – 431 hits
2. (housing OR house OR home OR indoor OR household OR dwelling) AND (accident OR hazard OR safety) AND (scalds OR sprains OR cuts OR electrocution OR "electric shock" OR bruises OR abrasion OR mortality OR death OR morbidity) – 333 hits
3. (housing OR house OR home OR homes OR indoor OR household OR households OR dwelling OR dwellings) AND (accident OR accidents OR accidental OR injury) – 1020 hits

## Appendix 18 Search strategy for highly sensitive supplementary search – update search conducted in 2018

**Ovid MEDLINE(R) Epub ahead of print, in-process and other non-indexed citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) 1946 to present**

Search date: 09 April 2018

Comment: Original search strategy included OldMedline, and did not include Medline Epub Ahead of Print. OldMedline is a closed database, containing records from 1946 to 1965. Medline Epub Ahead of Print was not available at the time of the original searches, but has not been included in the standard search option for Ovid Medline.

### Search strategy:

Searches		Results
1	housing/ or housing for the elderly/ or assisted living facilities/ or public housing/ or gardening/ or building codes/	20 834
2	(housing or house or houses or household* or residential or residence* or home or homes or dwelling* or accommodation or abode* or habitation or garden* or backyard* or "back yard*" or slum or slums or shanty* or shanties).ti,ab.	439 386
3	1 or 2	446 854
4	accidents, home/	4 386
5	accidental falls/	20 373
6	accident prevention/ or safety/ or "hazard analysis and critical control points"/	44 527
7	environmental exposure/ or inhalation exposure/ or hazardous substances/	81 681
8	(accident* or hazard* or safety).ti,ab.	685 123
9	(floor* or stairs or stairway* or staircase* or step or steps or ((stair or fire or scald or door or rail) adj guard) or fireguard* or stove* or electricity or electric or socket* or "grab rail*" or "hand bar*" or handbar* or handrail* or "hand rail*" or shower or balcon* or veranda* or terrace* or portico* or window* or door or doors or doorway* or gate or gates or gateway* or (home adj2 "structur* modif*") or ((smoke or fire or CO or carbon) adj (detector or alarm*))) .ti,ab.	700 688
10	or/4-9	1468 831
11	exp animals/	21 418 374
12	humans/	16 978 365
13	11 not (11 and 12)	4 440 009
14	3 and 10	52 064
15	14 not 13	50 123
16	exp nursing homes/	36 183

Searches		Results
17	homes for the aged/	12 761
18	group homes/ or halfway houses/ or orphanages/ or poverty areas/	7 776
19	schools/ or schools, nursery/	33 602
20	universities/	34 812
21	((("old age*" or elderly or nursing or universit* or college* or school*) adj3 (shelter* or hostel* or home* or housing or residen*)) or orphanage* or hotel*).ti,ab.	44 593
22	or/16-21	140 336
23	15 not 22	45 448
24	limit 23 to yr="2015 – current"	11 135

## Appendix 18 Studies excluded or awaiting classification

Studies excluded after full-text assessment	
Study	Reason for exclusion
Aras 2012	Wrong exposure and outcome
Arch 2012	Wrong intervention
Atak 2010	Wrong exposure/interventions. Wrong outcomes
Babul 2007	No reporting of outcome of interest
Byles 2014	No outcome
Cagle 2006	Wrong Intervention/outcome
Chaikin 2013	Wrong Intervention (multisectoral /multicomponents)
Chan 2009	Wrong outcome
Chandran 2013	Wrong intervention/exposure
Cheng 2014	Wrong intervention/exposure
Church 2012	Cost-effective study. Wrong outcome
Ciaschin 2009	Wrong intervention (multisectoral /multicomponents)
Clouatre 2013	Wrong intervention
Cresci 2005	Is a narrative review
Cwik 2004	Wrong study design. Commentary
D Souza 2008	Wrong exposure/intervention
Dal Santo 2004	Wrong intervention/exposure
Dam 2011	Wrong exposure/interventions. Wrong outcomes
Davis 2012	Wrong exposures/interventions
De Lourdes 2007	Descriptive data only for outcome of interest
Deave 2013	Wrong outcomes
Deave 2014	Wrong exposures/interventions
Di Guesspei 2012	No outcomes
Di Monaco 2011a	Wrong intervention (multisectoral /multicomponents)
Di Monaco 2011b	Wrong intervention (multisectoral /multicomponents)
Drachler 2007	Wrong intervention /exposure/outcome
El Tayeb 2014	Descriptive data only. No effect estimate
Erkal 2006	Wrong outcomes
Farchi 2006	Wrong exposure/interventions
Finlayson 2015	Descriptive data only. No effect estimate
Flores 2005	Wrong exposure/interventions. Wrong outcomes
Gielen 2004	Wrong study design. Commentary
Ginnelly 2005	Cost-effective study. No reporting of effect size for outcome of interest
Godson 2014	Wrong study design. Narrative
Grey Micheli 2013	Wrong interventions/exposure and outcomes
HaudarMorano 2011	Wrong outcomes
Head 2012	Wrong exposure/interventions. Wrong outcomes
Hendrickson 2005	Wrong intervention /exposure/outcome

Studies excluded after full-text assessment	
Study	Reason for exclusion
Huang 2004	Wrong intervention /exposure
Hurley 2004	Wrong study design. Narrative
Into 2008	Wrong intervention /exposure/outcome
Jagnoor 2011	No outcomes
Johnston 2011	Wrong population (windows)
Johnston 2011	Wrong population
Kamal 2013	Descriptive data only. No effect estimates
Kara 2009	Wrong exposure/intervention/outcome
Keall 2011	Wrong exposure/interventions and outcomes
Keall 2013	Wrong outcomes
Kendrick 2012	Wrong study design. Protocol. Wrong outcome
Kerse 2004	Wrong exposure/interventions and outcomes
Khambalia 2006	Not a primary study. Systematic review. Wrong outcomes
Khan 2013	Wrong outcomes
King 2012	Wrong study design. Commentary
Klein 2014	Wrong study design. Protocol
Klitzman 2005	Wrong outcomes
Kool 2010	Descriptive data only. No effect estimates
Kuhirunyarath 2013	Wrong outcomes
La Grow 2006	Wrong outcomes
Lahat 2006	Wrong intervention/exposure/outcome
Leclerc 2005	Wrong outcomes
Lin 2007	Wrong outcomes
Logan 2010	Wrong intervention/exposure and outcomes
Lu 2011	Focus discussion report on old people living in assisted living facilities
Lyons 2006	Wrong intervention/exposure
MacDougall 2012	Wrong exposure/interventions
Malta 2012	Wrong intervention/exposure and outcomes
Manrique Espinoza 2010	Wrong exposure/intervention/research question
Markle-Reid 2010	Wrong outcome
Mashreky 2011	Descriptive study. No effect estimate
Meadows Oliver 2010	Is a narrative review
Mitoku 2014	Wrong outcome
Mitty 2007	Wrong study design. Narrative review
Morris 2004	Wrong exposure/intervention and outcome
Mueller 2008	Wrong outcomes and different research question
Mulvaney 2004	Wrong intervention/exposure
Myers 2012	Wrong exposure/interventions
Nachreiner 2007	Wrong intervention /exposure/outcome
Nelson 2010	Wrong exposure/intervention and outcome

Studies excluded after full-text assessment	
Study	Reason for exclusion
Neslihan 2013	Wrong outcomes
Olaitan 2006	Wrong intervention /exposure/outcome
Otaka 2013	Wrong study design. Review
Panczak 2013	Wrong interventions/exposure
Park Lee 2013	Wrong intervention /exposure/outcome
Parker 2013	Wrong outcomes
Pearson 2010	Not a primary study
Phillips 2011	Wrong interventions/exposure
Phillips 2011	Wrong interventions/exposure
Pighills 2011	Wrong intervention /exposure
Polzien 2007	Wrong study design. Commentary
Powell 2010	Wrong exposure/intervention and outcome
Presseley 2009	Wrong outcome
Qiu 2014	Wrong intervention/exposure
Ranaweera 2013	Wrong intervention /exposure/outcome
Randell 2008	Wrong population. Wrong exposure/interventions
Raymond 2011	No outcomes. Descriptive data only
Rivara 2004	Wrong study design. Commentary
Robinovitch 2015	Wrong study design. Commentary
Rojo 2010	Wrong intervention /exposure/outcome
Rolita 2010	Wrong intervention/exposure and outcomes
Rosenblatt 2013	
Sach 2012	
Sadeghi-Bazargan 2011	
Sahiner 2011	Wrong exposure /intervention
Schewebel 2009	Wrong outcomes
Schlismann 2008	Wrong exposure/outcome. Descriptive data only.No effect estimates
Schnitzer 2006	Wrong study design. Narrative review
Scott 2010	Wrong intervention/exposure
Shai 2006	Wrong exposure/interventions. Wrong outcomes
Shi 2014	Wrong outcome
Shin 2005	Wrong intervention
Sjosten 2007	Wrong intervention/exposure
Somrngthong 2014	Wrong outcomes
Sophonrotnapokin 2012	Wrong outcome
Stefannaci 2012	Wrong study design. Commentary
Stevens 2011	Wrong exposure. Descriptive data only
Stolze 2004	Wrong exposure/interventions. Wrong outcomes
Teems 2011	Wrong intervention/exposure
Terchiren 2006	Wrong intervention/exposure

Studies excluded after full-text assessment	
Study	Reason for exclusion
Turner 2011	Wrong study design. Evidence summary of Cochrane review
Unwin 2009	Narrative review
Valenza 2007	Wrong study design. Commentary
Vish 2005	Descriptive data only. No effect estimates
Vladitiu 2008	No outcomes
Vladitiu 2012	No outcomes
Watson 2012	Wrong intervention/no exposures
Webb-Henderson 2009	Descriptive data .Wrong intervention/exposure
Wynn 2014	Wrong study design. Protocol
Yeh 2011	Wrong intervention/exposure
Zhang 2006	Wrong outcomes

### Articles awaiting classification

Rose DJ, Hall CD. Identifying risk factors for falls in older adults residing in assisted living settings. *Medicine and Science in Sports and Exercise* 2004;36(5): S181. [Full text not obtained by 6 July 2015]

Cagle KM, Davis JW, Dominic W, Gonzales W. Results of a focused scald-prevention program. *J Burn Care Res* 2006;27(6):859-63. [Full text not obtained by 6 July 2015]

Kerse N, Butler M, Robinson E, Todd M. Fall prevention in residential care: a cluster, randomized, controlled trial. *J Am Geriatr Soc* 2004;52(4):524-31. [Full text not obtained by 6 July 2015]

Posner JC, Hawkins LA, Garcia-Espana F, Durbin DR. A randomized, clinical trial of a home safety intervention based in an emergency department setting. *Pediatrics* 2004;113(6):1603-8. [Full text not obtained by 6 July 2015]

Zhou BY, Shi J, Yu PL. Consequence and risk factors of falls-related injuries in community-dwelling elderly in Beijing, *Zhonghua Liu Xing Bing Xue Za Zhi*. 2013;34(8):778-81. [Full text obtained but could not be translated from Chinese by 6 July 2015]

## Appendix 19 Characteristics of included studies

1	Study: Campbell 2005		Title: Randomised controlled trial of prevention of falls in people aged ≥75 with severe visual impairment: the VIP trial		
Authors: Campbell AJ, Robertson MC, La Grow SJ, Kerse NM, Sanderson GF, Jacobs RJ, Sharp DM, Hale LA					
Study type	Setting	Inclusion criteria		Exclusion criteria	Recruitment procedures
Randomized trial 2x2 factorial design	New Zealand	Adults ≥75 with severe visual impairment(i.e. visual acuity ≤6/24)		Those who could not walk around their own residence  Those who were receiving physiotherapy  Those who could not understand the trial requirements	Researchers identified potential participants through the register of the Royal New Zealand Foundation of the Blind, University of Auckland optometry clinic, Dunedin and Auckland hospital low vision outpatient clinics, and a private ophthalmology practice. Potential participants were invited by Foundation/clinic staff.
Samples	Interventions		Outcome	Results	Quality and limitations
391 participants in total 1) Home safety assessment and modification programme only (n=100) 2) Exercise programme only (n=97) 3) Home safety assessment and modification programme together with exercise (n=9) 4) Social visits only (participants not assigned to home safety assessment and modification programme or exercise programme) (n=96)	Home safety assessment and modification: Occupational therapist visited home and carried out home safety assessment, and modifications were facilitated accordingly. Home safety modifications included: <ul style="list-style-type: none"><li>removing or changing loose floor mats</li><li>painting the edge of steps</li><li>reducing glare</li><li>installing grab bars and stair rails</li><li>removing clutter</li><li>Improving lighting.</li></ul> Exercise programme included modified Ontago exercise for a year, with vitamin D supplementation.  Social visits included two home visits each lasting 60 minutes.		Serious injurious falls leading to hospital admission or fractures or stitches required*  Moderate injurious falls which included bruising, sprains, cuts, abrasions, or reduction in physical function for a minimum of 3 days, or if the participant sought medical help  Falls which required medical care*  Cost-effectiveness  * Of interest to our systematic review	The number of serious injurious falls per person year for the home safety assessment and modification only group was 0.10 compared to 0.04 in exercise only group and 0.04 in social visit group and 0.12 in combined home safety assessment and modification + exercise group. In the combined intervention groups analyses the number of serious injurious falls per person year was 0.11 for those receiving home safety programme compared to 0.04 in those nor receiving home safety programme.  The number (%) of falls which needed medical care for home safety assessment and modification only group was 19(30%) compared to 32 (27%) in exercise only and 32(21%) in social visits only group and 30(28%) in group which received both home safety assessment and modification together with exercise. In the combined intervention group analyses the number (%) of falls for which medical care was sought was 49(48%) for those receiving home safety assessment and programme compared to 64 (24%) in those who did not receive the home safety programme.  The Home safety assessment and modification programme only group versus social visits group had a incidence rate ratio of 0.56 (95% CI: 0.36-0.87) for injurious falls. Injurious falls included both serious and moderate categories.	The study included several home modifications which are not of our interest and it was not possible to differentiate between them and thus there is some confounding as a result of these.  Computer generated random numbers used for group allocation.  Participants' abilities were not taken into account for participating in an exercise programme.  An interaction between the two interventions of home safety modification and exercise was seen (i.e the home safety assessment and modification programme seemed less effective when the person was also receiving the exercise programme). This raises some doubt on whether the preventions of falls was due to the occupational therapist's visit or the home modification.

2	Study: Pressley 2005		Title: Child and adolescent injury as a result of falls from buildings and structures		
Authors: Pressley JC, Barlow B					
Study type	Setting	Inclusion criteria		Exclusion criteria	Recruitment procedures
Retrospective analyses of cross-sectional data	USA	People aged 18 years and younger who were discharged from a US hospital		People aged 19 years or older, because not all states reported on people older than 18 years. Routine, elective, or scheduled admissions for falls from buildings or structures were excluded as unlikely incident injury.	Retrospective analyses of cross-sectional data available from Kids Inpatient Database (KID-HCUP), which provided the national sample of state-wide acute care hospital discharges from 27 states of USA.
Samples	Interventions		Outcome	Results	Quality and limitations
Data from 2,163,402 people aged 18 years and younger who were discharged from a US hospital during the year 2000 was analysed.	Legislation based window fall prevention (window guard) programme with enforcement. Areas with and without window guard legislation were identified from the New York Statewide Planning and Research Cooperative System (SPARCS).		Hospitalization for injury as a result of falls from buildings and structures in areas with and without enforced mandatory window guard legislation.	Cumulative incidence of emergency and urgent hospitalization admissions due to falls from buildings/structures in New York City (window guard legislation) was 1.5 per 100 000 compared to Upstate/Long Island (no window guard legislation) which had incidence of 3.0 per 100 000.	The ICD-9- CM codes used to identify falls from buildings and structures also included non-window falls from buildings, such as falls from fire escapes. The data set did not include data about people dying before hospital admission, not seeking treatment, failing to receive the appropriate E-code, or those treated and released from an emergency department.
3	Study: Kendrick 2005		Title: Relationships between child, family and neighbourhood characteristics and childhood injury: a cohort study		
Authors: Kendrick D, Mulvaney C, Burton P, Watson M					
Study type	Setting	Inclusion criteria		Exclusion criteria	Recruitment procedures
Cohort (control arm of a randomized trial)	United Kingdom	Children <5 years		--	Control arm of a randomized trial investigating the effectiveness of health visitor plus access to free or low-cost safety equipment fitted in the homes of families with children under 5.
Samples	Interventions		Outcome	Results	Quality and limitations
2357 participants	Smoke alarm* Fitted stair gate* Safe storage of sharp objects in kitchen * Of interest to current systematic review		Primary care attendance rate A&E attendance rates Hospital admission rate	The study reported the relation between incidence rate ratios (IRR) for univariate relationships between use of working smoke alarm and the following: Primary care attendance: IRR: 0.88 (95% CI: 0.59–1.30) A&E attendance: IRR 0.79 (95% CI: 0.65-0.95) Hospital admissions: IRR 0.51 (95% CI: 0.30–0.89) The study reported the relation between incidence rate ratios (IRR) for univariate relationships between use of fitted stair gates and the following Primary care attendance: IRR 1.09 (95% CI: 0.77–1.53) A&E attendance: IRR 0.97 (95% CI: 0.82-1.15) Hospital admissions: IRR 0.46 (95% CI: 0.26–0.83)	This study, nested within the control arm of a randomized trial had a clearly defined methodology, sufficient power and high follow-up rates.

4	Study: Le Blanc 2006	Title:Home safety measures and the risk of unintentional injury among young children: a multicentre case–control study			
Authors: LeBlanc JC, Pless IB, King WJ, Bawden H, Bernard-Bonnin A-C,Klassen T, Tenenbein M					
Study type	Setting	Inclusion criteria	Exclusion criteria		Recruitment procedures
Case control	Canada	Cases: children younger than 8 years who presented in emergency department because of a fall, scald, burn, poisoning, ingestion or choking episode at home.  Controls: sex and age (within 6 months) matched children who presented to same department with a non-injury-related diagnosis.	--		Hospital based recruitment by daily screening of logs in emergency department of 5 Canadian Children's hospitals.
Samples	Interventions	Outcome	Results		Quality and limitations
692 participants in total 346 cases and 346 controls.	Smoke detector or alarm* In kitchen, kettle or appliances with dangling cords No stove guard to prevent child from grabbing pots* Various others exposures *Of interest to current systematic review	Burns* Injuries Poisoning Falls *Of interest to current systematic review	After adjustments for the presence of siblings in the home, level of mother's education and parent participation in labour or service sector, the odds ratio (OR) for burns and the absence of a smoke detector was 3.25 (95% CI: 1.4–7.7) and the lack of a functioning smoke alarm gave an OR of 1.7 (95%CI: 1.0–2.8)  Odds ratio for burns or scalds when kettles or appliances had dangling cords in kitchen was 0.64 (95% CI: 0.28–1.49)  Odds ratio for burns or scalds when there was no stove guard to prevent child from grabbing pots was 1.20 (95% CI: 0.37–3.83).		The study did not report participation rates for case and control. Controls were matched for only age and sex. It is unclear if a previous history of home injuries were taken into account when selecting controls. Other exposures were reported in study but their outcomes are not in the criteria for this review (falls, poisoning and choking).

5	Study: Keall 2008	Title:Association between the number of home injury hazards and home injury		
Authors: Keall MD, Baker M, Howden-Chapman P, Cunningham M				
Study type	Setting	Inclusion criteria	Exclusion criteria	Recruitment procedures
Retrospective Cohort	New Zealand	Residents living in Lower Hutt Valley (the northern part of the city of greater Wellington, New Zealand) who gave consent for collection of health outcomes for 2 years immediately preceding a home inspection and a short period thereafter.	----	Households were recruited based on a stratified random sampling in the study area.The strata were definedby: the age of the house; deprivation levels of the city block or immediate neighbourhood; and geographic location.
Samples	Interventions	Outcome	Results	Quality and limitations
102 households with 255 members	Home hazards as listed below: Bathroom floor uneven/slippery/sloped. Shower/bath with slippery surface. Inadequate space around bath/shower. Floor uneven, slippery or sloped, in rest of house (apart from bathroom). Unsafe electrical wiring. Hot water thermostat temperature set to >60° or measured >55°at tap. Internal stairs present. Stair handrail in disrepair, too high or too low, or not continuous. Landing balustrade in disrepair, too low, with too wide openings or insufficient strength. Stair risers uneven, too low or too high. Stairs slippery. Stairs not adequately lit. Stairs too steep. Stair treads too wide, 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 or laundry that could be protected from young children. Outdoor pathway poorly lit, slippery, too steep, uneven or with window opening onto pathway in hazardous way. Handrail on external steps in poor	Injury outcomes were assessed from data held by the New Zealand Accident Compensation Corporation (a no fault accident insurer) which was considered to be a record of injuries needing medical interventions/ medical service including attendance to a medical practitioner.	The study intended to study the association between the number of injury hazards (or lack of safety features) with occurrence of injury in the home and estimated an increaseof 22% in the odds of injury occurrenceassociated with each additional injury home injury hazard(95% CI: 6—41%).  The odds ratio (adjusted for clustering) for 0-5 hazards was 1.0 while for 6-7 hazards 5.2 (95%CI: 0.6-47) and 7.6 for more than 8 hazards (95% CI: 0.9-64).	The study had a limited sample size and had a very low cooperation rate. Moreover due to the retrospective nature of design it suffers from the issue of temporal ambiguity. Confounding for important parameters like socioeconomic status and ethnicity, etc., is a limitation of the study

	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 or difficult to see.			
6	Study: Fitzharris 2010	Title:The Whitehorse No falls trial: effects on fall rates and injurious fall rates		
Authors: Fitzharris MP, Day L, Lord SR, Gordon I, Fildes B				
Study type	Setting	Inclusion criteria	Exclusion criteria	Recruitment procedures
Randomized trial (factorial design)	Australia	Community-dwelling adults aged 70 and above in the Whitehorse local government area in metropolitan Melbourne.  Should be living in their own home or apartment or leasing similar accommodation where they are permitted to make modifications.	Individuals with severe disability, mobility or cognitive limitations.	Invitation letters was sent to all aged 70 and above who were registered on the Australian electoral rolls in the study area. This was followed up with telephone calls. The invitation letter explained the study, and provided the inclusion and exclusion criteria. Local publicity and recruitment by general practitioners was used as a primary recruitment strategy.
Samples	Interventions	Outcome	Results	Quality and limitations
1090 participants 1) Exercise (n=135) 2) Home hazard modification (HHM) (n=136) 3) Vision(n=139) 4) Exercise+ HHM (n=135) 5) Exercise+ vision (n=136) 6) Vision+ HHM (n=137) 7) Exercise+ Vision+ HHM (n=135) 8) No intervention (n=137)	The study had eight arms with different combination of HHM, exercise and vision, and a control group.  Exercise: a strength and balance exercise class lasting 1 hour per week for 15 weeks, supplemented by daily home exercises.  HHM: the removal or modification of hazards, as identified by initial risk factor assessment.  Vision: referral to the participant's usual eye-care provider, general practitioner or local optometrist, if their vision tested below predetermined criteria.	Falls Falls requiring medical care* *Of interest to our systematic review	Only those outcomes relevant to this review are extracted here.  Incidence of falls requiring medical care per 100 person-years was 15.0 for HHM alone, higher than that of exercise+HHM (8.1), vision+ HHM (6.1) and exercise+vision+HHM arm (8.3). In control arm, the incidence of falls requiring medical care was 10.2 per 100 person-years.  The incidence of falls requiring medical care for those who received HHM was 9.37 per 100 person years, compared to 8.24 per 100 person years for those who did not get HHM for the combined intervention analyses which adjusted for the effect of other interventions.	The study is a reanalyses of a previously published study (.BMJ 2002;325:128) which had used .time to event outcomes and analysed data differently. Study has adequate randomization and allocation concealment. Blinding of participants was not done as this is not possible due to the nature of the intervention.

7	Study: Leclerc 2010		Title:Relationship between home hazards and falling among community-dwelling seniors using home-care services		
Authors: Leclerc BS, Be'gin C, Goulet C, Allaire JF, Meloche J, Leduc N, Kergoat MJ					
Study type	Setting	Inclusion criteria		Exclusion criteria	Recruitment procedures
Cohort	Canada	Community-dwelling people aged 65 years or more who received home-care services.		People who could speak neither French nor English Unable to walk more than six meters Reduced communication and cognition ability	Convenience sampling of those who consented for the study
Samples	Interventions		Outcome	Results	Quality and limitations
959 participants	Multiple exposures were studied using a room by room 37-item checklist. This included several exposures of interest in review and additional ones related to lighting and furniture are exposures not of interest to the systematic review.		Falls Falls needing medical consultation* *Of interest to our systematic review	The number of home hazards increased the risk of second fall-related medical visit (IRR = 1.27) and all fall-related medical visits marginally (IRR=1.09). This was non-significant for the first fall related medical visit.	The study used convenience sampling. Information for falls requiring medical consultation was not available after the recruitment period and hence only censored data was available for the outcome of interest to the review. Outcome assessment was self-reported using questionnaires administered by telephone.  The study counted hazards and saw the relation with outcomes and it was not possible to differentiate between exposures of our interest and other exposures.
8	Study: Mashreky 2010		Title:Determinants of childhood burns in rural Bangladesh: A nested case-control study		
Authors: Mashreky SR, Rahman A, Khan TF, Svanström L,Rahmana F					
Study type	Setting	Inclusion criteria		Exclusion criteria	Recruitment procedures
Case control	Bangladesh (rural)	Cases: children under 10 years of age who were burnt within the previous year in the surveillance area.  Controls: age, sex, socioeconomic status matched children from the same geographical location with no history of burns.		None specified (other than not giving consent).	Children under 10 years of age living in the surveillance zone were recruited. (community based)
Samples	Interventions		Outcome	Results	Quality and limitations
840 participants in total 420 cases and 420 control	KupiBati (traditional kerosene lamp) [i,e Unprotected hot surfaces (which could include open fires, solid fuel stoves etc.)] Kitchen having door		Burns Injuries	Odds ratio (OR) for burns in the presence of a traditional kerosene lamp (kupibati):3.16 (95% CI: 1.58–6.35). OR for burns in the absence of a kitchen door:1.38 (95% CI: 0.98-1.96)	Cases and controls were not adequately compared to establish similarities and differences. Exposure status was measured by face-to-face-interviews with mothers or caregiver of children. Only a limited number of potential confounders were accounted for.

9	Study: Phelan 2011		Title: A Randomized Controlled Trial of Home Injury Hazard Reduction The HOME Injury Study		
Authors: Phelan KJ, Khoury J, Xu Y, Liddy S, Hornung R, Lanphear BP					
Study type	Setting	Inclusion criteria	Exclusion criteria	Recruitment procedures	
Randomized trial	USA	Mothers and their children under 3 years of age.	Those living in homes where landlords refused to give consent for the intervention. Mothers with twins. Mothers under 18 years of age More than 19 weeks' gestation Living in a home built after 1978 Plans to relocate in the next 12 months Living in public housing or a shelter Unable to speak English.	Mothers who attended any of the 7 participating obstetrical practices within a birth cohort examining the developmental effects of exposure to prevalent environmental neurotoxicants were screened for eligibility.	
Samples	Interventions	Outcome	Results	Quality and limitations	
355 participants in total 1) Intervention (n=181) 2) Control (n=174)	Home assessment followed by multiple modifications as required including stair gates, cabinet locks, and smoke and CO detectors.	Modifiable injuries, specific injuries falls, cuts and burns* were also reported. Medically attended injury (i.e. telephone calls, office visits, and emergency visits for injury).* A medically attended injury was defined as an injury that prompted the parents to call or visit a physician's office, urgent care or an emergency department. *Of interest to the review	Overall, the rate ratio for all medically attended injuries for intervention versus control was 0.69 (95%CI:0.40-1.18) and rate ratio for medically attended modifiable injuries was 0.30 (95%CI:0.10-0.86) Odds ratio for prevention of burns/fires for smoke detector at 12 months was0.99 (95%CI:0.59-1.65), 3.02 (95%CI:1.40-6.53), 1.85 (95%CI:0.75-4.59) at baseline, 12 and 24 months Odds ratio for prevention of burns/fires by CO detector was 1.09 (0.70-1.70), 6.50 (3.67-11.51) and 3.23 (1.87-5.57) at baseline, 12 and 24 months.	Randomization was done after baseline home visit and landlord consent for interventions. This was computer generated and kept in sealed opaque envelopes. Participants were not masked but they were asked not to reveal their group status to interviewers. Investigators and analysts were masked until the end of data analyses.	
10	Study: Taira 2011		Title:Predictors of sustaining burn injury: does the use of common prevention strategies matter?		
Authors: Taira BR, Cassara G, Meng H, Salama MN, Chohan J, Sandoval S, Singer AJ					
Study type	Setting	Inclusion criteria	Exclusion criteria	Recruitment procedures	
Case control	USA	Cases: all burn patients enrolled in the burn registry of the study centre for the year 2008.  Controls: non-random sample of non-burned emergency department attendees in the same study period.	----	Single institution based burn registry was used for recruitment of cases while controls were from non-burn emergency department patients of the same institution but different study period	

Samples		Interventions	Outcome	Results	Quality and limitations
592 participants in total 194 cases 398 controls		Smoke alarm* CO detector* Fire extinguisher Escape plan Knowing maximum temperature of water heater Fireplace guards* Keeping flammable liquids locked Keeping flammable liquids in cool, dry place * Of interest to our systematic review	Burns	Cases reported the same rates of smoke alarm usage (96.9% vs96.3%, p=0.692) and use of carbon monoxide detectors (75.3% vs 67.2%, p=0.05). However cases used of fireplace guards less (13.8% vs 37.7%, p=0.003) when compared to controls. Cases reported a higher rate of safe storage of flammable liquids. i.e. at cool dry place (61.6 vs 47.9%, p=0.002).  In multivariable analyses having smoke alarms was not associated with burns (OR: 0.75, 95%CI: 0.22-2.61) and keeping flammable liquids in a locked area was protective for burns (OR: 0.59, 95%CI: 0.44-0.80).	The control group was non-random in nature and this is one key limitation of the study and result should be interpreted with caution.
11	Study: Pearce 2012		Title:Does the home environment influence inequalities in unintentional injury in early childhood? Findings from the UK Millennium Cohort Study		
Authors: Pearce A, Li L, Abbas J, Ferguson B, Graham H, Law C					
Study type	Setting	Inclusion criteria		Exclusion criteria	Recruitment procedures
Cohort	the United Kingdom	Children aged 9 months to 3 years		Children where main responder was not mother.	Data from a longitudinal survey (Millenium Cohort Study) of 18,296 singleton children born in the United Kingdom between September 2000 and January 2002 was used. This was a retrospective analyses of data.
Samples	Interventions		Outcome	Results	Quality and limitations
14 .378 participants	Various exposures including four home safety, i.e. fireguard, safety gate, smoke alarms and electric socket covers		Burn or scald injuries* Falls * Of interest to our systematic review	The study intended to find the role of disadvantaged status for unintentional studies and found that after controlling for the indicators of housing quality and safety equipment use there was no change in the increased of injury experienced by children from less advantaged backgrounds. Children who lived in households with none of the four home safety equipment were around 20%less likely to have been injured than those with all four.  Only exposure-outcome pairs of relevance to review and where adjusted data is presented is reported below.  No association between fireguard use and burn or scald injuries (RR; 1.05; 95% CI: 0.67-1.65) .Only households with working fires (fires used for heating: gas, wood, coal and electric) was used for the fireguard analyses as it was not thought to be relevant for other houses.	Study was carried out using secondary data. The outcome assessment was not active and mothers were asked to report events. Exposure assessment however objective in nature and is a significant strength of this study.

12	Study: SadeghiBazargan 2012		Title:Household related predictors of burn injuries in an Iranian population: a case-control study		
Authors: Sadeghi-Bazargani H, Arshi S, Mashoufi M, Deljavan-anvari R, MeshkiniM,Mohammadi R					
Study type	Setting	Inclusion criteria		Exclusion criteria	Recruitment procedures
Case control	Ardabil Province, the Islamic Republic of Iran	Cases: Patients with unintentional burn injuries admitted to Ardabil Burn Center; patients with thermal burn injuries including scalds, flame burns, and contact burns. Controls: Age, sex and urbanity status (rural vs. urban) matched patients with no history of burn injuries during the month before enrolment and admitted to one of the university hospital wards in Ardabil Province that share a common reference population with the Ardabil Burn Center.		<b>Cases</b> Frostbites and chemical burns Self-immolation and other intentional burns Burn injuries occurred out of Ardabil Province Outpatient admissions <b>Controls</b> Admitted to hospital because of chronic diseases Admitted to hospital because of other major types of injuries Outpatient admissions	Hospital based recruitment of cases and controls. For cases, all inpatient burn victims were enrolled into this study whether they died after admission, were discharged or were transferred to the more specialized centres.
Samples	Interventions		Outcome	Results	Quality and limitations
485 participants in total 239 cases and 246 controls	Unvented gas / solid fuel burning stoves electric samovars traditional samovars picnic gas-stove non-conventional pipe-less air heaters conventional piped kerosene or gas burning heaters samovars lacking the national standard authorization mark		Burns Injuries	Risk of burn injury was associated with the use of nonconventional pipe-less air heaters instead of conventional piped kerosene- or gas-burning heaters (OR: 1.98, 95% CI: 1.1-3.6), use of picnic gas stove for cooking at home (OR: 1.6, 95%CI: 1.0–2.4), use of electric samovars instead of other types of samovars (OR:0.3, 95% CI: 0.1-1.0), and use of samovars lacking the national standard authorization mark (OR: 2.2, 95% CI: 1.4-3.6).	The study attempted to identify a large number of predictors. The similarity or cases and controls is not reported. Long follow-up but the sample size was not large enough for subgroup analyses of important parameters (e.g. age and gender).
13	Study: Harvey 2013		Title: The impact of recent changes in smoke alarm legislation on residential fire injuries and smoke alarm ownership in New South Wales, Australia		
Authors: Harvey LA, Poulos RG, Sherker S.					
Study type	Setting	Inclusion criteria		Exclusion criteria	Recruitment procedures
Retrospective cohort	Australia	Residential fire injuries from 2002 to 2010 (4 years prior and post legislation in 2006)for all hospitals in study area (New South Wales). Data about smoke alarm ownership and demography was obtained from NSW population health survey.		---	---
Samples	Interventions		Outcome	Results	Quality and limitations
437 hospitalizations for residential burns	Legislation regarding compulsory smoke alarm ownership. Legislation required all homes to have at least one smoke alarm.		Smoke alarm ownership Residential fire-related hospitalizations* * Of interest to our systematic review	Before introduction of universal legislation, hospitalization rates were increasing slightly; but, after the introduction of legislation, hospitalization rates decreased by 36.2% (95% CI: 16.7-55.8) annually	The study is retrospective cohort and hence the issue of confounding factors including that of increased awareness which typically comes both before and after legislative changes cannot be ruled out from the data. The information about smoke alarm ownership was owned telephonically and as a result there might have been a bias in reporting.

14	Study: Othman 2013	Title:Risk factors for burns at home in Kurdish preschool children: a case-control study			
Authors: Othman N,Kendrick D					
Study type	Setting	Inclusion criteria	Exclusion criteria	Recruitment procedures	
Case- control	Iraq	Cases: children aged 0–5 years who had sustained an acute burn injury and attended the burns centre for a burn injury occurring at home (including the yard).A burn injury was defined using ICD-10 classification system (T20–T32).This includes flame injuries, scalds, contact burns, electrical burns and chemical burns.  Controls: children aged 0-5 years who attended the hospital but did not have a burn injury. Controls were frequency matched to cases by sex and age in 1 year intervals.	<b>Cases</b> Burn sustained in natural and man-made disasters or by lightning Child was a sibling of a child already recruited as a case. <b>Controls</b> History of previous burn injury Child was a sibling of another child already recruited as a control Admitted for typhoid or diarrhoea.(there was an epidemic of typhoid and diarrhoea during study period and they were excluded from study)	Cases were recruited by an author of the study. Controls were selected by simple random sampling and recruited, interviewed by a trained doctor.	
Samples	Interventions	Outcome	Results	Quality and limitations	
496 participants in total 248 cases 248 controls	Various home hazards were studied but of relevance to this review are kerosene heater, samovars (unprotected hot surfaces) and smoke alarms.	Burns Scalds	Smoke alarm was not installed in homes of equal number and percentages of cases and controls. More controls used kerosene heaters for space heating than cases ( $\chi^2=10.5$ , $p=0.001$ ). More cases had samovars as main tea making equipment than controls but the difference was not significant ( $\chi^2=0.2$ , $p=0.67$ ).	The study had a very high participation rate which is a strength. One of the limitations of the study is that the study used hospital-based recruitment and hence there is some bias with respect to that. Since an author was also involved in recruitment and interviewing of cases (but not controls) there might have been some bias due to this.	
15	Study: Istre 2014	Title:Preventing deaths and injuries from house fires: an outcome evaluation of a community-based smoke alarm installation programme			
Authors: Istre GR, McCoy MA, Moore BJ, Roper C, Stephens-Stidham S, Barnard JJ, Carlin DK, Stowe M, Anderson RJ					
Study type	Setting	Inclusion criteria	Exclusion criteria	Recruitment procedures	
Cohort	USA	General population with significant proportion aged >64 years.  A programme house was defined as one that received at least one smoke alarm.  Non-programme house was any other house in the same census tract that did not receive a smoke alarm.	--	Recruitment was done as a part of Operation Installation (OI)in Texas, which installed smoke alarms in high-risk census tracts. High-risk tracts were those tracts that were "previously identified as having high rates of house fire-related deaths and injuries, and had lowest median income".	

Samples	Interventions	Outcome	Results	Quality and limitations
107 705	Smoke alarm (targeted, community-based intervention)	House-fire related death / Injury(Burns) (Composite)	Unadjusted case rate in the smoke alarm installed population was lower than in the population without a smoke alarm (3.1 vs 9.6 per 100 000 population, respectively; rate Ratio: 0.32; 95% CI 0.10-0.84).). Adjusted case rate, by multivariate analyses in programme houses was 63%lower than non-programme houses.(3.5 vs 9.5 per 100 000 population, respectively, rate difference 6.0; 95% CI 0.8-11.1; RR: 0.37, 95% CI 0.00-0.86). The difference was significant in the first 5 years of the programme but became non-significant by 10 years, as smoke alarms became non-functional.	The study investigators had not verified if non-programme houses had pre-existing smoke alarms or were different in other important ways. Study did not attempt to measure the awareness that might have resulted as a result of smoke alarm installation.
16	Study: Chamania 2015	Title:Pilot project in rural western Madhya Pradesh,India, to assess the feasibility of using LED and solar-powered lanterns to remove kerosene lampsand related hazards from homes		
Authors: Chamania S, Chouhan R, Awasthi A, Bendell R, Marsden N,Gibson J, Whitaker IS, Potokar TS				
Study type	Setting	Inclusion criteria	Exclusion criteria	Recruitment procedures
Interventional Study (pre-post)	India (rural)	Households in villages in the Malwa region of Madhya Pradesh	--	Households were randomly chosen from 18 villages
Samples	Interventions	Outcome	Results	Quality and limitations
1042 households	Replacement of kerosene lamps in villages with solar lamps and LED lamps.	Incidence of burns* Social acceptance by villagers, Cost implications and availability of LED lamps * Of interest to our systematic review	At the baseline, 23 burns were reported by villagers in the last 5 years of their memory. At 6 months after the introduction of the alternative light sources, there was only one burn incident which was suicidal. This incidence was unrelated to the lamp and therefore not included in the analysis.	The study conducted in rural India does not balance for confounders and the length of follow up is only 6 months which is limited. However it provides data from a contextual setting from which no data is available.

17	Study: Keall 2015 Australian New Zealand Clinical Trials Registry, number ACTRN12609000779279.	Title:Home modifications to reduce injuries from falls in the Home Injury Prevention Intervention (HIPI) study: a cluster-randomized controlled trial		
Authors: Keall MD, Pierse N, Howden-Chapman P, Cunningham C, Cunningham M, Guria J, Baker MG				
Study type	Setting	Inclusion criteria	Exclusion criteria	Recruitment procedures
Randomized trial	New Zealand	People living in the study area (Taranaki) who had recently received government-subsidized home insulation that was retrofitted to their homes. The qualification for this scheme was house constructed before 1980 with at least one occupant who was a holder of a community services card(cards are given to people on a relatively low income, unemployed individuals, students, pensioners (age 65 years or older), and people in receipt of sickness benefits, which indicate that the person is entitled to state subsidies).	Rented houses Individuals who did not intend to live at the house for at least the next 3 years	People meeting study criteria were approached for consent for studies by WISE-Better Homes, a local community trust.
Samples	Interventions	Outcome	Results	Quality and limitations
842 households (n=1848 occupants) 1) Intervention: 436 households (n=950 individual occupants) 2) Control:406 households (n=898 occupants)	Home modifications after identification of risks: handrails for outside steps and internal stairs; other minor repairs to outside steps; repairs to window catches; grab rails for bathrooms and toilets; adequate outside lighting; high-visibility and slip-resistant edging for outside steps; fixing of lifted edges of carpets and mats; non-slip bathmats; and slip-resistant surfacing for outside surfaces such as decks.  The interventions group, who got modifications, were also given a pamphlet on home safety. This pamphlet was not given to control households.	<b>Primary outcome:</b> rate of unintentional falls at home per person per year that needed medical treatment.* <b>Secondary outcome:</b> rate of injuries caused by falls at home per year exposed to the intervention.(specific) *Of interest to our systematic review	Crude rate of medically treated falls per person per year was 0.061 in the intervention group and0.072 in the control group (RR: 0.86, 95% CI:0.66–1.12). 26% reduction in the rate of injuries caused by falls at home per year exposed to the intervention was estimated for the intervention group compared with the control group, after adjustment for age, previous falls, sex, and ethnic origin (RR: 0.74, 95% CI: 0.58–0.94).	Study is methodologically robust. Randomization was done after baseline evaluation and consent, using a computer generated randomization schedule (R version 2.10.0, using an electronic coin toss) and allocation was proper. Participants were not masked but coders were masked to the allocation status.  A slightly higher mean number of hazards were found in homes allocated to the intervention group than the control group(1.98 vs. 1.91)  The study group received an additional pamphlet and the effect of its educational value could not be differentiated from the effect of home modifications.

18	Study: Kendrick 2015	Title:Risk and Protective Factors for Falls From Furniture in Young Children: Multicenter Case-Control Study		
Authors: Kendrick D, Maula A, Reading R, Hindmarch P, Coupland C,Watson M, Hayes M, DeaveT				
Study type	Setting	Inclusion criteria	Exclusion criteria	Recruitment procedures
Case-control (1:4)	United Kingdom	Cases: children aged 0-4 years with a fall from furniture attending an emergency department, minor injury unit, or admitted to hospital.  Controls: children aged 0-4 years without a medically attended fall from furniture on the date of the case's injury. They were individually matched on age (within 4 months of a case's age), sex, calendar time (within 4 months of a case's injury) and from the case's general practice or a neighbouring practice.  Study aimed to recruit an average of 4 controls per case. Where fewer than 4 controls were recruited per case, the authors used control participants from cases with more than 4, control participants who were no longer matched to cases, and control participants from the other ongoing case-control studies as extra control participants. These were matched for age, sex, calendar time and study centre and were used only once as an extra matched control.	Intentional or fatal injuries or those living in children's homes	Potential cases were approached during their medical attendance or by telephone or mail within 72 hours of attendance. For each case, 10 controls were invited to participate by mail. The controls were identified by searching in practice registers and if more than 10 eligible controls were found to meet the inclusion criteria the 10 with dates of birth closest to the case were approached.  For postal study invites to both cases and controls, a GBP 5 voucher, a second questionnaire reminder, university logos on study information, personalized invitations, and first class mailing were used.
Samples	Interventions	Outcome	Results	Quality and limitations
672 cases 2648 controls	Safety behaviours Safety equipment Home hazard (stair / safety gates)*  *Of interest to our systematic review	Falls from furniture occurring at the child's home resulting in attendance at an emergency department, minor injury unit, or hospital admission	Only result related to exposure of interest is reported.  Parents of cases were significantly more likely not to use stair/ safety gates (Adjusted OR:1.65, 95% CI: 1.29-2.12)	Study though robust has very low participation rates (but comparable between cases and controls).
19	Study: Kamei 2015	Title: Effectiveness of a home hazard modification program for reducing falls in urban community-dwelling older adults: A randomized controlled trial.		
Authors: Kamei T, Kajii F, Yamamoto Y, et al				
Study type	Setting	Inclusion criteria	Exclusion criteria	Recruitment procedures
Randomized trial	Tokyo, Japan	Adults (≥65 years), community dwelling first time participation in the programme; allowed by their primary physician to undergo physical exercise; living in their own residence	low cognitive function; dementia; poor physical condition such as inability	Study information for recruitment was initially send through posters, flyers, and websites from the Tokyo metropolitan region. . A trained nurse screened the interested individuals for eligibility criteria

Samples	Interventions	Outcome	Results	Quality and limitations
130 (interventions =67; control =63)	Home hazard modification program (HHMP): education and practice regarding home safety by using a model mock-up of a typical Japanese home	Occurrence of overall and indoor fall events. Fall prevention awareness and modification of hazards at home	Falls in the home at 1 year were reduced by 11.7% with HHMP versus control group (HR: 0.397, 95% CI: 0.151-1.045, p=0.052). In adults <75 years: ARR 0.124 (95% CI: -0.030 to 0.186); in adults ≥75 years: ARR 0.109 (95% CI: -0.061 to 0.244).	The study was judged to have high risk of bias in domains of blinding of participants, outcomes measures, incomplete outcome data and selective outcome reporting.

20	Study: Stewart 2016	Title: Modifiable risk factors for scald injury in children under 5 years of age: A Multi-centre Case-Control Study.		
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Citation: Stewart J, Benford P, Wynn P, et al.				
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Study type	Setting	Inclusion criteria	Exclusion criteria	Recruitment procedures
Case-control (1:4)	Emergency departments (EDs), minor injury units (MIU) and inpatient wards in English National Health Service (NHS) hospitals	Cases were children 0–4 years with a scald injury occurring at home, seeking medical attention at an ED, MIU or admitted to hospital. Controls were children 0–4 years who did not seek medical Attention for a scald injury on the same date of the case's Injury. Controls were recruited from the same general practice (GP) in which the case was registered, or a neighbouring practice.	Case exclusion criteria – with fatal or intentional injuries and those living in children's homes	Cases – invited during their medical attendance or by telephone or postal invite within 72 h of attendance. Control – general practitioners (GPs) used their practice register to match and send a postal invite. All participants were asked to complete one age appropriate paper questionnaire. One reminder was sent after two weeks and a £5 gift voucher was sent upon return of a completed questionnaire.

Samples	Interventions	Outcome	Results	Quality and limitations
338 cases and 1438 controls	Home hazards and use of safety and other potentially risk reduction equipment: Used a baby walker in the last 24 h (children aged 0 to 36 months only) Use of safety and other potentially risk reducing equipment Safety gates or stairgates anywhere in the house Kettles with curly or short cables Play pens or travel cots (children aged 0 to 36 months only) Stationary activity centres (children aged 0 to 36 months only)	Medically attended scald injuries	Imputation analysis for not using a safety gate: a OR 1.69 (95% CI: 1.21 to 2.34)	The study was in general good quality but participation rates in the case and control groups was unclear. It was also unclear what measures were taken to prevent ascertaining of cases based on knowledge of primary exposures.

## Appendix 20 Risk of bias assessment of included studies

Risk of bias and quality assessment for case-control studies											
Study ID	Did the study address an appropriate and clearly focused question?	Were the cases and controls taken from comparable populations?	Was the same exclusion criteria used for both cases and controls?	What was the participation rate for each group?	Were participants and non-participants compared to establish their similarities or differences?	Were cases clearly defined and differentiated from controls?	Was it clearly established that controls are not cases?	Were measures taken to prevent knowledge of primary exposure influencing case ascertainment?	Was exposure status measured in a standard, valid and reliable way?	Were the main potential confounders identified and taken into account in the design and analysis?	Are the results relevant?
Le Blanc 2006	+	+	+	?	+	+	?	?	+	-	+
Mashreky 2010	+	+	+	+	-	+	+	+	-	-	+
Taira 2011	+	-	?	-	+	+	+	?	?	?	+
Sadeghi Bazargan 2012	+	+	+	+	-	+	-	+	-	?	+
Othman 2013	+	+	+	-	-	+	+	-	+	+	+
Kendrick 2015	+	+	+	+	+	+	+	?	?	+	+
Stewart 2016	+	+	+	?	+	+	+	?	+	+	+

Risk of bias and quality assessment for case-control studies											
Study ID	Was the study population clear defined?	Was selection bias sufficiently accounted for?	Was the exposure clearly defined and was the method appropriate?	Was the outcome clear defined and was the method appropriate?	Was the outcome blinded assessed? If the outcome was not blinded; did this influence the outcome?	Was the follow-up sufficiently long?	Was selective loss to follow-up appropriately prevented?	Are the most important confounders identified and is this adequately accounted for in the design and analyses?	Were the results valid and applicable? If not, the checklist could be stopped	Summary of the main results given?	Are the results relevant?
Kendrick 2005	+	?	+	+	+	+	+	+	+	+	+
Pressley 2005	+	+	?	-	+	NA	NA	+	+	+	+
Keall 2008	+	+	-	?	+	+	NA	-	+	+	+
Leclerc 2010	+	-	+	-	-	+	+	+	+	+	+
Pearce 2012	+	?	+	+	-	+	+	+	+	+	+
Cloatre 2013	+	+	+	+	?	+	NA	-	+	+	+
Harvey 2013	+	+	-	+	+	+	NA	-	+	+	+
Istre 2014	+	-	+	+	+	+	+	+	+	+	+
Chamania 2014	+	?	+	+	?	-	+	-	+	+	+

Risk of bias assessment of randomized trials					
Domain	Campbell 2005	Fitzharis 2010	Phelan 2011	Keall 2015	Kamei 2015
Random sequence generation (selection bias)	+	+	+	+	+
Allocation concealment (selection bias)	+	+	+	+	?
Blinding of participants (performance bias)	-	-	-	-	-
Blinding of personnel (performance bias)	+	+	+	+	?
Blinding of outcome assessment (detection bias)	?	?	+	+	-
Incomplete outcome data (attrition bias)	+	+	+	+	-
Selective outcome reporting? (reporting bias)	+	+	+	+	-
Other bias	+	+	+	-	+

## Appendix 21 Evidence profile: Housing safety and injuries

### Home safety assessment and modification programmes

Quality assessment							No. of participants	Effect	Quality	Importance
Number of studies	Designs	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations				
Serious injurious falls										
1 (Campbell 2005)	Randomized: 1 (Campbell 2005)	Low	Not applicable (one study)	Direct	Precise	Study was in 391 adults (≥75 years) with severe visual impairment in New Zealand (Campbell 2005).	Randomized trial: 391	Randomized trial: number of falls causing serious injury per person year was 0.10 in the home safety assessment and modification only group and 0.11 in the combined home safety assessment and modification plus exercise group, compared to 0.04 in the exercise only group and 0.04 in the social visit group (Campbell 2005).	⊕⊕⊕⊖ Moderate	Moderate
Falls needing medical care or medical consultation										
5 (Campbell 2005, Fitzharris 2010, Kamei 2015, Keall 2015, Phelan 2011)	Randomized: 5 (Campbell 2005, Fitzharris 2010, Kamei 2015, Keall 2015, Phelan 2011)	Moderate	Consistent	Direct	Precise	Studies were in 391 adults (≥75 years) with severe visual impairment in New Zealand (Campbell 2005), 1090 adults (≥70 years) in Australia (Fitzharris 2010), 130 adults (≥65 years) in Japan (Kamei 2015), 1848 people (842 households) in New Zealand (Keall 2015) and 355 mothers and their children (<3 years) in the USA (Phelan 2011).	Randomized trials: 3814	Randomized trials: One study found that the number (%) of falls was higher with the home safety assessment and modification programme than with other interventions (Campbell 2005), while another study found that falls requiring medical care were more common in the home hazard modification alone group (15.0 per 100 person years) than in the control group (10.2) but less common when home hazard modification was combined with exercise (8.1), vision interventions (6.1) or both (8.3) (Fitzharris 2010). In three other studies, there were non-statistically significant reductions when home safety assessment and modifications were compared to a control group for all medically attended injuries in children <3 years (RR: 0.69, 95% CI:0.40-1.18) (Phelan 2011), for medically treated falls (RR: 0.86, 95% CI: 0.66–1.12) (Keall 2015), and for indoor falls at 12 months follow up for adults <75 years (ARR: 0.124, 95% CI: –0.030 to 0.186) or ≥75 years (ARR: 0.109, 95% CI: –0.061 to 0.244) (Kamei 2015). However, the second of these studies	⊕⊕⊕⊖ Moderate	High

Quality assessment							No. of participants	Effect	Quality	Importance
Number of studies	Designs	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations				
								also found a statistically significant reduction in medically attended modifiable injuries (RR: 0.30, 95% CI: 0.10-0.86) in children <3 years (Phelan 2011).		

## Fire or smoke alarms

### Burns or scalds

4 (LeBlanc 2006, Othman 2013, Phelan 2011, Taira 2011)	Randomized: 1 (Phelan 2011) Case-control: 3 (LeBlanc 2006, Othman 2013, Taira 2011)	Low for randomized trial but high for case-control studies	Inconsistent	Direct	Imprecise	Studies were in 355 mothers and their children (<3 years) in the USA (Phelan 2011), 692 children (<8 years) presenting to an emergency department with or without an injury in Canada (LeBlanc 2006), 496 children (0-5 years) who attended hospital with and without a burn or scald injury in Iraq (Othman 2013) and 592 people who presented to an emergency department with or without burns in the USA (Taira 2011).	Randomized trial: 355 Case-control studies: 1780	Randomized trial: burns and fires in the homes were prevented by smoke alarms (OR: 0.99, 95% CI: 0.59-1.65 at baseline, OR: 3.02, 95% CI: 1.40-6.53 at 12 months, and OR: 1.85, 95% CI: 0.75-4.59 at 24 months (Phelan 2011). Case-control studies: Meta-analysis was not done because of heterogeneity and the results were inconsistent. One study (LeBlanc 2006) found an increase in burns in the absence of a smoke alarm (OR: 3.2, 95% CI: 1.4-7.7) or functioning smoke detector (OR: 1.7, 95% CI: 1.0-2.8), while the multivariate analysis in another study (Taira 2011) found a non-significant reduction in burns with a smoke alarm (OR: 0.75, 95% CI: 0.22-2.61) and the third (Othman 2013) found that smoke alarms were not installed in homes of equal proportions of cases (with burns) and controls (without burns).	⊕⊕⊕⊖ Low	Moderate
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Quality assessment							No. of participants	Effect	Quality	Importance
Number of studies	Designs	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations				
Primary care attendance										
1 (Kendrick 2005)	Cohort: 1 (Kendrick 2005)	Low	Not applicable (one study)	Direct	Imprecise	Study was in 2357 children (<5 years) in the United Kingdom (Kendrick 2005).	Cohort study: 2357	Cohort study: no significant effect of smoke alarms (IRR 0.88, 95% CI: 0.89-1.30) (Kendrick 2005).	⊕⊕⊕⊕ Very low	Very low
Accident and emergency (emergency department) attendance										
1 (Kendrick 2005)	Cohort: 1 (Kendrick 2005)	Low	Not applicable (one study)	Direct	Precise	Study was in 2357 children (<5 years) in the United Kingdom (Kendrick 2005).	Cohort study: 2357	Cohort study: significant effect of smoke alarms (IRR: 0.79, 95% CI: 0.65-0.95) (Kendrick 2005).	⊕⊕⊕⊕ Very low	Very low
Hospital admission										
2 (Harvey 2013, Kendrick 2005)	Quasi-experimental: 1 (Harvery 2013)  Cohort: 1 (Kendrick 2005)	High	Consistent	Direct	Precise	Studies were in 437 people hospitalized for burns in Australia (Harvey 2013) and 2357 children (<5 years) in the United Kingdom (Kendrick 2005).	Quasi-experimental study: 437  Cohort study: 2357	Quasi-experimental study: hospitalizations decreased by 36.2% (95% CI: 16.7-55.8) after legislation on smoke alarms (Harvey 2013).  Cohort study: significant effect of smoke alarms (IRR: 0.51, 95% CI: 0.30-0.89) (Kendrick 2005).	⊕⊕⊕⊕ Low	Low
House-fire related burns and injuries (composite outcome)										
1 (Istre 2014)	Cohort: 1 (Istre 2014)	Low	Not applicable (one study)	Direct	Precise	Study was in 107,705 adults (>64 years) in the USA (Istre 2014).	Cohort study: 107,705	Cohort study: significant effect of smoke alarms (unadjusted RR: 0.32, 95% CI: 0.10-0.84; adjusted RR: 0.37, 95% CI: 0.00-0.86) (Istre 2014).	⊕⊕⊕⊕ Low	Low

Quality assessment							No. of participants	Effect	Quality	Importance
Number of studies	Designs	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations				
Stair and safety gates										
Primary care attendance										
1 (Kendrick 2005)	Cohort: 1 (Kendrick 2005)	Low	Not applicable (one study)	Direct	Imprecise	Study was in 2357 children (<5 years) in the United Kingdom (Kendrick 2005).	Cohort study: 2357	Cohort study: no significant effect of stair gate (IRR: 1.09, 95% CI: 0.77-1.53) (Kendrick 2005).	⊕⊕⊕⊕ Very low	Very low
Accident and emergency (emergency department) attendance										
1 (Kendrick 2005)	Cohort: 1 (Kendrick 2005)	Low	Not applicable (one study)	Direct	Imprecise	Study was in 2357 children (<5 years) in the United Kingdom (Kendrick 2005).	Cohort study: 2357	Cohort study: no significant effect of stair gate (IRR: 0.97, 95% CI: 0.82-1.15) (Kendrick 2005).	⊕⊕⊕⊕ Very low	Very low
Hospital admission										
1 (Kendrick 2005)	Cohort: 1 (Kendrick 2005)	Low	Not applicable (one study)	Direct	Imprecise	Study was in 2357 children (<5 years) in the United Kingdom (Kendrick 2005).	Cohort study: 2357	Cohort study: significant effect of stair gate (IRR: 0.46, 95% CI: 0.26-0.83) (Kendrick 2005).	⊕⊕⊕⊕ Very low	Very low
Medically attended falls										
1 (Kendrick 2015)	Case-control: 1 (Kendrick 2015)	Low	Not applicable (one study)	Direct	Precise	Study was in 3320 children (0–4 years) with and without a medically attended fall from furniture in the United Kingdom (Kendrick 2015).	Case-control study: 3320	Case-control study: parents of children with medically attended falls were significantly more likely not to use stair/safety gates (adjusted OR: 1.65, 95% CI: 1.29-2.12) (Kendrick 2015).	⊕⊕⊕⊕ Very low	Very low

Quality assessment							No. of participants	Effect	Quality	Importance
Number of studies	Designs	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations				
Burns or scald injuries										
2 (Mashreky 2010, Stewart 2016)	Case-control: 2 (Mashreky 2010, Stewart 2016)	High	Consistent	Direct	Precise	Studies were in 840 children (<10 years) with and without burns in Bangladesh (Mashreky 2010) and 1776 children (<5 years) with and without scalds in the United Kingdom (Stewart 2016).	Case-control studies: 2616	Case-control studies: both studies showed that safety gates reduced burns or scalds. One study found that absence of kitchen door non-significantly increased the risk of burns (OR: 1.38, 95% CI: 0.98-1.96) (Mashreky 2010) and the other study found that not using safety gates was associated with a significant increase in scalds (aOR: 1.69, 95% CI: 1.21-2.34) (Stewart 2016).	⊕⊕⊖⊖ Low	Low
Stair and safety gates										
Emergency and urgent hospital admission										
2 (Pearce 2012, Taira 2011)	Cohort: 1 (Pearce 2012) Case-control: 1 (Taira 2011)	High	Inconsistent	Direct	Imprecise	Studies were in 14,378 children (9 months to 3 years) in the United Kingdom (Pearce 2012) and 592 people who presented to an emergency department with or without burns in the USA (Taira 2011).	Cohort study: 14 378 Case-control study: 592	Cohort study: no association between fireguard use and burn or scald injuries (RR; 1.05, 95% CI: 0.67-1.65) (Pearce 2012).  Case-control study: burn cases had used fireplace guards less often than controls (13.8% vs. 37.7%, p=0.003) (Taira 2011).	⊕⊖⊖⊖ Very low	Low

Quality assessment							No. of participants	Effect	Quality	Importance
Number of studies	Designs	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations				
Unvented gas, fuel burning stove or unprotected hot surfaces										
Burn or scald injuries										
5 (Chamania 2015, LeBlanc 2006, Mashreky 2010, Othman 2013, Sadeghi-Bazargani 2012)	Quasi-experimental: 1 (Chamania 2015)  Case-control: 4 (LeBlanc 2006, Mashreky 2010, Othman 2013, Sadeghi-Bazargani 2012)	High	Inconsistent	Direct	Precise	Studies were in 1042 households in India (Chamania 2015), 692 children (<8 years) presenting to an emergency department with or without an injury in Canada (LeBlanc 2006), 840 children (<10 years) with and without burns in Bangladesh (Mashreky 2010), 496 children (0-5 years) who attended hospital with and without a burn or scald injury in Iraq (Othman 2013) and 485 people admitted to hospital with and without burns in the Islamic Republic of Iran (Sadeghi-Bazargani 2012).	Quasi-experimental study: 1042 households  Case-control studies: 2513	Quasi-experimental study: the number of unintentional burns reduced to zero from 23 among 1042 households within 6 months after replacement of kerosene lamps with solar/LED lamps (Chamania 2015).  Case-control studies: Meta-analysis was not done because of heterogeneity and the results were inconsistent. One study found no significant effect for burns or scalds when there was no stove guard (OR: 1.20, 95% CI: 0.37-3.83) (LeBlanc 2006) and another study found that more controls used kerosene heaters for space heating than cases ( $\chi^2=10.5$ , $p=0.001$ ) (Othman 2013). Other studies found an increase in burns in the presence of a traditional kerosene lamp (OR: 3.16, 95% CI: 1.58-6.35) (Mashreky 2010) and the use of non-conventional pipe-less air heaters instead of conventional piped kerosene- or gas-burning heaters (OR: 1.98, 95% CI: 1.1-3.6), use of picnic gas-stove for cooking at home (OR: 1.6, 95% CI: 1.0-2.4), use of samovars lacking the national standard authorization mark (OR: 2.2; 95% CI: 1.4-3.6) (Sadeghi-Bazargani 2012) and samovars as the main tea making equipment ( $\chi^2=0.2$ , $p=0.67$ ) (Othman 2013), and a decrease in burns with the use of electric samovars instead of other types of samovars (OR: 0.3, 95% CI: 0.1-1.0) (Sadeghi-Bazargani 2012).	⊕⊕⊕⊖ Low	Moderate

## Window guards

### Emergency and urgent hospital admission

1 (Pressley 2005)	Cross-sectional: 1 (Pressley 2005)	Low	Not applicable (one study)	Direct	Precise	Study was in 2 163 402 people (<18 years) discharged from hospital in the USA (Pressley 2005).	Cross-sectional study: 2,163,402	Cross-sectional study: cumulative incidence in areas with window guard legislation was 1.5 per 100,000 compared 3.0 per 100,000 in areas with no window guard legislation (Pressley 2005).	⊕⊕⊕⊖ Low	Moderate
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## Appendix 22 Supplementary evidence from individual studies

1	Study: Johnston 2011		Title: Pilot case control study of paediatric falls from windows		
Authors: Johnston BD,Quistberg DA,Shandro JR, Partridge RL,Song HR, Ebel BE					
Study type	Setting	Inclusion criteria	Exclusion criteria	Recruitment procedures	
Case-control study (1:2)	USA	Windows, not children, were identified as cases and controls. Case: window through which an index event occurred. An index event was the unintentional fall of a child under the age of10 years from a household window for which medical evaluation was sought in a participating hospital emergency department for a fall which occurred at a residence in one of three adjacent counties of the participating hospital. Control: households selected by identifying an age- and gender-matched patient who did not fall through a window but was treated for a burn or injury in one of our clinical sites within2 weeks of the incident fall.	Fatal falls, falls from window at public facilities, falls that were intentional in nature. Case homes where children were in custody of low enforcement of the State or whose guardians did not speak either English or Spanish,	Cases were identified from medical record review among children discharged from emergency departments or admitted for care subsequent to a fall from a window. Parents/legal guardians of identified children of cases were mailed a letter explaining the study and offering an opportunity to 'opt out' of a research recruitment phone call. Up to 3 telephonic attempts were made for enrolment. Potential controls for cases were also identified and recruited in similar manner. If there were several potential controls, the child who presented closest in time to the case was selected for recruitment. If the parents of a potential control child declined to participate, we contacted parents for the child presenting next closest in time until a matching control household was found. All families were given a US\$25 gift card for participation.	
Samples	Interventions/exposure		Results	Quality and limitations	
18 case windows 18 in-home controls 14 matched community controls	These included window type, presence of locks, guards or other safety devices (at the time of the window fall), and presence of a screen (at the time of the window fall). Direct measurements included maximum opening dimension of the window, the dimensions of the window, height of sill from floor and height of sill from any object under the window (functional sill height), sill depth, and exterior height of window above grade (the finished ground level adjacent to the window opening). The exterior height of the window above a roof, carport, awning, or other structure was also measured (functional exterior height)		Case windows were more likely than community controls to be horizontal sliders (100% vs.50%), to have deeper sills (6.28 vs. 4.31 inches), to be higher above the exterior surface (183 vs. 82 inches), and to have screens that failed below a threshold derived from the static pressure of a 3-year-old leaning against the mesh (60.0% vs. 16.7%).	The study was a pilot study to enumerate various methodological issues and did not do any sample calculation and done in a limited sample. Whether those who did home-visits knew of exposure status is unclear. The study also did face problems in recruiting matched community controls, which was an important feature of the methodology. On the other hand there was almost no variability between case windows and in-home controls thus indicating they were overmatched.	
2	Study: Clouatre 2013		Title:Incidence of hot tap water scalds after the introduction of regulations in Ontario		
Authors: Clouatre E, Pinto R, Banfield J, Jeschke MG.					
Study type	Setting	Inclusion criteria	Exclusion criteria	Recruitment procedures	
Retrospective cohort.	Canada	Hot tap water scald cases identified from the national Ambulatory Care reporting System and the Discharge Abstract Database of the Canadian Institute for Health Information for April 2002 to March 2010. (Legislation was passed in September 2004)	---	---	

Samples		Interventions		Outcome	Results	Quality and limitations
6952 cases of hot tap water scald		Legislation requiring all new or renovated residential buildings to lower the maximum setting of their hot water heaters to 49°C (120°F) by installing anti-scalding mixer valves	Scalds Scalds needing hospitalization Length of hospital stay		Significant decrease in the age-standardized monthly ambulatory scald cases per 100 000 population after the intervention of 0.01055 (95% CI: 0.004-0.017, P=0.0018) with a rate of change of 0.9455 (95% CI:0.90-0.98, P <0.0001) and a long-term decrease of 0.19 per 100 000. No significant difference in length of stay of hospitalized cases after the intervention (RR: 0.91; 95% CI:0.70-1.18, P=0.4624)	The study is retrospective cohort and the low level of incidence of hospitalization limited the ability to detect significant change through statistical analyses. Also there as a decreasing trend of incidence even pre-intervention and the confounding of increased awareness which typically comes both before and after legislative changes cannot be ruled out from the data.
3.	Study: Phillips 2011 Other Publications: <i>Arch Dis Child</i> 2011;96:232-239 (Original Study) Trials. 2008; 9: 14 (Protocol)			Title: Preventing bath water scalds: a cost-effectiveness analysis of introducing bath thermostatic mixer valves in social housing		
Authors: Phillips CJ, Humphreys I,Kendrick D,Stewart J,Hayes M,Nish L,Stone D,Coupland C,Towner E						
Study type		Setting	Inclusion criteria		Exclusion criteria	Recruitment procedures
Economic evaluation conducted alongside a randomized trial		United Kingdom	Families with children under 5 years of age living in accommodation provided by the Glasgow Housing Association (GHA), a social housing provider.		Moving from the property Pipe work unsuitable for TMV fitting Participation in other tap water scald prevention projects.	Written invitation from GHA were send to tenants on the East End Child Safety Project database, and to tenants aged 18–40 years identified from the GHA tenant database; or by face-to-face contact with local housing organizations.
Samples		Interventions		Outcome	Results	Quality and limitations
124 families		Participants in the intervention arm were provided:  An educational leaflet mailed prior to Thermostatic mixture valve.  A TMV set at a maximum temperature of 45C fitted by a qualified plumber from City Building (Glasgow) Limited Liability Partnership.  A waterproof educational guide on how to use the TMV attached to the tap by the plumber at installation.  Participants in control group were provided same intervention after study follow-up was completed.		Severe scalds(requiring 5 or more days as inpatients and/or transfer to specialist burns unit)* Severe scalds(requiring less than5 days as inpatients)* Minor Scalds(attendance at emergency department, but discharged without admission)* Cost effectiveness * Of interest to our systematic review	A reduction after TMV installation (based on TMVs reducing risk by 68%) in the risk of a child requiring hospitalization for 5 or more days or treatment at a specialist burns centre following a bath water scald to 1 in 12398(from 1 in 3964 pre-installation), the risk of a child requiring shorter periods of hospitalization to 1 in 16186 (from 1 in 5250 pre-installation), and the risk of a child requiring an ED attendance to 1 in 4625 (from 1 in 1475); and would reduce the risk of total ED attendances/admissions to 1 in 2788 (from 1 in 892)	The study used data from the original RCT to derive differences in the number of families with at-risk temperatures between groups. Estimates of emergency department visits from bath water scalds were assumed, based on estimated numbers of the United Kingdom emergency department attendances from the Royal Society for the Prevention of Accidents (RoSPA) and the number of hospital admissions reported by the Department of Trade and Industry, the United Kingdom.

## Appendix 23 Supplementary evidence from related systematic reviews

1	Review: Kendrick 2012	Title: Home safety education and provision of safety equipment for injury prevention		
Citation: Kendrick D, Young B, Mason-Jones AJ, Ilyas N, Achana FA, Cooper NJ, Hubbard SJ, Sutton AJ, Smith S, Wynn P, Mulvaney CA, Watson MC, Coupland C. Home safety education and provision of safety equipment for injury prevention. Cochrane Database of Systematic Reviews 2012;(9): CD005014				
Types of included studies	Population	Interventions/exposures	Outcomes	
Randomized controlled trials Non-randomized controlled trials Controlled before and after studies	Children and young people aged less than 19 years and their families. Interventions offered in healthcare settings, schools and the homes of children and families were all included.	Home safety education with or without the provision of safety equipment (stair gates, fireguards, smoke alarms, window locks, electrical socket covers, non-slip bath mats, fire extinguishers, ipecac syrup, poison centre control number stickers).	Self-reported or medically attended injury in children and young people aged up to 19 years. Possession and use of home safety equipment Safety practices (storage of medicines, sharp objects, cleaning products, poisons and matches or lighters; use of baby walkers; safe hot water temperature; keeping hot foods or liquids, small objects and plants out of the reach of children; not leaving children alone in the bath, not leaving children alone on a high surface; checking smoke alarm batteries, having or practising a fire escape plan).	
Results				
98 studies were included: 57 randomized trials, 11 non-randomized trials, 30 controlled before after (CBA) studies and one whose design could not be sufficiently distinguished. Some evidence that home safety interventions reduced injury rates after adjusting CBA studies for baseline injury rates (IRR 0.89, 95% CI: 0.78 to 1.01) but there was significant heterogeneity between studies. Greater reductions in injury rates were found for interventions delivered in the home (IRR: 0.75, 95% CI: 0.62-0.91), and for those interventions not providing safety equipment (IRR: 0.78, 95% CI: 0.66-0.92). Insufficient evidence that home safety interventions reduced rates of thermal injuries or poisoning. Some evidence that home safety interventions lead to improved home possession and use of home safety equipment but this was not related to health-related outcomes. Some evidence that interventions which were provided for free, low cost or discounted safety equipment were more effective in improving some safety practices than other interventions.				
2	Review: Turner 2011	Title: Modification of the home environment for the reduction of injuries		
Citation: Turner S, Arthur G, Lyons RA, Weightman AL, Mann MK, Jones SJ, John A, Lannon S. Modification of the home environment for the reduction of injuries. Cochrane Database of Systematic Reviews 2011;(2): CD003600				
Types of included studies	Population	Interventions/exposures	Outcomes	
Randomized controlled trials	People, irrespective of age, living in homes, which are situated in areas where housing is normally architect-designed and always subject to housing regulations.	Modifications of building fabric or 'fixtures and fittings' (that is, removable items within a property that are fastened or attached to the building fabric)  Modifications such as the installation of grab rails, stair gates, fireguards, cupboard locks, hot-water tap adaptations and lighting adjustments.  Multi-factorial Interventions were included.	Change in injury rate or risk. Change in prevalence of safety features. Change in prevalence of hazards.	
Results				
29 randomized trials were included. Meta-analyses was possible only for the effect of multi-factorial interventions (home hazard assessment and modification, medication review, health and bone assessment and exercise) on falls (RR: 1.09, 95% CI: 0.97 to 1.23). Insufficient evidence to determine whether interventions focused on modifying environmental home hazards reduce injuries and none of the studies which focussed on children or older adults demonstrated any reduction in injuries as a result of home safety modification.				

3	Review: McClure 2005	Title:Population-based interventions for the prevention of fall-related injuries in older people		
Citation: McClure RJ, Turner C, Peel N, Spinks A, Eakin E, Hughes K. Population-based interventions for the prevention of fall-related injuries in older people. Cochrane Database of Systematic Reviews 2005;(1): CD004441				
Types of included studies	Population	Interventions/exposures	Outcomes	
Prospective controlled community trials where the unit of analysis is the entire community.	Adults>65 years	Any population-based intervention which aimed to reduce fall-related injury among older people	Pre versus post-intervention medically treated fall-related injury incidence in the intervention community  Change in incidence of fall-related injury reported as having been treated by a medical practitioner in the intervention community versus the control community (to account for secular changes in injury rates not attributable to the intervention)	
Results				
6 studies were included. All showed decreases or downward trends in fall-related injuries(varying from 6 to 33%).				
4	Review: DiGueseppi 2001	Title: Interventions for promoting smoke alarm ownership and function		
Citation: DiGuisseppi C, Goss CW, Higgins JPT. Interventions for promoting smoke alarm ownership and function. Cochrane Database of Systematic Reviews 2001;(2): CD002246				
Types of included studies	Population	Interventions/exposures	Outcomes	
Controlled trials (randomized, quasi-randomized or non-randomized)	People of any age living in the community (non-institutionalized)	Any interventions designed (either wholly or in part) to increase the prevalence of owned or properly functioning smoke alarms.	Fire-related injuries or burns (self-reported injuries, GP visits, Accident & Emergency visits, hospitalizations, disabilities or deaths) Fires Owned or installed and functioning smoke alarms (self-reported or observed).	
Results				
26 studies were included, of which 17 were randomized. Injury outcomes were reported in only one randomized trial, which found no effect of a smoke alarm give-away programme on total injuries (rate ratio 1.3; 95% CI: 0.9-1.9) or hospitalizations and deaths (RR: 1.3; 95% CI 0.7-2.3).Substantial reduction in serious injuries in a non-randomized trial that evaluated a similar give-away programme. Neither study showed a beneficial effect on fires. Programmes to promote smoke alarms have mild to modest beneficial effects on smoke alarm ownership and function, but there is no demonstrated beneficial effect on fires or fire-related injuries.				
5	Review: Gates 2008	Title: Multifactorial assessment and targeted intervention for preventing falls and injuries among older people in community and emergency care settings: systematic review and meta-analysis		
Citation: Gates S, Fisher J D, Cooke M W, Carter Y H, Lamb S E. Multifactorial assessment and targeted intervention for preventing falls and injuries among older people in community and emergency care settings: systematic review and meta-analysis. BMJ 2008; 336:130				
Types of included studies	Population	Interventions/exposures	Outcomes	
Randomized and quasi-randomized controlled trials	Elderly adults	Any intervention designed to prevent falls or fall related injuries. Interventions targeted at hospital inpatient or residential care populations were excluded.	Falls Fall-related injuries Recurrent falls Hospital admissions Attendance at emergency departments Attendance at doctors surgery Death Moved to institutional care.	
Results				
19 studies were included. Risk ratio for the number of fallers was 0.91 (95% CI: 0.82-1.02), among 18 trials; and 0.90(95% CI: 0.68-1.20) for fall related injuries, among 8 trials. No differences in hospital admissions, emergency department attendance, death, or move to institutional care.				

6	Review: Neyens 2011	Title:Effectiveness and implementation aspects of interventions for preventing falls in elderly people in long-term care facilities: a systematic review of RCTs.	
Citation: Neyens JC, van Haastregt JC, Dijcks BP, Martens M, van den Heuvel WJ, de Witte LP, Schols JM.Effectiveness and implementation aspects of interventions for preventing falls in elderly people in long-term care facilities: a systematic review of RCTs.J Am Med Dir Assoc 2011;12(6):410-25.			
Types of included studies	Population	Interventions/exposures	Outcomes
Randomized trials	Elderly, disabled (cognitive or physical) residents of long-term care settings and nursing homes	Any preventive interventions on fall incidents (falls, fallers, recurrent fallers, fall-related injuries). Studies on both multi-factorial and mono-factorial interventions were included	Fall incidents
Results			
20 included trials. Significant reduction in the fall rate (ranging from 27% to 49%), percentage of recurrent fallers (reduced by 19%), or both the fall rate and the percentage of persons sustaining femoral fractures (reduced by 77%) was seen in 7 trials (4 multi-factorial and 3 mono-factorial). Mono-factorial interventions which showed positive effects were vitamin D supplementation, combined calcium and vitamin D supplementation and a clinical medication review. Multi-factorial interventions which showed positive effects were individual safety assessment and recommendations; environmental and personal safety assessments and improvement; education, environmental adaptation, balance and resistance training, and hip protector; fall risk evaluation, specific and general interventions.			
7	Review: Chang 2004	Title:Interventions for the prevention of falls in older adults: systematic review and meta-analysis of randomized clinical trials	
Citation:Chang John T, Morton Sally C, Rubenstein Laurence Z, Mojica Walter A, Maglione Margaret,Suttorp Marika J et al. Interventions for the prevention of falls in older adults: systematic review and meta-analysis of randomized clinical trials BMJ 2004; 328:680			
Types of included studies	Population	Interventions/exposures	Outcomes
Randomized trials	Elderly adults	Multifactorial falls risk assessment and management Exercise Environmental modifications Education	Falling at least once during a specified follow up period Monthly rate of falling.
Results			
40 included trials. Multifactorial falls risk assessment and management programmes were effective for risk of falling (0.82, 95% CI: 0.72-0.94, number needed to treat (NNT): 11) and monthly fall rate (0.63, 95% CI: 0.49-0.83; intervention group had 11.8 fewer falls per 100 patients per month). Exercise interventions reduced the risk of falling (0.86, 95% CI: 0.75-0.99, NNT: 16) and monthly fall rate (0.86, 95% CI: 0.73-1.01;NNT: 2.7)			