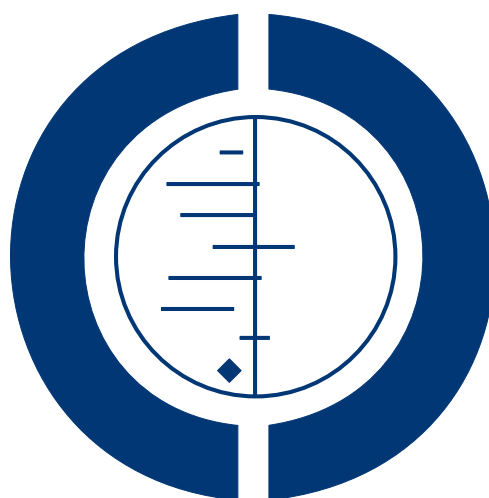


The 'WHO Safe Communities' model for the prevention of injury in whole populations (Review)

Spinks A, Turner C, Nixon J, McClure RJ



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[Intervention Review]

The 'WHO Safe Communities' model for the prevention of injury in whole populations

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ABSTRACT

Background

The safe communities approach has been embraced around the world as a model for coordinating community efforts to enhance safety and reduce injury. Over 80 communities throughout the world have been formally designated as 'Safe Communities' by the World Health Organization. It is of public health interest to determine to what degree the model is successful, and whether its application does indeed reduce injury rates in communities to which it is introduced.

Objectives

To determine the effectiveness of the Safe Communities model to prevent injury in whole populations, or targeted sub-groups of populations.

Search strategy

The search strategy was based on electronic searches, handsearches of selected journals, snowballing from reference lists of selected publications and contacting a key person from each WHO-designated Safe Community.

Selection criteria

Studies were independently screened for inclusion by two reviewers. Included studies were those conducted within a WHO Safe Community that reported changes in population injury rates within the community compared to a control community.

Data collection and analysis

Data were independently extracted by two reviewers. Meta-analysis was not appropriate, due to the heterogeneity of the included studies.

Main results

Only seven WHO Safe Communities, of more than 80 worldwide, have undertaken controlled evaluations using objective sources of injury data. These communities represent only four countries from two geographical regions in the world: the Scandinavian countries of Sweden and Norway and the Pacific nations of Australia and New Zealand. Safe Communities in Sweden and Norway have resulted in significant reductions in injury rates. The Australian and New Zealand communities have been unable to replicate the same level of success.

Authors' conclusions

Evidence suggests the WHO Safe Communities model is effective in reducing injuries in whole populations. However, important methodological limitations exist in all studies from which evidence can be obtained. A lack of reported detail makes it unclear which factors facilitate or hinder a programme's success, and makes uncertain, whether the success of any particular application of the model is necessarily replicable in other communities. In evaluated programmes that did not report significant decreases in injury rates, this lack of information makes it difficult to distinguish between evidence of no effect of the model, or no evidence of effect. The four countries that have evaluated their Safe Communities with a sufficiently rigorous study design have higher economic wealth and health standards and lower injury rates than much of the world. No evaluations were available from other parts of the world, despite the designation of WHO Safe Communities in countries such as South Africa, Bangladesh, China, Vietnam, Canada, UK and USA. Generalisation of results of studies conducted in just four countries, to the international population needs to be done with caution. There is a need for more high-quality, methodologically strong evaluations of the model in a range of diverse communities and detailed reporting of implementation processes.

PLAIN LANGUAGE SUMMARY

The 'WHO Safe Communities' model for the prevention of injury in whole populations

The World Health Organization Manifesto for Safe Communities states that 'All human beings have an equal right to health and safety'. The emphasis of the Safe Communities approach is on collaboration, partnership and community capacity building to reduce the incidence of injury and promote injury-reducing behaviours. More than 80 communities throughout the world have been designated as 'Safe Communities', in countries as diverse as Sweden, Australia, China, South Africa and the Czech Republic. Programmes target high-risk groups or environments and promote safety for vulnerable groups. They range from bicycle helmet promotion in Sweden to anti-violence programmes in South Africa, traffic safety initiatives in South Korea and indigenous community injury prevention programmes in New Zealand.

The review authors identified that only seven of the Safe Communities have undertaken controlled evaluations. These communities are from two geographical regions: the Scandinavian countries of Sweden and Norway and the Pacific nations of Australia and New Zealand, which have relative economic wealth, higher health standards and lower injury rates than many other parts of the world. The overall results were positive. Safe Communities in Sweden and Norway resulted in reductions in injury rates, which suggest that the WHO Safe Communities model is effective in reducing injuries in whole populations. The Australian and New Zealand communities were less successful and shorter lengths of follow up may have contributed to this. Limited information is available about how the programmes were implemented, their impact on injury risk factors and sustainability. They also had methodology limitations. No evaluations were available from other parts of the world particularly those with lower economic and health standards.

BACKGROUND

The Manifesto for Safe Communities states that 'All human beings have an equal right to health and safety' (WHO Safe Communities). The Safe Communities concept was introduced to the world during the First World Conference on Accident and Injury Prevention held in Stockholm, Sweden in September 1989. It arose as the celebrated response to a successful community approach to the problem of injury which had been implemented as a pilot project in the Swedish municipality of Falköping in 1974 (WHO 1999). This project demonstrated a 23% decrease in total population injury rates, following an intervention which focussed

on specific injury related issues identified within the local community (Schelp 1987).

Since then, the Safe Communities approach has been embraced around the world as a model for coordinating community-oriented efforts to enhance safety and reduce injury (Svanstrom 1997; Sznajder 2002; Zhao 2003). The Safe Communities ideology engenders the notion that safety can be achieved through integrated, collaborative efforts that are implemented in a supportive social, cultural and political environment. Partnerships that unite various community members and groups are thus an essential component of the Safe Communities process. The official WHO Safe

Communities Web site is available at <http://www.phs.ki.se/csp/default.htm> and describes the Safe Communities model in detail. This official site also provides details of all existing designated Safe Communities and Affiliate Safe Community Support Centres.

The WHO Safe Community accreditation process

Communities are eligible for international recognition and accreditation through the World Health Organization (WHO) if they meet the following six indicators:

- an infrastructure based on partnership and collaborations, governed by a cross-sectional group that is responsible for safety promotion in their community;
- long-term, sustainable programmes covering both genders and all ages, environments, and situations;
- programmes that target high-risk groups and environments, and programmes that promote safety for vulnerable groups;
- programmes that document the frequency and causes of injuries;
- evaluation measures to assess their programmes, processes and the effects of change; and
- ongoing participation in national and international Safe Communities networks ([WHO Safe Communities](#)).

Initially communities were expected to meet 12 criteria, but this has since been amended to the above six indicators and there is now an evaluation component.

Since 1989, more than 80 communities throughout the world have been formally designated as 'Safe Communities'. These communities exist in many culturally diverse countries that include Sweden, Australia, China, South Africa and the Czech Republic. Not only do these countries differ in culture and lifestyles, but also in many other aspects that affect the predominant causes, types and prevalence of injury, including climate, geography and government. Each of these communities encounters unique issues and has specific injury-related problems that need to be addressed. They are equipped with varying levels of resources and infrastructure with which to manage the injury problem. Further, the political environments in which these communities exist, as well as the attitudes of community members towards safety initiatives differ considerably from community to community.

By definition, each Safe Community around the globe is an individual programme with its own challenges to overcome. Specific injury prevention initiatives in the different communities range from bicycle helmet promotion in Skaraborg County, Sweden; to anti-violence programmes in Eldorado Park, South Africa; traffic safety initiatives in Suwon, South Korea; and indigenous community injury prevention programmes in Waitekere, New Zealand. The unifying element within these programmes is the emphasis on collaboration, partnership and community capacity building that is the core of the Safe Community model.

Why it is important to do this review

Given the global interest in the Safe Community concept, it is of public health importance to determine the degree to which the model is successful in reducing injury rates in the communities to which it is introduced. Due to the long-term nature of the intervention within WHO Safe Communities, there are few published studies reporting injury rate outcomes and of those published there are conflicting findings. This systematic review will identify those studies conducted within WHO-designated Safe Communities that have an evaluative component that includes a comparison with a control community to determine the effectiveness of the Safe Communities model in preventing injury.

OBJECTIVES

To determine the effectiveness of the Safe Communities model to prevent injury in whole populations, or targeted sub-groups of populations.

METHODS

Criteria for considering studies for this review

Types of studies

Any study that measures and reports changes in injury rates compared to a control community in a WHO-designated Safe Community. (Designated Safe Communities are those that have undergone the formal WHO accreditation process on the basis of meeting the six eligibility criteria outlined in the background section of this protocol). Study designs that are 'before and after studies' that compare changes between baseline and outcome measures for intervention communities (WHO Safe Community) with changes in these measures in comparable control communities and/or regions.

Types of participants

Whole populations within a community or specifically targeted sub-populations (e.g. children, the elderly).

Types of interventions

Community interventions based on the WHO Safe Community model that are aimed at reducing the incidence of injury and / or promoting injury-reducing behaviour. Interventions vary based on the needs of the communities and this review has included both

those that are broad in focus and those that are targeted to specific injury outcomes (e.g. bicycle-related injury), and / or specific age population sub-groups.

Types of outcome measures

Objectively measured changes in injury rates (morbidity and mortality) for whole populations or specifically targeted population sub-groups. Studies reporting outcome measures based on self-report of injury were excluded from the review.

Search methods for identification of studies

Electronic searches

- MEDLINE Webspirs (1966 to 2004)
- CINAHL (1982 to 2004)
- PsycINFO (1966 to 2004)
- EMBASE (1994 to 2004)
- Cochrane Controlled Trials Register
- Cochrane Injuries Group's Trials Register

The search strategy was based on the terms: 'Safe community' OR 'Safe communities'.

Searching other resources

Handsearching

- *Injury Prevention* (1995 to 2004)
- *Accident Analysis and Prevention* (1974 to 2004)

Snowballing

References of selected studies and relevant reviews were hand-checked to find additional studies. The Science Citation Index was also used.

Unpublished studies

Attempts were made to contact a key person from each of the WHO-designated Safe Communities to ensure that all published and unpublished reports were located. Contact was made via email after addresses were obtained via the Safe Communities website (<http://www.phs.ki.se/csp/default.htm>). Fifty-four emails were sent in total and 19 replies were received.

Data collection and analysis

Selection of studies

Abstracts from electronic searches; handsearched journals; reference checks and unpublished studies identified through personal contact with key persons for WHO-designated Safe Communities were screened, based on inclusion criteria, by an experienced reviewer.

Relevant studies selected from the process in Stage 1 were independently assessed by two reviewers against the inclusion criteria. Differences were resolved via discussion amongst all reviewers.

Data extraction and management

Data were independently extracted from the included studies by two reviewers using standardised forms. Data were available as measures of association (e.g. odds ratios, relative risks) and measures of percentage changes in injury rates that compared the Safe Community to a control community and linked programme interventions and changes in injury rates. Meta-analysis was not appropriate, due to the heterogeneous nature of the WHO Safe Community model, including duration of intervention and follow-up, characteristics of the interventions and the demographics of the target populations. For all included studies, a detailed discussion of the findings along with a description of the exact intervention methods used is recounted in this review.

Assessment of risk of bias in included studies

The investigation of methods used in the implementation of community trials is a new field of exploration in injury research and few instruments to assess methodological quality are available. Traditional quality scoring was not undertaken. However, a quality assessment process was performed independently by two reviewers. This process was based on four of the seven criteria used for the quality assessment for controlled before-and-after designs, as described in the data collection checklist described by the Cochrane Effective Practice and Organisation of Care Review Group (EPOC). The criteria chosen are those that are relevant to community trial designs and specifically gauge the appropriateness of: baseline measurements, characteristics of the control site, protection against contamination between sites, and reliability of outcome measures.

RESULTS

Description of studies

See: [Characteristics of included studies](#); [Characteristics of excluded studies](#).

Results of the search

Out of a total of 62 publications located relating to WHO Safe Communities, the first reviewer selected 48 evaluations to be independently screened for inclusion by two additional reviewers. A number of Safe Communities have produced multiple research publications, therefore 19 individual WHO Safe Communities were represented by these publications.

Fourteen published evaluations pertaining to seven individual Safe Communities were selected for inclusion in the review. The Safe Communities represented by these evaluations were [Falkoping](#) (Sweden), [Falun](#) (Sweden), [Lidkoping](#) (Sweden), [Motala](#) (Sweden), [Harstad](#) (Norway), [Shire of Bulla](#) (Australia) and [Waitakere](#) (New Zealand). These communities and the injury outcomes which were evaluated are described below and in [Table 1](#).

Thirty-five evaluations that were excluded described the following Safe Communities: [Falkoping \(exc\)](#) (Sweden), [Lidkoping \(exc\)](#) (Sweden), [Motala \(exc\)](#) (Sweden), [Skaraborg County](#) (Sweden), [Harstad \(exc\)](#) (Norway), [Vaeroy](#) (Norway), [Penarth](#) (UK), [Boulogne-Billancourt](#) (France), [Dallas](#) (USA), [Fort McMurray](#) (Canada), [LaTrobe](#) (Australia), [Illawarra](#) (Australia), [Shire of Bulla \(exc\)](#) (Australia), [Waitakere \(exc\)](#) (New Zealand), [Turanganui-a-kiwa](#) (New Zealand), [Rangiora & Kawerau](#) (New Zealand), [Ngati Porou](#) (New Zealand), [Thinh Liet & Co Nhue](#) (Vietnam). Evaluation studies from these communities were excluded for the following reasons: no injury outcomes were assessed (n=8); no community control was used as a comparison (n=10); no baseline data was available for comparison (n=2), the evaluation presented baseline injury data only (n=4), data presented was contained in subsequent evaluations that were included (n=5), the geographical region studies did not meet the criteria for a Safe Community (n=4), the evaluation was a cost-benefit study (n=1), or the evaluation was a critique reanalysing data presented and included previously (n=1).

All of the included evaluations were published in scientific journals. The excluded evaluations were either published in journals or were available from relevant institution publication lists.

Included studies

[Falkoping](#), a Swedish municipality with 36 000 inhabitants was the 'original' WHO Safe Community, awarded this distinction after the implementation of the Falkoping Accident Prevention programme (FAPP). The programme was initiated in 1975, although interventions targeting injuries did not begin until 1979 with the establishment of a cross-sectoral intervention group that operated at a county level. Over the ensuing decade, the intervention targeted traffic, childhood, home and work injuries and advocated community recognition and ownership of the injury problem. A

local injury surveillance network was established to record injury data from health centres and emergency clinics. Hospitalisation data was also obtained from the Swedish National Board of Health and Welfare. One publication was included for Falkoping, which covered the time period from 1978 till 1992. This publication describes the activities of the intervention programme over 15 years. Injury rates are compared over that time with the entire county in which Falkoping is situated (Skaraborg County) and Sweden as a whole. The publication describes how the FAPP cross-sectoral intervention group was dissolved in 1982 and re-established in 1991 to coincide with the First International Conference on Safe Communities. The dissolution of the intervention group was in accordance with the original study design, and occurred in order that the responsibility for intervention activities would be removed from the county-level community health administration and would be absorbed by existing organisations at the local level. The rationale for this procedure was to test the ability of the community to carry the programme based on available local resources without external assistance. Therefore, from 1984 onward, programme activities were directed by the local Falkoping Health Committee as part of their general health promotion activities.

[Lidkoping](#) was designated as a WHO Safe Community in 1989 following the implementation of the Lidkoping Accident Prevention programme which commenced in 1984. Lidkoping is a Swedish municipality in the county of Skaraborg with approximately 36,000 inhabitants, and had initially been the control community for Falkoping when the first community based injury prevention programme was being trialed in Sweden. The Lidkoping Accident Prevention programme had a number of components designed to target a wide range of injuries in various subgroups of the population. Specific activities employed by the programme included the establishment of an interdisciplinary group to administer the programme, provision of safety related information to the public, training courses, a bicycle and traffic safety campaign including an infant car seat loan programme, and various ecological changes to remove environmental hazards. One publication that evaluated childhood injuries was selected to be included in the review. Injury rates were derived from hospital admissions data extracted from the National Swedish Hospital Discharge Register. One year of baseline data was available for the year (1983) prior to the programme commencement and seven years of follow-up data were available to 1991. Three separate areas were chosen as control regions: 1) the four municipalities bordering Lidkoping (combined population of 42,000), 2) Skaraborg county as a whole, and 3) Sweden as a whole.

[Falun](#), a Swedish municipality in the county of Dalarna was designated as a WHO Safe Community in 1995. Falun has approximately 55,000 inhabitants. The injury prevention programme was initiated in 1989 when a cross-sectoral group was established to implement injury prevention initiatives focussing on five specific risk groups and environments. This cross-sectoral group was then transformed in 1992 into a broader healthcare management

group, which still focussed on the five priority areas. These five areas were: injuries among children at home, injuries among elderly at home, traffic injuries, injuries at school, and injuries in sports activities. Intervention activities consisted primarily of education, training, information provision, supervision and some environmental changes. One publication which evaluated all injuries for all ages was included for this community. Injury related hospital admissions extracted from the national Swedish hospital discharge register were used to derive injury rates. Specific injury outcomes reported were home, work, traffic, sport and school injuries. Two years of baseline (1987 to 1989) and eight years of follow-up data (1989 to 1996) were available. Two regions served as control areas: Dalarna County (pop 290 000) and Sweden as a whole (pop approx 8 800 000).

Motala, in Ostergotland County, Sweden, was designated as a WHO Safe Community in 1990. The Safe Community model was applied to this community, with specific activities including the establishment of a Child Safety Council, provision of injury prevention information to the public, safety maintenance of public places, demonstration of safety modifications to homes, safe cycling and safe travel programmes, and the inclusion of local sports clubs in the programme. Six publications were included for this community, evaluating all injuries, childhood injuries, work-related injuries, injuries related to physical exercise, traffic injuries and injuries in the elderly. Injuries presenting to health care units were used in the analysis. All six of the publications used the same baseline and follow-up periods with one year of baseline data (1983 to 1984) and one year of follow-up data (1989). The control area was the municipality of Mjølby, also in Ostergotland County.

The Harstad Injury Prevention Study commenced in July, 1985. **Harstad**, an Arctic Norwegian municipality with 22,000 inhabitants was designated as a WHO Safe Community in 1994, and again in 2003. The programme targeted a number of injuries in various subgroups of the population. Three separate publications were selected for inclusion in the review. These publications evaluated the following components of the programme: 1) burns and scalds in young children, 2) traffic injuries, and 3) fractures in the elderly. The baseline and follow-up periods for the different publications varied as the programme components were initiated at different times. Injury rates were derived from emergency department presentations and hospital admissions recorded by a prospective hospital recording system. The burns and scalds component had a baseline period of 19 months and ten years of follow-up from 1985 till 1995. The traffic injuries component had 2.5 years of baseline and 7.5 years of follow-up, and the fractures in the elderly programme had 3 years of baseline and 5 years of follow-up. The control region was Trondheim, a city with 134,000 inhabitants located 1000 km south of Harstad.

The Safe Living programme in the **Shire of Bulla**, Australia was initiated in 1991 in an attempt to replicate the success of Swedish Safe Community efforts. The Shire of Bulla has a population of approximately 37,000 inhabitants and was officially designated as

a WHO Safe Community in 1994, and again as Hume City in 1996. Interventions were driven by various working parties whose membership, 345 in total, included representatives from individuals and organisations both internal and external to the community. One hundred and thirteen activities of various duration that targeted many injury types and mechanisms were implemented during the first three years of the programme. These activities included media publicity, safety displays and promotions, subsidy and rebate schemes for safety equipment, training courses, and ecological changes to remove environmental hazards. One publication evaluating the effect of the Safe Living programme on injuries and deaths in all ages was included in the review. This publication analysed data from various health and government datasets that detailed injury related deaths, hospital admissions and emergency department presentations. Five years each of baseline (1987 to 1991) and follow-up (1992 to 1996) were available. The Shire of Melton (pop 34,000), an outer district of Metropolitan Melbourne matched on demographic characteristics was selected as a control community.

Waitakere, a city in New Zealand with approximately 156,000 inhabitants was designated as a WHO Safe Community in 1999 after implementation of the Waitakere Community Injury Prevention programme. This programme was initiated as a pilot project awarded to the Waitakere City Council by the New Zealand Public Health Commission as a response to the national injury programme. The programme targeted all injuries at all ages in the community, and injury rates were extracted from morbidity data for admissions to public and private hospitals (1989 to 1998). Injury hospitalisation rates were calculated using 1991 and 1996 census figures, and separate analysis was performed for children 0 to 14 years of age. Seven years of baseline (1989 to 1996) and two years of follow-up (1996 to 1998) data were available. The control area was a comparable community (pop 147 000) matched on demographic characteristics, new housing developments, road safety and crime statistics. The rest of Auckland served as a second control region. There were two distinct phases of the intervention, a developmental phase which lasted for nine months and an implementation phase which lasted for the remainder of the three years. Twenty-five percent of the Waitakere population are of Maori or Pacific Island descent and this was reflected in the composition of the project which had three major components for the Maori, Pacific and general populations. There were seven priority areas identified: Maori, Pacific, children, young people, older people, alcohol and road. Working parties were established for each priority area to drive intervention activities. Specific activities included promotion of child restraint, helmet and smoke alarm use, environmental hazard reduction, and home safety education.

Risk of bias in included studies

Four of seven criteria outlined in the Data Collection Checklist described by the Cochrane EPOC Review Group were used to establish the methodological quality of included studies. These four criteria were:

- availability of baseline measurements;
- appropriate choice of control;
- protection against contamination between intervention and control site;
- reliability of outcome measures.

A fifth criterion, duration of follow-up, was added by the reviewers. Table 2 summarises the quality of the included studies against these criteria. The overall methodological quality was fair. None of the included evaluations achieved the top possible rating against all of the methodological criteria. Furthermore, there were additional issues explored in the discussion of this review that may have limited the validity of the results.

Baseline measurements prior to programme commencement were sometimes measured for a period of one year's duration only: Lidköping (childhood injuries evaluation), Motala and Falköping. The baseline periods for evaluations from the remaining communities varied from 19 months to 14 years. The limited duration of baseline data is problematic in that it is difficult to determine the true effect of the intervention without having established a valid starting point. Baseline levels may have been significantly under or over-estimated if the time period selected was unrepresentative of true injury rates. This is particularly a problem in small communities, where injury rates may fluctuate quite dramatically due to the relative rarity of specific events.

Duration of follow-up varied from 1 to 14 years. The beginning of the follow-up period coincided with the start of the intervention for all except one community, Motala. For this community, the follow-up period was for one year only and occurred five years after the intervention period had begun. The relatively short duration of this follow-up period is problematic, in that this time period may not necessarily have represented the true injury pattern over the full time span of the intervention. The follow-up duration was considered to be adequate for the remaining communities.

Various methods were used to define control regions for the intervention communities. Four of the communities identified a particular geographically identifiable community as a control region: Harstad, Motala, Shire of Bulla and Waitakere. The three remaining Swedish communities, Lidköping, Falköping and Falun, as well as two of the evaluations for Harstad used a combination of surrounding municipalities, the county and the whole country to act as comparisons for changes in injury rates.

The appropriateness of these various control measures is difficult to determine for some communities. Good attempts were made to match control communities selected for Motala, Waitakere and the Shire of Bulla on various demographic characteristics. For Harstad, however, the control community was selected on the basis that it was the only other Norwegian community for which longitudinal injury data was available. The size of the two communities was dis-

parate (22,000 vs 135,000) and the geographical distance (1000 km) may have had significant demographic implications given that Harstad is located in a remote, northern region of Norway whilst Trondheim is located closer to other urban regions. The authors claim that the two communities were similar in demographic characteristics, including employment and age structure.

The use of surrounding municipality, whole county and whole country data as control regions has the advantage of comparing injury rate changes in the intervention community with local and national trends. At the same time, however, possible confounding influences inherent in the intervention area may not be accounted for. For example, higher socio-economic status in Falun compared to the rest of Sweden. Similarly, Lidköping was not identical to the surrounding municipalities selected as a control region for all predisposing factors that could be related to injury risk. Another limitation in selecting a surrounding region as a control comparison is the likely contamination of the control sites with intervention initiatives.

Little information was available to determine how effectively control communities had been protected against exposure to the interventions. It can be assumed that Trondheim, the control for Harstad received no exposure to the Safe Community intervention given the geographical distance between the two communities. The evaluation for the Shire of Bulla included a telephone survey to determine reach of the programme. This survey, which represented 2% of the total population, revealed that a small number of inhabitants in the control region had received some exposure to the intervention. No information was available for the remaining communities, however it is likely that contamination did occur for those that used neighbouring areas as control regions. National safety programmes outside the Safe Communities programme were mentioned in some of the evaluations, although detailed information about these interventions was not recorded. If contamination between sites did occur, the evaluation would most likely underestimate the effectiveness of the Safe Community model in preventing injury compared to a control.

All of the evaluations made use of objective injury data sources, however the reliability of the sources varied for the different communities. The most reliable sources for injury data are local surveillance systems which systematically capture outpatient data from either all or a representative sample of treatment facilities in the catchment area. The communities which employed injury surveillance systems were Falköping, Motala, Harstad and the Shire of Bulla.

Less reliable are databases which record hospital discharge data for administrative purposes. Whilst administrative databases are often convenient and less costly for evaluation purposes, they are quite often unreliable and are subject to misclassifications that may arise due to changes in admission policies and diagnostic coding. Additionally, evaluations which rely on hospital discharge data may be insensitive to changes in the incidence of injuries of a less severe nature which nonetheless constitute a costly burden

to emergency department and general practitioner services. The communities using this method to determine injury rates were Lidköping, Falun and Waitakere.

Effects of interventions

Falköping

From the beginning of the programme in 1978 till 1991, injury rates increased significantly in Falköping by an average of 8.7% for females and 4.9% for males annually. Corresponding annual increases have been 4.7% for females and 3.0% for males in Skaraborg county and 2.3% for females and 0.5% for males in Sweden. However, closer examination of the pattern of injury incidence from year to year reveals another picture. Initially, whilst the county-level cross-sectoral intervention group was operational, a decrease of 23% in injury rates occurred. From 1983 onward however, coinciding with the break-up of this group, injury rates increased again at a rate higher than the rest of Sweden. The authors maintain that injury prevention efforts from 1983 were not conducted in the organised, coordinated manner typical of a Safe Community and that collaboration between the various sectors declined.

Lidköping

Childhood injury rates did not change significantly although linear regressions did reveal a downward trend (2.4% for boys, 2.1% for girls) in the intervention region. A smaller trend occurred in the whole county (1.0% for boys and 0.3% for girls) while injury rates increased (non-significantly) in the four bordering municipalities (0.6% for boys, 0.3% for girls).

Motala

An evaluation of all injuries found a decrease of 13% in Motala (OR 0.87 [95% CI 0.84 to 0.91]) while the incidence remained unchanged in the control community.

Additional evaluations examined the effect of the intervention on different types of injuries:

- childhood injuries decreased by 26% in Motala (OR 0.74 [95% CI 0.68 to 0.81]) and remained unchanged in the control community (OR 0.93 [95% CI 0.82 to 1.05]);
- injuries amongst the elderly decreased by 13% in Motala (OR 0.87 [95% CI 0.77 to 0.99]) and remained unchanged in the control community (OR 0.98 [95% CI 0.82 to 1.18]);
- physical exercise related injuries decreased by 13% in Motala (OR 0.87 [95% CI 0.79 to 0.96]) and remained unchanged in the control community (OR 0.93 [95% CI 0.81 to 1.07]);
- work related injuries decreased by 21% in Motala (OR 0.79 [95% CI 0.70 to 0.89]) and remained unchanged in the control community (OR 1.08 [95% CI 0.95 to 1.23]);
- traffic injuries did not change in either Motala (OR 0.91 [95% CI 0.81 to 1.02]) or in the control community (OR 1.09 [95% CI 0.91 to 1.31]).

Falun

Linear regression models were used to determine the effect of the intervention on targeted and 'most targeted', 'less targeted' and 'non-targeted' injuries. These linear regression parameters showed that there was no change in injury related hospitalisations for either 'most targeted' (Beta 0.072 [95% CI -0.091 to 0.235]) or 'less targeted' (Beta -0.104 [95% CI -0.108 to 0.316]) injuries in the intervention area over the period of the intervention. Meanwhile, a significant increase occurred in 'most targeted' injuries in the control area Dalarna county (Beta 0.233 [95% CI 0.109 to 0.379]). The authors argue that the Safe Community intervention may have prevented a similar increase that may have otherwise occurred in Falun.

Harstad

Burns and scalds in children decreased in the intervention region (RR 0.49; P=0.04) whilst a nonsignificant increase and decrease occurred respectively in the two control regions: Trondheim RR 1.18 (P=0.19), and six surrounding municipalities RR 0.60 (P=0.32). The six surrounding municipalities were gradually exposed to the same interventions as occurred in Harstad during the intervention period.

Traffic injury rates in Harstad decreased by 26% following initiation of the intervention (RR 0.74 [95% CI 0.63 to 0.86]). Meanwhile, in Trondheim traffic injuries increased by 9% (RR 1.09 [95% CI 1.02 to 1.15]).

Overall fracture rates in the elderly did not change significantly in Harstad, although a downward trend did occur (RR 0.91, P=0.2). Fracture rates did however increase significantly in the control community (RR 1.31, P<0.0001).

Shire of Bulla

No significant changes in injury related deaths, hospitalisations or emergency department presentations occurred in either the intervention or control community. The authors suggest that low programme reach (1% to 27% for various components) may have been responsible for the lack of positive results.

Waitakere

Logistic regression models revealed no significant differences between the communities for all injuries requiring hospital admission during the intervention / post-intervention period. Separate analysis for a paediatric subgroup (0 to 14 years), however, revealed a significant decrease in injury related hospital admissions for the intervention region compared with the control region (P<0.05). Analysis of programme documentation revealed that intervention activities had primarily focussed on child safety activities, which may explain why significant injury reductions were achieved in the paediatric population. A significant increase in injury prevention awareness was reported both by individuals and organisations post versus pre-intervention, which suggests successful outreach of the programme.

DISCUSSION

The overall results for the review were positive. However, cautious interpretation is required given the methodological limitations of several of the evaluative study designs. Some issues relating to methodological quality have already been discussed in this review. Firstly, the lack of baseline data or the short duration of baseline and follow-up periods that may not truly represent injury rates before and after the programme implementation. Secondly, the reliance on administrative databases to ascertain injury rates. Thirdly, the poor selection of control communities/regions for comparison and the possibility of contamination between intervention and control sites, whereby individuals living in control areas may have been exposed to elements of the intervention. If contamination did occur, however, the effect of the intervention is likely to have been under-estimated and not over-estimated.

One issue that has not yet been discussed concerns the inherent limitations related to any controlled community trial. Given the nature of these trials, randomisation is often not feasible and was not applied to any of the evaluations included in this review. Although efforts were made in some of the included evaluations to match the control and intervention areas on a number of demographic characteristics, there may have been confounding influences (community factors related to injury outcomes) that were not accounted for in the analysis. For some evaluations, control areas were selected for convenience of available data and no attempt was made to match demographic characteristics which may have affected the results.

Another limitation in several evaluations was failure to take pre-existing trends in injury rates into account and the use of linear regression analysis to detect change over time that did not take into account social level confounders or the changing demographic characteristics of the denominator population.

An additional issue inherent in the systematic review process is that of publication bias. Positive results are more likely to be published in the scientific literature than negative results. Efforts were made to contact Safe Community personnel to locate additional evaluations that may have met inclusion criteria. However, it is possible that evaluations exist which we were unable to locate.

Finally, there is the issue that only a small number of communities have been formally evaluated to date. Only seven Safe Communities out of more than 80 worldwide have undertaken controlled evaluations using objective sources of injury data. These communities represented only four countries from two geographical regions in the world: the Scandinavian countries of Sweden and Norway and the Pacific nations of Australia and New Zealand. These four countries enjoy relative economic wealth and higher health standards including lower injury rates than most other parts of the world. No evaluations were available from other parts of the world with either similar or lower economic and health standards, despite the designation of WHO Safe Communities in countries

such as South Africa, Bangladesh, China, Vietnam, Canada, UK and USA. Therefore, it is difficult to generalise these results to suggest that the Safe Communities model will necessarily reduce injury rates in these other communities. It is anticipated that more evaluations will be made available over time and will be included in the review so that a more comprehensive picture of the global effects of Safe Communities can be produced.

It was also interesting to note that the most successful Safe Communities were in Sweden and Norway. The communities in Australia and New Zealand failed to replicate the same level of success that occurred in Scandinavia. Shorter follow-up durations may have been somewhat responsible for this lack of effect. However, there may be other differences characteristic to the particular populations or programme implementation styles that were responsible. The extremely limited information available for these programmes about the implementation process and the impact of the intervention on risk factors for injury prevent any real attempt to explain differences in outcome on the basis of process and impact factors. The information that was available for one community, the Shire of Bulla suggested that limited programme outreach (1% to 27%) may have limited the programme effectiveness.

As a rule, reported evaluation studies omitted details of the implementation process, thus making it difficult to distinguish between ineffective implementation of the various programmes and/or the effectiveness of the overall Safe Communities model for injury prevention. Omission of process and impact detail also leads to the inability to determine which component of the multi-strategy interventions might have led to the effectiveness of the overall model approach. Given the complex nature of the model it is likely that barriers to complete delivery of the multi-faceted interventions could frequently occur. Detailed reports/publications of the programme implementation processes, in addition to high-quality evaluation of the overall programme effectiveness is essential to build the evidence base for the Safe Community approach to injury prevention.

Sustainability of the programme is also an important issue, as noted in Falköping where initial drastic injury decreases were followed by a rise, once the community coalition was disbanded after a few years. It could be argued that during the initial years when injury rates declined, the intervention that was in place was not actually a safe community intervention, but was an externally (county) driven, broad focussed intervention. The real safe community programme in which the impetus for interventions was derived at the local level began in 1983, when injury rates actually began to rise to pre-intervention levels. The resources required and difficulty of maintaining a safe community model was also evident in Falun where a waning effect was noted in the final two years of programme. The authors concluded that the programme must be continuously renewed and reinforced which should not be necessary within the community development approach where safety practices become the norm. Well documented implemen-

tation processes of both successful and unsuccessful programmes would assist in determining programme sustainability and the potential for transferability and replication in other communities.

Most of the limitations evident in the evaluation study designs included in this review were largely unavoidable in the circumstances. Indeed, most of the important limitations can only be circumvented by a large, centralised, rigorously conducted, multi-community trial. While multi-community trials have been conducted in conditions such as cardiovascular disease, there have been no such studies to date in the field of injury prevention. With the substantial allocation of resources now increasingly being made to safe community interventions across the globe, perhaps the time has come to conduct such a trial in order to provide definitive answers to what appears to be a successful approach to the prevention of injury.

AUTHORS' CONCLUSIONS

Implications for practice

There is some evidence that the Safe Communities model does reduce injuries in whole populations, and further implementation

of these programmes is supported.

Implications for research

There are limitations to the evaluation methodology that qualifies the strength of the claims that can be made about the effectiveness of the Safe Communities model. More WHO Safe Communities around the globe need to be well evaluated using methodologically strong evaluation techniques and the implementation processes employed need to be well documented. There is sufficient evidence of the effectiveness of the safe community model to warrant the establishment of an appropriately funded and conducted, global, multi-community trial.

ACKNOWLEDGEMENTS

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Falkoping

Methods	Non-randomised, controlled community trial Regression analysis
Participants	Intervention: Falkoping, Skaraborg County, Sweden (pop 32,000) Control 1: Skaraborg County (pop 266 000) Control 2: Sweden (pop 8.6 million)
Interventions	Falkoping Accident Prevention Program
Outcomes	Injury rates determined from local injury surveillance system and hospital discharge data
Notes	Year of WHO designation: 1991

Falun

Methods	Non-randomised, controlled community trial Regression analysis
Participants	Intervention: Falun, Dalarna County, Sweden (pop 55,014) Control 1: Dalarna County (pop 292 103) Control 2: Sweden (pop 8.8 million)
Interventions	WHO Safe Community model Specific activities included: - establishment of cross-sectoral group focussing on five risk groups and risk environments: - injuries among children at home - injuries among elderly at home - traffic injuries (with focus on cycling and pedestrian injuries) - injuries at school - injuries in sports activities
Outcomes	Injury-related hospital admissions extracted from the national Swedish hospital discharge register Specific injury outcomes reported: - home - work - traffic - sport - school

Falun (Continued)

Notes	Year of WHO designation: 1995
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Harstad

Methods	Non-randomised, controlled community trial Regression analysis
Participants	Intervention: Harstad, Norway (pop 22,000) Control: Trondheim (pop 134 000), located 1000 km from Harstad
Interventions	Harstad Injury Prevention Study Specific activities included: <ul style="list-style-type: none"> - campaign to prevent burns and scalds in small children - campaign to reduce fall related fractures in the elderly - traffic injury prevention campaign - bicyclist and pedestrian injury prevention campaign
Outcomes	Injury-related emergency department presentations and hospital admissions recorded by a prospective hospital recording system Specific injury outcomes reported: <ul style="list-style-type: none"> - burn injuries in children - fall-fractures in the elderly - traffic injury - bicyclist and pedestrian injury
Notes	Year of WHO designation: 1994 3 publications were included

Lidköping

Methods	Non-randomised, controlled community trial Regression analysis
Participants	Intervention: Lidköping, Skaraborg County, Sweden (pop 35,949) Control 1: 4 bordering municipalities (pop 42 078) Control 2: entire population of Skaraborg county
Interventions	Lidköping Accident Prevention Programme Specific activities included: <ul style="list-style-type: none"> - establishment of interdisciplinary group to administer program - provision of safety related information to parents of small children - infant carseat loan program - safe snow ploughing campaign - training course to prevent sports injuries - telephone hotline to advise public on specific safety issues - bicycle safety campaign - environmental changes e.g. improving gym floors in schools

Lidköping (Continued)

	- traffic safety campaign
Outcomes	Injury-related hospital admissions extracted from the national Swedish hospital discharge register
Notes	Year of WHO designation: 1989 1 publications was included

Motala

Methods	Non-randomised, controlled community trial Interrupted time series analysis
Participants	Intervention: Motala, Ostergotland County, Sweden Control: Mjölby, Ostergotland County
Interventions	WHO Safe Community model Specific activities included: - Establishment of a Child Safety Council to implement regular safety measures - provision of injury prevention information via mass media - provision of age adjusted safety information to parents at compulsory annual health visits - distribution of video demonstrating safety modifications in the home display of safety products and modifications in public places - safety maintenance at daycares, playgrounds, schools - inclusion of local sports clubs in program - "Safe way to school" program implemented at every primary school - safe cycling program implemented and bicycle helmets subsidised
Outcomes	Nature and extent of injuries presenting to health care units Specific injury outcomes reported: - childhood injury - injuries in the elderly - traffic injury - acute injuries from physical exercise
Notes	Year of WHO designation: 1990 6 publications were included

Shire of Bulla

Methods	Non-randomised, controlled community trial Regression analysis
Participants	Intervention: Shire of Bulla, Australia (pop 37 257) Control: Outer metropolitan Melbourne (pop 33 592) Matched on demographic characteristics
Interventions	Safe Living Program Specific activities included: - Publicity for the program through local newspaper, newsletters, safety displays and

Shire of Bulla (Continued)

	<p>promotions</p> <ul style="list-style-type: none"> - Subsidy and rebate schemes for safety equipment (smoke detectors, safety harnesses) - Safety and first aid related education and training courses - School playground equipment audits - Home safety packages delivered to all households - Environmental changes to roads and paths
Outcomes	<p>Injury-related deaths, hospital admissions, emergency department presentations and self reports</p> <p>Sources of injury data included the Victorian Coroner's Facilitation System; the Victorian Inpatient Minimum Database, the Victorian Emergency Minimum Dataset and the Victorian Injury Surveillance System</p>
Notes	<p>Year of WHO designation: 1994 (changed to Hume City - 1996)</p> <p>3 publications were included</p>

Waitakere

Methods	<p>Non-randomised, controlled community trial</p> <p>Regression analysis</p>
Participants	<p>Intervention: Waitakere, New Zealand (pop 155 565)</p> <p>Population makeup:</p> <ul style="list-style-type: none"> 67% European 14% Maori 11% Pacific people 7% Asian 1% Other <p>Control 1: comparable community (pop 147 000) matched on demographic characteristics, new housing developments, road safety, crime prevention</p> <p>Control 2: rest of Auckland</p>
Interventions	<p>Waitakere Community Injury Prevention Project</p>
Outcomes	<p>Injury statistics: morbidity data for admissions to public and private hospitals (1989-1998)</p> <p>Injury hospitalisation rates calculated from 1991 and 1996 census figures.</p> <p>Separate analysis performed for children 0-14 years of age</p>
Notes	<p>Year of WHO designation: 1999</p>

Characteristics of excluded studies [ordered by study ID]

Study	Reason for exclusion
Boulogne-Billancourt	Two publications were excluded. They both present baseline injury data only
Dallas	No injury outcomes were assessed.
Falkoping (exc)	Data presented was also presented in a subsequent publication that was included
Fort McMurray	No injury outcomes were assessed.
Harstad (exc)	Five publications were excluded. No community control was used as a comparison for three. Two were earlier publications of data that was presented in subsequent publications
Illawarra	No community control was used as a comparison for injury outcomes
LaTrobe	3 publications were excluded. No community control was used as a comparison for 2. No baseline data was available for the third
Lidkoping (exc)	5 publications were excluded. 1 was a critique reanalysing data presented previously. 1 did not assess injury outcomes. 1 did not present baseline data for the outcome being assessed. 2 presented baseline data only
Motala (exc)	4 publications were excluded. 2 had no appropriate community control used as a comparison. 1 did not assess injury outcomes. 1 was a cost-benefit analysis and did not present changes in injury incidence
Ngati Porou	The community was not a WHO-designated Safe Community.
Penarth	No injury outcomes were assessed.
Rangiora & Kawerau	No injury outcomes were assessed.
Shire of Bulla (exc)	2 publications were excluded. They both presented data that was present in a subsequent publications that was included
Skaraborg County	3 publications were excluded. The geographical area being studied (Skaraborg county) did not meet with the definition for a Safe Community
Thinh Liet & Co Nhue	No injury outcomes were assessed.
Turanganui-a-kiwa	No community control was used as a comparison.
Vaeroy	No community control was used as a comparison.
Waitakere (exc)	No injury outcomes were assessed.

DATA AND ANALYSES

This review has no analyses.

ADDITIONAL TABLES

Table 1. Summary of results

Safe Community	Reported statistics	Intervention area	Control area
Falkoping	Annual percentage changes	Initial decrease in injury rate Increased over entire time span.	Smaller increase in injury rates.
Lidkoping	Linear regression models	No changes in childhood injuries. Downward trend.	No significant changes in childhood injuries.
Falun	Linear regression model (Beta statistic)	No changes in targeted injuries.	Increase in “most targeted” injuries.
Motala	Odds ratios	Decrease in total injuries. Decrease in childhood, elderly, physical activity and work related injuries No change in traffic injuries.	No change in total injuries. No change in childhood, elderly, physical activity, work or traffic related injuries
Harstad	Relative risks - calculated by reviewers for traffic injuries using information provided	Decrease in burns and scalds in children. Decrease in traffic injuries No change in fractures in the elderly.	No change in burns and scalds in children. Increase in traffic injuries. Increase in fractures in the elderly
Shire of Bulla	Incidence rates	No changes in injuries.	No changes in injuries.
Waitakere	Logistic regression model rates	No change in overall injuries. Decrease in paediatric injuries.	No change in overall injuries. Increase in paediatric injuries.

Table 2. Methodological quality of included studies

Safe Community	Baseline Measurement	Follow-up duration	Control Community	Protection of Sites	Outcome Reliability	Outcome Source
Falkoping	1 year	14 years	1) Whole county 2) Sweden	No information	Local injury surveillance	Hospital admissions
Lidkoping	1 year	8 years	1) Bordering municipalities 2) whole county 3) Sweden	No information	Administrative database	Hospital admissions

Table 2. Methodological quality of included studies (Continued)

Falun	2 years	8 years	1) Whole county 2) Sweden	No information	Administrative database	Hospital admissions
Motala	1 year	1 year	Community matched on demographic characteristics	No information	Local injury surveillance	All presentations to health care units
Harstad	19 months - 3 years	5-10 years	Larger community not matched on demographic characteristics	Good	Local injury surveillance	Hospital admissions Emergency department presentations
Shire of Bulla	5 years	6 years	Community matched on demographic characteristics	Telephone survey revealed some exposure to inhabitants in control region	Local injury surveillance system Administrative database	Deaths Hospital admissions Emergency department presentations
Waitakere	8 years	2 years	1) Community matched on demographic characteristics 2) rest of Auckland	No information	Administrative database Administrative database	Hospital admissions Hospital admissions

WHAT'S NEW

Last assessed as up-to-date: 16 February 2005.

Date	Event	Description
14 May 2008	Amended	Converted to new review format.

HISTORY

Protocol first published: Issue 4, 2003

Review first published: Issue 2, 2005

Date	Event	Description
17 February 2005	New citation required and conclusions have changed	First published version of review.

CONTRIBUTIONS OF AUTHORS

Anneliese Spinks was involved in the conception of the review, searching and initial screening of potential articles, coordinating discussion with other authors and manuscript preparation. Catherine Turner and Rod McClure each independently assessed relevant studies against the inclusion criteria and independently extracted data from the included studies and participated in editing the manuscript. Jim Nixon participated in discussion to resolve selection of studies and in the editing of the manuscript.

DECLARATIONS OF INTEREST

None known.

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Internal sources

- Injury Prevention and Control (Australia) Ltd, Australia.
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INDEX TERMS

Medical Subject Headings (MeSH)

Accident Prevention; Australia [epidemiology]; New Zealand [epidemiology]; Program Evaluation; * Safety; Scandinavia [epidemiology]; World Health Organization; Wounds and Injuries [epidemiology; *prevention & control]

MeSH check words

Humans