

# **The development of evidence based recommendations to support policy and practice: falls prevention**

**A report prepared for  
Population Health Branch, Queensland Health**

**Cochrane Health Promotion and Public Health Field and  
School of Health and Social Development,  
Deakin University**

**May 2007**

Suggested citation: Armstrong R, Waters E, Davis E, Harper C, Priest N. *The development of evidence based recommendations to support policy and practice*, Queensland Health. Brisbane 2007.



# Table of contents

<b>TABLE OF CONTENTS</b> .....	<b>2</b>
<b>ACKNOWLEDGEMENTS</b> .....	<b>3</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>4</b>
<b>RECOMMENDATIONS</b> .....	<b>6</b>
<i>WHAT DOES THE REVIEW EVIDENCE TELL US ABOUT FALLS PREVENTION FOR ADULTS AGED 65 YEARS AND OLDER?</i> .....	6
<i>WHAT SHOULD POPULATION HEALTH DO ABOUT FALLS PREVENTION FOR ADULTS AGED 65 YEARS AND OLDER?</i> .....	7
<b>INTRODUCTION</b> .....	<b>9</b>
PROJECT AIMS AND OBJECTIVES .....	9
PROJECT STEERING COMMITTEE.....	10
<b>METHODS</b> .....	<b>10</b>
PHASE 1 – ESTABLISHING CONTEXT .....	10
PHASE 2 - ESTABLISHING THE EVIDENCE BASE .....	11
<i>Systematic review search</i> .....	11
<i>Extraction and critical appraisal</i> .....	12
PHASE 3 - DEVELOPING RECOMMENDATIONS FOR POLICY AND PRACTICE .....	12
<i>Theoretical Frameworks</i> .....	12
ETHICS APPROVAL .....	16
<b>TOPIC AREAS AND RESEARCH LITERATURE REVIEW SCOPE</b> .....	<b>16</b>
<i>Falls prevention in older people</i> .....	16
<b>SECTION A: THE PREVENTION OF FALLS IN ADULTS AGED 65 YEARS AND OLDER</b> .....	<b>18</b>
BUILDING THE CASE FOR ACTION ON FALLS PREVENTION .....	18
IDENTIFYING CONTRIBUTING FACTORS AND POINTS OF INTERVENTION .....	19
DEFINING THE RANGE OF OPPORTUNITIES FOR ACTION .....	20
<i>Summaries of key informant interviews</i> .....	21
<i>Summary of implementation areas and support actions</i> .....	29
<i>Main strategy options</i> .....	30
EVALUATING POTENTIAL INTERVENTIONS .....	32
SELECTING A PORTFOLIO OF SPECIFIC POLICIES, PROGRAMS AND ACTIONS FOR QUEENSLAND HEALTH	
POPULATION HEALTH PROGRAMS AND WORKFORCE .....	38
<i>WHAT DOES THE REVIEW EVIDENCE TELL US?</i> .....	39
<i>WHAT SHOULD POPULATION HEALTH DO ABOUT FALLS PREVENTION FOR ADULTS AGED 65 YEARS AND OLDER?</i> .....	42
<b>OVERARCHING ISSUES IDENTIFIED IN THIS REPORT</b> .....	<b>62</b>
<i>Decision-making and partnership development</i> .....	62
<i>Engagement with evidence</i> .....	62
<i>Limitations</i> .....	63
<b>CONCLUSION</b> .....	<b>65</b>
<b>APPENDIX 1. KEY INFORMANTS</b> .....	<b>66</b>
<b>APPENDIX 2. LIST OF QUESTIONS FOR KEY INFORMANTS</b> .....	<b>68</b>
<b>APPENDIX 3. SEARCH TERMS</b> .....	<b>69</b>
<b>APPENDIX 4. APPRAISAL TOOL</b> .....	<b>70</b>
<b>APPENDIX 5. DESCRIPTION OF FALLS PREVENTION PROJECTS</b> .....	<b>71</b>
<b>REFERENCES</b> .....	<b>72</b>

## **Acknowledgements**

The Research Team acknowledge the assistance and contribution of Queensland Health members of the Project Steering Committee: Catherine Harper, Michael Tilse, Nikki Bushell, Peter McKeown, Philip Baker, Robyn Clark and Sophie Dwyer.

We acknowledge also the participants who provided invaluable insights into policy and practice within the Queensland context.

The project team also acknowledge Christopher Lamb who provided research assistance on this project.

## Executive summary

This report provides recommendations for evidence based population health actions for falls prevention for Queensland Health Population Health services and partners to inform planning and decision making. In addition, it outlines a process for generating evidence based recommendations for policy and practice. This process moves beyond the sole use of evidence from systematic reviews or individual research studies. Rather, the process supports the integration of evidence with context, drawn from current and projected national and state policies, epidemiological population data, intersectoral considerations and stakeholder consultations.

The project had three key aims and related methods.

1. Develop an understanding of the context within which decisions are made for policy and practice in population health for falls prevention, through key informant interviews
2. Identify evidence for interventions in falls prevention
3. Develop recommendations for policy and practice in falls prevention for Queensland Health's Population Health services and key partners to inform planning and decision making, by combining the information from phases 1 and 2 of the project.

The evidence identified in this project was based upon a systematic search of the citable literature to identify systematic reviews. While such reviews provide the highest level of research evidence in the topic area, there are limitations. Specifically, evidence was sought on effecting specific health outcomes, which may exclude interventions that addressed intermediary outcomes. In addition, while evidence from some primary studies was included, such evidence was not comprehensively reviewed.

The report provides an outline of the methodology and theoretical framework used to develop this process. This is followed by Section A: Falls prevention in adults aged over 65 years. Section A makes recommendations based on the research evidence and contextual information. This approach does provide some options for further consideration. Wherever possible, the individual components of the interventions are identified. Reporting on the individual components of a program is difficult given the paucity of such information reported in research studies and systematic reviews.

A review of the systematic reviews of falls prevention strategies for older people suggests the most effective interventions are multifaceted. (Multifaceted interventions include a range of socioenvironmental strategies for multiple risk factors employed together to reach a larger proportion of the population than may be achieved by conducting a single intervention. Effective multifaceted activities for falls prevention include a range of strategies to address: strength and balance exercise; home hazard reduction; vision assessment and referral; and medication review). Physical activity programs are also effective. Such programs should focus on strength and balance and should be structured. Structured physical activity programs are characterised by muscle strengthening, balance exercise, and a walking plan prescribed by an appropriately trained professional (for example, a physiotherapist). Where possible, this report proposes practical suggestions for multifaceted programs. There is already a strong commitment within Queensland for falls prevention initiatives. Further action should ensure that programs are closely aligned to existing and emerging evidence as outlined in this report.

Rigorous evaluation within Queensland should be supported to better understand ‘what works for who and in what context’. This is particularly so for interventions with the greatest potential for population health impact (for example, community level, inter-organisational approaches).

There is much dialogue surrounding evidence based public health policy globally, but the processes by which the research literature are synergised with policy and program requirements have few demonstrated precedents. This project drew on the best available evidence and recommendations from global policy and research initiatives. Through an extremely constructive engagement between Queensland Health, Deakin University, the Cochrane Health Promotion and Public Health Field and other colleagues this project developed and tested a framework that could be applied to a range of population health issues to help inform policy and practice.

## **Recommendations**

The following recommendations are drawn from each section of the report.

### **WHAT DOES THE REVIEW EVIDENCE TELL US ABOUT FALLS PREVENTION FOR ADULTS AGED 65 YEARS AND OLDER?**

#### **POPULATION FOCUS – SOCIOENVIRONMENTAL APPROACH**

##### **Established evidence**

Specific multidisciplinary, multifaceted interventions for those at moderate or greater risk of falling (p 39-41). Multifaceted interventions (as detailed in the falls prevention literature) should consist of a range of risk factor related strategies including education (knowledge and attitudes), vision assessment and referral, behaviour change, medication use, footwear and home hazard reduction. While effective programs are multifaceted, the minimal or essential elements for an effective program are unclear.

##### **Emerging evidence**

There is emerging evidence that community based (community driven), multifaceted, inter-organisational approaches to prevent fall-related injuries are successful (p 43).

##### **Limited evidence**

There is limited empirical evidence that identifies the elements of a good social marketing campaign for falls prevention. However, an evaluation of Stay on Your Feet (Western Australia) highlights the need for campaigns targeted to seniors that: (a) convince them that falls is an issue for older people; (b) communicate the serious consequences of falls including their impact on mobility and independence; and (c) highlight the need for seniors to consider their personal risk of falling.

#### **BEHAVIOURAL APPROACH**

##### **Established evidence**

There is evidence that effective interventions are structured and comprise individual physical activity programs prescribed by an appropriately trained professional and characterised by muscle strengthening, balance exercise and a walking plan. Home visits to support the program occur at 1, 2, 4 and 8 weeks with a follow-up at 6 months and monthly telephone calls (p 41-42).

Education alone is unlikely to reduce falls (p 42).

##### **Emerging evidence**

Untargeted group exercise which challenge balance (for example, Tai Chi: p41-42).

#### **INDIVIDUAL FOCUS – MEDICAL APPROACH**

##### **Established evidence**

Health professional prescribed home hazard assessment and modification reduces risk of falls in those at risk (p 41 and 42-43).

Home hazard assessment alone is not effective in reducing falls (p 42-43)

## **WHAT SHOULD POPULATION HEALTH DO ABOUT FALLS PREVENTION FOR ADULTS AGED 65 YEARS AND OLDER?**

### **Implementation**

1. Prioritise for action multifaceted community-level inter-organisational approaches and multifactoral interventions.
2. Map falls prevention action across Queensland at the Area Population Health Services level.
3. Conduct a long term evaluation of Stepping Out (Townsville) that incorporates process, impact and outcome measures. This would provide a valuable contribution to the evidence base and may support further action across Queensland.
4. Monitor outcomes of major demonstration projects such as Stay on Your Feet (Wide Bay) in order to identify opportunities for further roll out/scale up and to contribute to the primary prevention evidence base.
5. Support the conduct, through ARC Linkage or other research mechanisms, or initiate falls prevention demonstration projects that explore the effectiveness of multifaceted interventions in different geographic regions and population groups. These will be useful in developing a more in-depth understanding of what works, how much, for whom and why.
6. Review programs which are not consistent with the evidence base for effectiveness and work towards employing strategies which are demonstrated to be effective. However, continue support for Queensland-based programs that have been evaluated and found to be effective in reducing falls, regardless of any variation from the existing evidence base,.
7. Monitor shifts in population demography, and work with local or Area based services to ensure falls prevention strategies are in place for areas with projected higher densities of older persons.

### **Methodology**

8. Establish the cost-effectiveness of programs, or groups of programs by incorporating economic evaluation into programs. The complete cost of programs chosen for implementation should also be considered. The application of Health Technology Assessment principles may be useful in determining the cost-effectiveness of programs/interventions.
9. Strengthen methods of collecting and reporting population surveillance data about falls, associated risk and protective factors and indicators to monitor progress. This will involve lobbying and advocating, through the variety of national, state, and local forums, for the collection of falls-related data and access to high quality reports which analyse, interpret and report on falls-related data.

10. Employ media and social marketing strategies that target healthy ageing (for example, healthy eating, physical activity and social inclusion) rather than a narrow focus on falls prevention. Use local media to raise awareness and advocate for falls prevention action. Learning about barriers and facilitators gleaned from local evaluations should be shared.

### **Partnership development**

11. Encourage Areas which have invested in partnership development to document and then share their learnings from these approaches. A multifaceted and multifactorial approach requires the development of sophisticated partnership models, often requiring partners from across government, the private sector and community groups.
12. Establish partnerships outside health to support upstream approaches to falls prevention as cross-government policy development and implementation are central to macro-level action. For example, there are opportunities for partnerships with the Office of Seniors that focus on social isolation. Queensland Health may also explore opportunities for formal partnerships through the Department of Communities' Evidence Hubs.
13. Seek support from external organisations as both they and Queensland Health plan for future activities. Building a shared vision and shared priorities will help to strengthen a coordinated approach to falls prevention across the health care continuum.

### **Evaluation**

14. Support and resource community and population health practitioners to build evidence into existing programs, and evaluate programs, in order to inform the evidence base. This is particularly important where there is limited evidence but a strong likelihood of population impact (for example, in community level inter-organisational approaches).
15. Include in evaluations robust measures of effectiveness in improving health outcomes, cost benefit and critical success factors. This will enhance sustainability of programs and interventions and reduce duplication of effort.



## ***Introduction***

Deakin University was commissioned in mid-2006 by Population Health Branch, Queensland Health, to undertake a research project to develop evidence based recommendations for public health policy and practice within the Queensland Health context. The topic area for the project was falls prevention in older people.

## ***Project aims and objectives***

The project had three key aims and related objectives.

1. Develop an understanding of the context within which decisions are made for policy and practice in population health for falls prevention (Phase 1):
  - Conduct interviews according to agreed schedule.
2. Identify evidence for interventions in falls prevention (Phase 2):
  - Identify reviews of reviews through electronic databases
  - Identify systematic reviews through electronic databases
  - Where there are gaps (based on interviews conducted in Phase 1) identify single studies of evaluated programs/interventions. (These were identified through electronic database searches and grey literature searches using the web – for example, funded NHMRC and other projects underway in Queensland and Australia – and by key informants).
3. Develop recommendations for policy and practice in falls prevention for Queensland Health's Population Health services and key partners to inform planning and decision making (Phase 3):
  - Use extraction tables to frame recommendations
  - Link draft recommendations back to contextual information, compliance legislation requirements and federally endorsed programs
  - Consult extensively about the draft recommendations with the topic reference group
  - Conduct priority based workshops outlining the recommendations
  - Refine the draft recommendations following the consultations.

## ***Project Steering Committee***

The Project Steering Committee was created to formulate and define the topics and provide overall direction. It consisted of representatives from the Research Team at Deakin University, and from Population Health Branch, Queensland Health (QH), including Catherine Harper (QH), Prof. Elizabeth Waters (Deakin), Rebecca Armstrong (Deakin), Michael Tilse (QH), Nikki Bushell (QH), Peter McKeown (QH), Dr Philip Baker (QH), Robyn Clark (QH) and Sophie Dwyer (QH). The Project Steering Committee met face to face at the beginning of the project and used teleconferences for further meetings.

## **Methods**

This was a three-phase project.

Phase 1 involved the conduct of key informant interviews.

Phase 2 included a systematic search of the literature to identify systematic reviews.

Phase 3 combined the information from Phases 1 and 2 to generate recommendations for policy and practice.

### ***Phase 1 – Establishing context***

The Project Steering Committee nominated a list of key informants for the consultation phase of the project. The key informants were:

- health professionals from Queensland Health including Population Health Branch (corporate office), and Northern, Central, and Southern Area Population Health Units
- community health practitioners
- Aboriginal and Torres Strait Islander health practitioners
- Child and Youth Health Unit
- professionals in relevant disciplines nominated by Population Health from government departments, and organisations external to Queensland Health including the Department of Education, Department of Housing, university academics, and local government.

The key informants were contacted by a standard email or telephone call which described the project and invited them to participate in either a one hour interview, face to face or by telephone. Teleconferences were arranged where people worked in similar areas.

A full list of key informants can be found in Appendix 1.

Face to face interviews were conducted in Brisbane by Prof. Elizabeth Waters and Rebecca Armstrong. Telephone interviews were conducted by Prof. Elizabeth Waters, Rebecca Armstrong and Dr Elise Davis.

A series of questions for key informants were drafted by the Research Team and agreed upon by the Project Steering Committee. Questions were informed by theoretical perspectives described below. The list of questions can be found in Appendix 2.

## ***Phase 2 - Establishing the evidence base***

### **Systematic review search**

Evidence from systematic reviews typically tells us what interventions have been shown to work, not to work, or to cause harm.

This is a different domain from whether a stated issue is a problem, and if so, how significant a problem it is. This kind of information is typically identified from epidemiological studies of prevalence and burden of disease and is known as ‘needs based’ evidence.

While systematic reviews have long been acknowledged as valuable tools in clinical medicine they have challenged the public health domain. There is often a misconception that systematic reviews of public health interventions only include randomised controlled trials conducted in clinical environments. Reviews such as those conducted by the National Institute for Clinical Excellence (UK) incorporate a range of evidence including professional expertise. This information is more prone to bias and should be treated with caution. Nevertheless, it provides insight into promising practices. As public health interventions typically target populations, understanding context becomes increasingly important. Primary studies often do not collect information about context or do not include contextual information in published reports or papers. This is as typical of public health as it is of clinical domains. The challenge is then for systematic reviews of public health interventions both to provide meaningful information about whether interventions work and to indicate who they work for and in what circumstances. There is now general acceptance that primary studies and systematic reviews need to include this information; however, many studies and reviews conducted in the past have not done so. The process undertaken in this project is therefore important in helping to fill the gap between evidence contained in systematic reviews and the ‘real world’. In a practical sense systematic reviews are one of the most useful tools in informing policy and practice. It would be impossible at the point of decision-making to review all studies conducted in a particular area. It is therefore important that systematic reviews be considered in the real world context. Frameworks outlined in Phase 3 (below), in addition to key informants interviews as described above, incorporate the real world context.

A comprehensive search was conducted to identify systematic reviews for falls prevention in older people. The electronic databases searched included: The Cochrane Library; Database of Abstracts of Reviews of Effectiveness (DARE); Health-evidence.ca; The Community Guide; and the National Institute for Clinical Excellence. These databases were selected as they are comprehensive sources of high quality systematic reviews. While a systematic search would involve searching a broader number of databases, this was beyond the project’s parameters. We acknowledge, therefore, that there is some possibility that some systematic reviews were not identified. The search strategies are described in Appendix 3.

There is a time delay between the reporting and publication of primary intervention studies and publication of systematic reviews based upon consideration of such a primary study. As a result, recently conducted primary studies may not be included in this report.

## **Extraction and critical appraisal**

A template for data extraction was developed. The template was based on existing work conducted by the Cochrane Health Promotion and Public Health Field as a result of extensive engagement and collaboration with international systematic review initiatives. The template was reviewed by members of the Project Steering Group and amendments were made to ensure appropriate and relevant data would be extracted in the search for relevant research findings.

Each of the reviews was critically appraised for quality using a framework and template developed by health-evidence.ca<sup>[3]</sup>. This information was included in the data extraction template and was used to score the quality of the review. A copy of the completed extraction table can be found in the topic section below.

## ***Phase 3 - Developing recommendations for policy and practice***

### **Theoretical Frameworks**

This project is underpinned by several relevant public health frameworks and theories that were identified and agreed to by the Research Team and Population Health Branch: the social model of health, and the framework for health promotion action. These inform and strengthen the methods used to develop recommendations.

### **Population health**

Population health is the prevention of illness and injury; and the protection and promotion of health and wellbeing through organised efforts and informed choices of society, organisations (public and private), communities and individuals<sup>[4]</sup>.

A population health approach is characterised by:

- Addressing the entire range of risk and protective factors that determine the health of the community, including environmental and socioeconomic factors, community capacity, health behaviours and person-related factors
- Affecting the entire population and/or sub-populations.

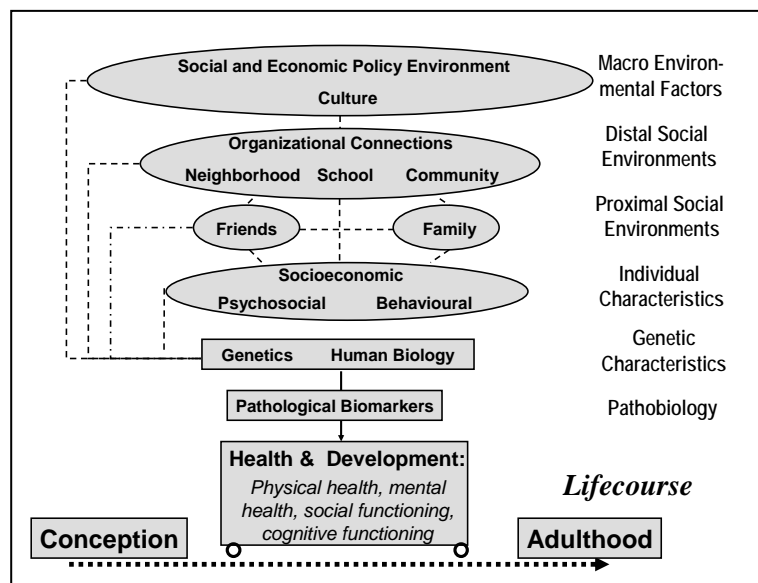
The approaches used by population health differ from that of other parts of the health system. Population health uses the following mechanisms to achieve health outcomes at a population, rather than individual, level:

- Policy
- Legislation
- Social marketing
- Environmental change
- Organisational and community development
- Surveillance
- Disease control

## The social model of health

The socioenvironmental model of health (Figure 1)<sup>[5]</sup> aims to identify the multiple environments that impact on health and other relevant outcomes across the lifespan or lifecourse. As such, it views health and development within a broader macro-environment and can be applied to population health issues generally. The model was used in this project to identify key risk factors. It was also used in conjunction with the Health Promotion Continuum (see Figure 2) to identify gaps and priorities for population health action. For example, risk factors that exist at a macro-environmental level (see Figure 1) require a action using a socioenvironmental approach (see Figure 2).

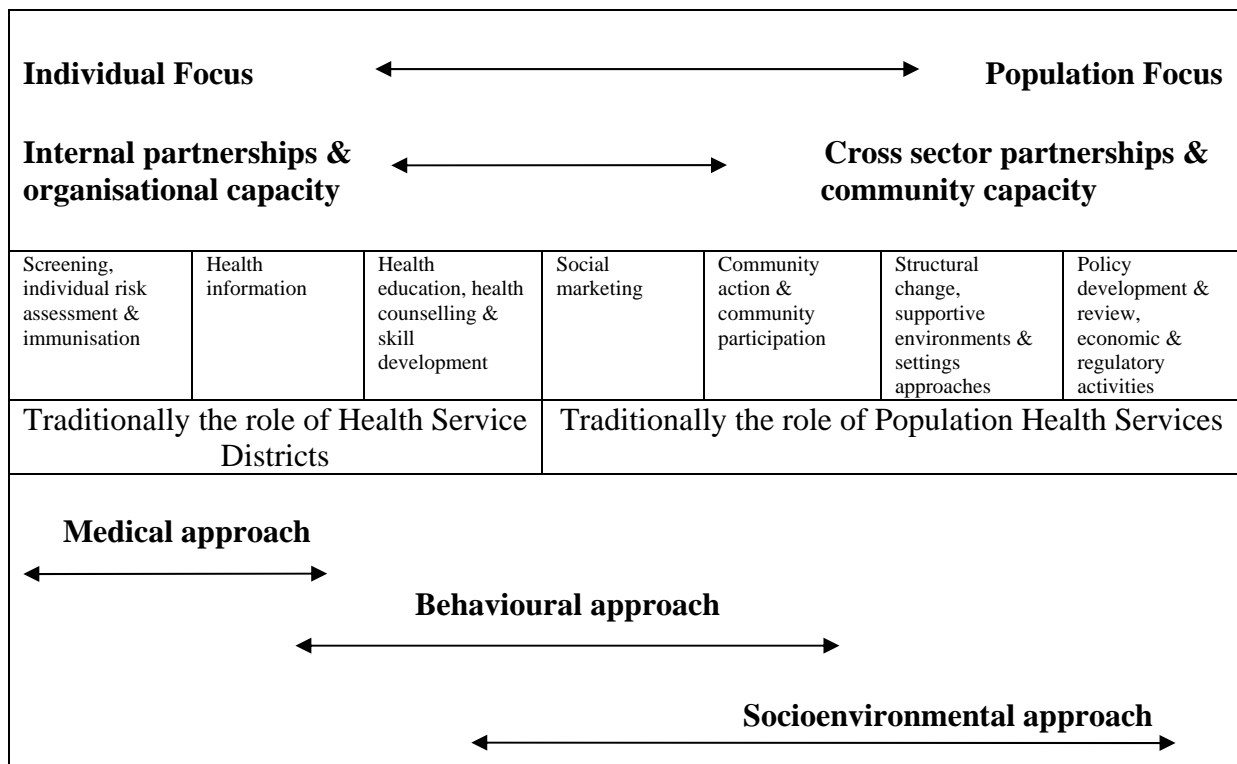
Figure 1. Social model of health – lifecourse approach to public health<sup>[5]</sup>



The Health Promotion Continuum – Approaches and Interventions (Figure 2)<sup>based on[2]</sup> developed by Queensland Health is used throughout the report to identify areas where action is most appropriately targeted. This framework suggests that there are three types of health promotion action; a medical approach, a behavioural approach and a socioenvironmental approach. Action occurring at a socioenvironmental approach is most in line with a population focus and the identification of interventions that fit within this category has been a priority of this project.

Health promotion incorporates multifaceted approaches to achieve health outcomes. That is, a range of strategies will be used, often from across the framework described above. While communication strategies may not change behaviour, they can be useful in combination with a range of other strategies including education sessions, community engagement and organisational change. As a combination, these strategies are more powerful than investing in stand-alone approaches. For example, some communities may respond better to community engagement initiatives than others; therefore, investing in this strategy alone may be ineffective. Multifaceted interventions delivered across sectors through collaborative partnerships are crucial. This approach increases the capacity to respond, it reduces duplication of effort and improves cost-effectiveness, it helps to build community capacity, and it supports the upstream approaches often needed from outside the health sector<sup>[2]</sup>.

Figure 2. Health Promotion Continuum – Approaches and Interventions<sup>[6]</sup>



**Evidence for policy**

We sought to identify an overarching framework to guide the conversion of evidence into policy recommendations. In obesity prevention, extensive efforts in recent years to bring about an evidence and policy nexus resulted in the publication in 2005 of a useful framework developed by the International Obesity Taskforce (IOT)<sup>[7]</sup>. While this framework was developed to inform evidence based obesity prevention, it was based on various relevant public health frameworks. The framework was proposed to the Project Steering Group which agreed to its application because it is highly relevant and readily applicable to other public health issues. The framework was developed in response to needs identified by policy and research groups for a framework to guide development of evidence based policy and programs. The IOT identified the key questions involved in the development of policy and considered the types of evidence needed to address these questions. As a result the framework describes five policy and program issues essential to supporting the translation of evidence into action. They are:

- building a case for action
- identifying contributing factors and points of intervention
- defining opportunities for action
- evaluating potential interventions
- selecting a portfolio of specific policies, programs and actions.

In 2005, Philip Davies<sup>[8]</sup> described a series of influences on decision-making in public health (see Figure 3). Based on his work in the UK Department of Treasury where he was responsible for the integration of evidence and policy, he presented a model to an international forum on this topic held in Melbourne. The model acknowledges that research evidence needs to be considered in the context of a range of factors including resources,

judgement and values. We reviewed how this model would integrate with the IOT framework which acknowledges that policy decisions are usually dominated by political, economic and historical forces. The IOT model explores these components and therefore this project sought to explore this range of factors through interviews and the integration of evidence with contextual data.

Figure 3. Knowing the place of evidence<sup>[8]</sup>



Further, in developing recommendations for policy and practice, it is essential to consider applicability and transferability<sup>[9]</sup>.

Applicability refers to an assessment of whether the intervention process could be implemented in the local setting, regardless of the outcomes. By contrast, transferability involves an assessment of whether the intervention would have a similar level of effectiveness to that described for a study population.

Key questions to assess *applicability* include:

- Does the **political environment** of the local society allow this intervention to be implemented?
- Is there any political barrier to implementing this intervention?
- Would the general public and the targeted population (or sub-population) accept this intervention? Does any aspect of the intervention go against local **social norms**? Is it ethically acceptable?
- Can the contents of the intervention be tailored to suit the local culture?
- Are the essential **resources** for implementing this intervention available in the local setting? (A list of essential resources may help to answer this question).
- Does the target population in the local setting have sufficient **education** to comprehend the contents of the intervention?
- Which organisation will be responsible for the provision of this intervention in the local setting?
- Is there any possible barrier to implementing this intervention because of the **structure of that organisation**?

- Does the provider of the intervention in the local setting have the **skill** to deliver this intervention? If not will training be available?

Key questions to assess *transferability* include:

- What is the **baseline prevalence** in the local setting of the health problem of interest? What is the difference in prevalence between the study setting and the local setting?
- Are the **characteristics of the target population** comparable between the study setting and the local setting? With regards to the particular aspects that will be addressed in the intervention, is it possible that the characteristics of the target population (such as ethnicity, socioeconomic status, and educational level) will impact on the effectiveness of the intervention?
- Is the **capacity to implement** the intervention comparable between the study setting in matters such as political environment, social acceptability, resources, organisational structure and the skills of the local providers?

### ***Ethics approval***

The project was granted approval by the Deakin University Human Research Ethics Committee (EC 162-2006). Participants were provided with a plain language statement and asked to sign an informed consent form. Following the interview, participants were provided with a transcript of their interviews for approval. All data was secured in accordance with Deakin University guidelines. Consent forms were stored separately to encoded data collected. Data will be retained for a period of six years and will be appropriately destroyed after this period of time. All participants were provided with opportunities to provide feedback on the draft report. A final report will be made available to all participants.

## **Topic area and research literature review scope**

### **Falls prevention in older people**

Falls prevention interventions aim to reduce the incidence of falls and fall-related injuries<sup>[10]</sup>. Interventions are typically conducted in a range of settings including community based, general practice, nursing homes, hospitals and other institutions.

This review included reviews that considered all of these settings. Reviews that incorporate community based with individually focused interventions were also included. It was agreed by the Project Steering Group that recommendations would focus solely on community based interventions. The scope included individuals at increased risk of falling (such as the frail elderly). Prospective controlled trials, uncontrolled trials with pre/post test, and interrupted time series studies, were sought. The population of interest was 65 years and older, however reviews that were broader in scope (for example, 55 years and older) were also considered.

### *Research question*

- What community based interventions are effective in reducing falls and fall-related injuries in adults aged 65 years and older?



*Outcome measures:*

- reduction in number of falls
- reduction in fall-related injuries
- change in incidence of fall-related injuries
- reduction in the severity of falls.

Please note that for the purposes of this project, only falls-specific outcome measures were used. The Research Team acknowledges that there are other outcome measures that may be relevant to the prevention of falls such as participation in physical activity, prevention of osteoporosis and enhanced generalised well-being. Of note, there is clear evidence of the impact of physical activity and healthy eating over the life course in the prevention of falls in older persons. Strategies to address these risk factors are identified in *Eat Well, Be Active* and *Be Active Queensland* strategies.

## **Section A: The prevention of falls in adults aged 65 years and older**

### ***Building the case for action on falls prevention***

It is estimated that by 2051, 22.5% of the Queensland population will be aged over 65 years<sup>[16]</sup>. The population distribution of older people in Queensland has implications for the prevalence of falls. The proportion of adults aged 65 years or older is projected to increase by 5.3% per year in the period 1996-2036. It is important to recognise the implications of population shifts within Queensland and Australia. For example, larger proportions of older people are likely to be found in retirement areas including the Sunshine Coast, the Gold Coast and Hervey Bay<sup>[17]</sup>.

Current estimates are that 1 in 3 older Queenslanders fall each year, with between 5% and 10% of these requiring hospitalisation<sup>[16]</sup>. Data from the Queensland Injury Surveillance Unit (2004)<sup>[18]</sup> reveal:

- almost 300 older Queenslanders each year as a result of a fall
- fall injuries comprise 60% of all injury presentations in older people
- females outnumber males 2:1
- two-thirds of falls occur at home
- two-thirds are the result of slipping, tripping or stumbling on the same level
- 40% of injuries from falls were fractures, with one in ten falls resulting in a hip fracture
- one-third of fall presentations result in admission to hospital.

While falls have a significant impact on personal injury they also reduce functioning and quality of life<sup>[19]</sup>. Hill et al<sup>[10]</sup> argue that unless an effective and coordinated falls prevention strategy is implemented, costs associated with emotional, physical, personal and health resources are likely to increase.

An increase in the ageing population is likely to see an increase in falls and fall-related injuries. This is of particular importance in the Queensland context as the population is both ageing and projected to continue growing rapidly. These factors have implications for the cost of care and services associated with fall-related injury in older people. These costs will absorb a significant proportion of increased spending on the health of older people unless effective preventive strategies are implemented<sup>[20]</sup>. More specifically, based on current incidence rates<sup>[21]</sup>, as the population ages the number of hip fractures in Australia is expected to double by 2026 and increase fourfold by 2051.

Currently, direct health care costs of fall-related injuries in Queensland have reached \$100m. Without intervention, it is estimated that by 2051 this figure will reach more than \$317.6m per annum<sup>[16]</sup>. This equates to a 3.67% increase in hospital separation costs, a 3.72% increase in total hospital bed day costs, a 5.5% increase in medical costs (GPs, non-inpatient and specialists), a 3.47% increase in prescriptions, a 3.36% increase in costs associated with allied health consults, and a 3.81% increase in costs for nursing home residents<sup>[22]</sup>. In more concrete

terms, it is suggested that over 500 additional hospital beds and 850 nursing home places will be needed<sup>[23]</sup>.

Moller (2003) suggests that a 66% reduction in prevalence of falls is needed to maintain cost parity between 2001 and 2051. Significant cost increases will occur in Queensland within ten years<sup>[22]</sup>. It is therefore crucial that additional efforts to reduce risk of falling in older people are undertaken to ensure that treatment costs do not preclude ongoing prevention initiatives. If this does not occur, data suggest that costs for treatment of falls will steadily increase in the short-term, leading to long-term health budget consequences.

**Identifying contributing factors and points of intervention**

Falls in older people are complex events impacted upon by a range of physical, psychological, environmental and social factors. The following section seeks to outline the risk factors for falls prevention. This assists in identifying of points of intervention. The major risk factors for falls are well-established and include both intrinsic and extrinsic factors (see Table 1). The evidence for additional risk factors including Vitamin D is less well established. Falls in older people are complex events involving a number of interactive factors<sup>[16]</sup>. The more risk factors an older person has, the greater their chance of falling. Research suggests that reducing the number of associated risk factors can also reduce the lifetime risk of falling<sup>[24]</sup>. Table 1 outlines the key risk factors for falls in older people.

Table 1. Falls risk factors<sup>[10]</sup>

Personal factors (intrinsic)	Environmental factors (extrinsic)
<ul style="list-style-type: none"> <li>• increased age</li> <li>• past history of falls</li> <li>• chronic medical conditions such as arthritis, stroke and Parkinson’s disease</li> <li>• multiple medications, and specific medication types (for example, long acting benzodiazepines, and psychotropic medication)</li> <li>• impaired balance and mobility</li> <li>• muscle weakness and loss of muscle mass and strength</li> <li>• sensory problems, including impaired visual acuity and depth perception, and peripheral neuropathy</li> <li>• dizziness</li> <li>• impaired cognition</li> <li>• depression</li> <li>• low levels of physical activity</li> <li>• low body mass index and osteoporosis (predictors of fracture risk)</li> <li>• fear of falling</li> <li>• female gender.</li> </ul>	<p><b>Environmental hazards</b></p> <ul style="list-style-type: none"> <li>• clutter</li> <li>• poor lighting</li> <li>• uneven flooring/ground levels</li> <li>• inappropriate footwear and clothing</li> <li>• the use of inappropriate or poorly maintained equipment.</li> </ul> <p><b>Risk taking behaviour</b></p> <ul style="list-style-type: none"> <li>• climbing a ladder</li> <li>• using unsteady furniture for support.</li> </ul>

The Queensland Injury Surveillance Unit has identified that older people who present to hospital having fallen most commonly have done so **in the home** (64%)<sup>[18]</sup>. Falls are reported

to occur most commonly in the bedroom (16%), living/family/dining room (9%), garden (8%), footpath (8%), stairs or steps (7%), bathroom (6%) and kitchen (6%)<sup>[18]</sup>. The most common injury factors for these falls include floor (19%), natural surface (11%), chairs (3%), bed (3%), rugs or mats (2%) and ladders (2%). Other places where falls occur include an institution (9%), on or near a road (8%), in hospital (5%) or in a shop or commercial premises (5%). It is difficult to assess the extent to which falls occurring outside are as a result of poor quality roads and footpaths or to individual factors (strength, balance and mobility). This information is important in guiding local action. For example, if 100% of falls occurring on or near a road were due to poor quality roads or footpaths, an 8% reduction in falls and fall-related injuries could be achieved by ensuring they were adequately maintained.

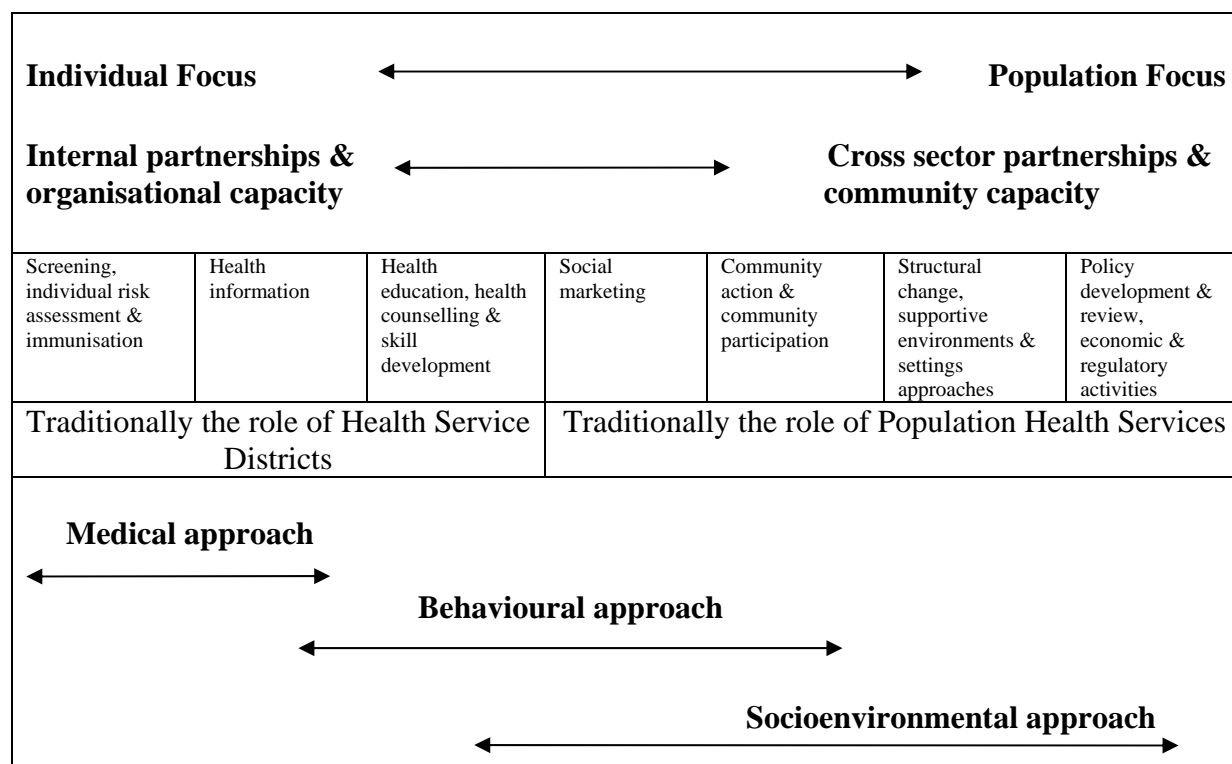
The most effective points of intervention for falls prevention in older people are likely to be impacted upon by the self-perceptions of older people of their level of risk. A study commissioned in 2000 by the Injury Prevention Section of the Commonwealth Department of Health and Ageing explored the information needs and perceptions of older Australians for falls and falls prevention<sup>[25]</sup>. The study suggested that older people represent a large and very diverse group. At one end of the spectrum are those who are hardly affected by the ageing process while others suffer from age-related health problems. While falls are generally known to be a problem for people aged 65 years or older, considerable variation exists in the way the problem is acknowledged. Older people who do not see themselves as being 'old', and who have greater levels of activity, tend to deny their personal falls risk and the relevance of prevention measures. In contrast, older Australians who have experienced a fall, or whose age-related health problems have a significant lifestyle impact, tend to acknowledge the risk of falling and the necessity for interventions. More recent data from the Western Australian Stay on Your Feet 2004 Falls Prevention Risk Factor Survey (comprising 1100 participants) shows seniors have a low concern for the seriousness of the falls issue, perceive falls have low personal relevance, and have low intentions to change behaviour<sup>[26]</sup>. These findings are supported by more recent international research, implementation and synthesis<sup>[27-29]</sup>.

### ***Defining the range of opportunities for action***

The following section builds on the risk factors outlined above. It seeks to identify the range of opportunities for action, presents several strategy options, and helps to answer 'how and where could we intervene?' These will then be combined with evidence from systematic reviews and key documents to develop recommendations.

Figure 4 outlines opportunities for action across the continuum of health promotion. It highlights that a population focus is most likely to be achieved through community action and community participation, structural change, supportive environments and settings approaches and policy development and review and economic and regulatory activities. In order to be effective, population health action should use a socioenvironmental approach and develop strong multi-sectoral partnerships. Medical and behavioural approaches are also important but should be used in conjunction with socioenvironmental approaches where possible. This framework has been used to define the range of opportunities for action as outlined below.

Figure 4. Health Promotion Continuum – Approaches and Interventions<sup>[6]</sup>



### Summaries of key informant interviews

Key informant interviews were conducted to help identify the range of opportunities for action. A summary of these interviews is provided below. A list of key informants is included in Appendix 1. There is already a significant amount of work happening in Queensland to address falls in older people. While it was not possible within the scope of this project to map this work comprehensively, an overview is provided of the types of activities being undertaken and some of the key partners are identified.

### Population Health Branch and Units

Teleconferences were conducted in two of the three Area Population Health Units (PHUs). Additional key informant interviews were conducted where necessary. There is no dedicated falls prevention workforce across the three Area Health Services. Population Health staff working on falls prevention in Area Health Services are generalist health promotion workers who managed this work amongst competing priorities.

### Summary of current programs

Table 2 provides a summary of the work identified in key informant interviews. This list is not intended to be comprehensive and it is likely that more unreported work is happening at the District Health Service level.

Interviews with key informants also identified a range of facilitators and barriers to undertaking falls prevention initiatives. These help to build an understanding of the influences on decision-making and local action.

Table 2. Summary of programs identified in key informant interviews

<b>Southern PHU</b>	<ul style="list-style-type: none"> <li>• Steady Steps</li> <li>• Life Steps</li> </ul>
<b>Central PHU</b>	<ul style="list-style-type: none"> <li>• An Area wide program approach is implemented across PHU's in Central with a focus on:</li> <li>• Healthy Ageing Partnerships (including HSD's)</li> <li>• Stay on Your Feet program</li> </ul>
<b>Tropical PHU</b>	<ul style="list-style-type: none"> <li>• Stepping Out (many of the programs listed below are connected to this initiative)</li> <li>• shopping centre audits</li> <li>• Sun ferry audits</li> <li>• Risk assessment checklists</li> <li>• community education (opportunistic)</li> <li>• Healthy Home Parties with community health</li> <li>• 'Don't fall for it' with Council of the Ageing</li> <li>• shoe fitters' workshop</li> <li>• home medication reviews</li> <li>• Cooking for One</li> <li>• physical activity programs</li> <li>• Promoting Life Steps in Aged Care Facilities</li> <li>• Active Ageing Grants</li> <li>• Safe Communities</li> </ul>
<b>Statewide action</b>	<ul style="list-style-type: none"> <li>• Statewide Falls Injury Prevention Collaborative</li> <li>• Smart Housing</li> <li>• Statewide Action Plan for falls prevention in older persons</li> <li>• Coordinate packaging of Stay On Your Feet into an implementation toolkit</li> </ul>

### *Facilitators*

- Work with partners (including the target group – older persons themselves) for whom activities are already part of core business. Share knowledge and expertise amongst partners so each understands their contexts, roles and responsibilities in addressing falls prevention and explore mutual benefits. For example, it is better with older persons and external partners to use the phrase 'healthy ageing' instead of the 'f' word.
- Plan for sustainability. At the outset, consider who might have a role in ongoing implementation and engage them early. Support for transitions is important.
- Explore and maximise opportunities to link falls prevention with current chronic disease priorities. For example, debate within the current political environment (in which physical activity and healthy eating are frequently raised) provides many opportunities to talk about falls prevention.
- Engage with evidence based health promotion and public health concepts to inform practice.
- Provide education and training concurrently with the release of evidence reviews and policy documents.

## *Barriers*

- Staff turnover both within Population Health Units and with partners.
- The sometimes limited capacity of the community health sector to participate in falls prevention programs initiated by Population Health Units.
- Poor quality of access to analysed data and limited dissemination of useful information/data related to falls.
- Perceived lack of coordination of activities.
- Lack of opportunities to share and learn with/from others' work
- Local service providers not always focused on falls prevention.
- Difficult to raise awareness with partners of the need for falls prevention to go beyond just physical activity (for example, acceptance of the importance of a multifaceted approach).
- No database containing project information.
- Lack of dedicated falls prevention officers.
- Some population health programs/areas continue to work in silos. The new structure under the Forster review has made statewide responses more difficult with an organisational structure of corporate and area health services.
- There is no single consistent message and no single suite of state resources that can be used by all who are working to promote falls prevention in the community. Instead there is an array of resources developed across the state.
- Lack of funding for injury prevention activities.
- No standards across Queensland Health hospitals. Each District implements its own methods of risk screening and data collection, using different systems that make it difficult to compare falls prevention activities and rates.
- Professional boundaries.
- Some Divisions of General Practice are unlikely to implement falls prevention strategies because they do not relate to their key performance indicators as funded by the Commonwealth.
- There are many opportunities that are difficult to maximise due to the bureaucracy of Queensland Health and the lack of information systems technology to communicate patient information across the continuum of care.
- General Practice Nurses are a growing profession and they are currently an underutilised professional group.
- Decision-making context.

The Health Promotion Unit within Population Health Branch of Corporate Office is responsible for reporting, monitoring, policy and planning across Queensland (rather than local level implementation). It also has a role in piloting statewide initiatives. Generic Health Promotion Officers are based in Area Health Population Health Units and for some, injury prevention is part of their role. Health Promotion Officers report to their Area Health Promotion Managers. Some practitioners discussed Outcome Area Plans. While they had some input into the Plans it was suggested that Outcome Area Plans were not always useful at a district level in guiding implementation.

The Statewide Action Plan expired at the end of 2006. The National Plan will most likely be used from that point. A review of the implementation of the Statewide Action Plan will be conducted.

### **Relationships with other organisations/sectors**

It was acknowledged that falls prevention is not just a Queensland Health responsibility, especially given the multiple risk factors and the range of settings involved. However, historically, falls prevention has been a health sector responsibility which has led to issues of governance. This also appears to impact on the degree of coordination for falls prevention work.

The Queensland Injury Surveillance Unit is funded by Queensland Health to collect injury surveillance data from some Queensland Hospital Emergency Departments. These local data can then be used to drive and evaluate local action. These data are very useful as they provide important contextual information for targeting interventions. This is demonstrated through the release in 2004/05 of a Bulletin specifically dealing with falls prevention.

The Patient Safety Centre is funded by Queensland Health. Centre staff are working with the Health Promotion Unit (Population Health Branch) to develop a joint workplan that clarifies roles and responsibilities and identifies agreed key areas for collaborative action across the continuum of care.

The Home and Community Care Program has provided \$500,000 to support falls prevention for older people. This has resulted in the development of the *Best Practice Falls Prevention Resource Kit*. The Kit includes:

- an Implementation Guide for a falls prevention program
- One Step Ahead – a clear and simple booklet on falls issues
- Staying On – a booklet used by clients to assess falls risk
- brochure on falls prevention in the elderly
- CD.

The following list outlines a range of key partners identified by key informants. In some areas these relationships are strong, in others they are less so. While it is difficult to make generalisations across the state, this list identifies a range of partners identified as important in falls prevention action.

Healthcare providers including:

- Divisions of General Practice
- pharmacists
- community health
- clinicians (including physiotherapists, dieticians, podiatrists, occupational therapists)
- optometrists.
- Government departments:
  - Department of Housing – Home Assist Secure
  - Department of Veterans Affairs – Home Front
  - Department of Communities (particularly the Office for Seniors)



- Department of Emergency Services
- local governments
- Sport and Recreation Queensland.

#### Community based organisations

- Sport and Recreation Queensland
- Fitness Queensland
- community service providers
- culturally and linguistically diverse (CALD) organisations
- Aboriginal and Torres Strait Islander (ATSI) organisations
- Council of the Ageing.

#### Private sector/other

- architects
- construction industry
- academia.

### **Queensland Health partners**

#### **Health and Community Care (HACC)**

##### *Programs*

The HACC *Best Practice in Falls Prevention Resource Kit* (described earlier) is the primary falls prevention initiative of the HACC program. The *Best Practice Falls Prevention Client Capacity Building Kit* is specifically for clients and includes relevant booklets. HACC has also developed a Facilitation Guide and Home Care Worker manuals, with a video included (*Standing on Your Own Two Feet* produced by the Pensioners and Superannuants League). The HACC Resource Unit has run training programs across the state to facilitate implementation of these packages.

The *Client Capacity Building Kit* is available in six languages: Greek, Italian, Chinese, Vietnamese, Polish and Turkish.

Posters and bookmarks have been developed to assist clients to maintain a healthy ageing pattern and avoid falls. These are being translated into fifteen languages for the culturally and linguistically diverse community.

A DVD resource – *Building Optimum Health Bone and Muscle Strength* – has also been produced to assist health workers working with the frail aged.

##### *Decision-making*

Funding for the *Resource Kit* project is now finished. Previously, State HACC Plans were developed yearly. Planning is now moving to a triennium basis (every 3 years). These plans include statewide and regional priorities. Falls prevention is no longer an explicit priority in the Queensland State HACC Plan. After the completion of the *Resource Kit* it was intended that ongoing falls prevention work would be sustained through established resources and relationships. The key informant suggested the Statewide Falls Injury Prevention

Collaborative will be important in continuing to advocate that falls prevention remains a priority for all key partners.

#### *Relationship with Population Health*

Informants have worked closely with Population Health. This will be facilitated now through the Statewide Falls Injury Prevention Collaborative.

#### *Key areas for investment by this agency*

Gaps in investment by HACC and others involved in falls prevention may include: programs to support the frail elderly; rural nutrition (with a focus on the frail elderly); indigenous communities; and translation of materials (particularly for newer CALD populations). It is critical also to ensure the availability of user friendly brochures on falls prevention.

### **Community Health**

#### *Programs*

Community health agencies are involved with Steady Steps, Stay on Your Feet and several other programs targeting community education and physical activity. Evaluation of these programs has been limited. In some instances participants have not wanted to participate in evaluation processes leading to poor response rates. A detailed evaluation of Stay on Your Feet in Wide Bay is being conducted and findings will further inform the recommendations outlined in this report. More structured evaluation processes are underway. Other actions have included:

- redevelopment of existing materials to ensure they are more user friendly
- development of a safety product list to assist older people to buy products that prevent falls
- links to the Home Assist program.

#### *Decision-making*

Community Health reported participating in steering committees to drive action on falls prevention. Involvement can be hindered by resource limitations (often worker capacity) and direct service pressures. One District has established a Health Promotion Unit that will help coordinate local activities and assist in better use of chronic disease funding. It will also give programs enhanced status. In other centres/areas coordination appears not to be established to this level. Some need for health promotion plans was identified.

#### *Relationship with Population Health*

Relationships with Population Health appear positive. Regular local meetings are held in some areas. Maintaining a relationship over distance was identified as difficult.

#### *Key Areas for Investment*

Key areas for investment will be driven at local levels. These decisions will be informed by other established programs outlined in government documents. Packages developed need to be transferable and consider the continuum of care. Health promotion was a key focus for the centres where staff were interviewed. Issues are therefore difficult to generalise across Queensland.

### **Patient Safety Centre**

#### *Programs*

The Patient Safety Centre (PSC) (which sits within the Reform and Development Directorate) has established a position to support the implementation of the National Guidelines for the prevention of falls and harm from falls in older people in hospital and residential aged care facility settings. The PSC is also responsible for the coordination of the Statewide Falls Injury Prevention Collaborative. PSC staff have been visiting Queensland Health Service Districts to run falls planning days which support implementation of the National Guidelines. This program is primarily for hospitals and residential aged care facilities due to the fact that the National Guidelines pertain specifically to these settings. However, due to the interest in falls prevention, community and Population Health representatives have attended these planning days. This had led to extension of the mapping into the community sector. These planning days have revealed a huge diversity in the falls prevention programs currently being implemented. These programs primarily focus on physical activity. Within the community, evidence is used as a rationale for action on falls prevention but not necessarily used to plan program approaches (for example physical activity program components).

#### *Decision-making*

Patient Safety Officers work in each Health Service Districts. Decision-making on falls prevention is impacted on by line management. Policy is planned at State level and action is planned and implemented at a local level.

#### *Relationship with Population Health*

A formal meeting occurs every month between PSC and Health Promotion Unit. PSC and the Health Promotion Unit have a joint workplan. One joint activity is a mapping project to identify current action and opportunities for further development. Local Population Health staff in some Health Service Districts have attended falls planning days and subsequent meetings.

#### *Key Areas for Investment*

The Statewide Falls Injury Prevention Collaborative was established in February this year. A steering committee and five working groups form part of the Collaborative. Each of these working groups has its own workplans and associated projects. These are:

1. To improve incident reporting indicators for falls.
2. To improve education/training/awareness programs for clinicians and consumers.
3. To implement service development:
  - a) specialist Falls Prevention Resource Officers;
  - b) falls clinics (community and/or outpatient);
  - c) statewide cross-continuum approaches where appropriate (including primary prevention programs).

## **Department of Communities**

### *Programs*

The Office for Seniors has a cross-government role and ensures a focus on seniors issues. Its role involves leading projects and coordination. Recently the Office has run a pooled project (in which the resources of cross-government project partners are pooled) focusing on social isolation. This involved a literature review, consultations to identify what work was happening (n=10), and forums. A total of 191 submissions were received and five projects were funded. A Steady Steps program in Logan was funded through this process. There is anecdotal evidence to suggest that the project running in Greenvale is very successful and has ‘transformed the community’.

### *Decision-making*

The Queensland Seniors Council provides advice to the Minister for Communities, Disability Services and Seniors. The Council also identifies opportunities for action on issues pertinent to seniors across Queensland. The most recent policy framework is *Our Shared Future: Queensland’s Framework for Ageing 2000-2004*.

### *Relationship with Population Health*

The Office has good relationships with Population Health. To strengthen opportunities for partnership, Population Health should approach the Office at the idea/planning stage of new initiatives to facilitate its contribution.

### *Key Areas for Investment*

The Office has three key priorities: elder abuse, social isolation/participation, and grandparents.

## **Local government**

### *Programs:*

Home Modification Service is a program funded under the Home and Community Care Program (HACC). Basic home assistance is provided to the frail aged and people with a disability. Major improvements are made to the home to provide a safe environment for the elderly and disabled people. The most common improvements include bathroom alterations, ramps, stair climbers and water lifts. The aim is to prevent people with disabilities and frail elderly people from entering institutional care prematurely.

### *Decision making*

The Area Manager develops and coordinates Home and Community Care initiatives within the region. The HACC committee meets monthly to assess new initiatives and other community committees, such as the Aged Care Assessment Team, meet to discuss funding eligibility for individuals. Funding is provided by HACC and managed through the Department of Housing.

### *Relationship with Population Health*

Relationships with Population Health appear positive. Regular local meetings are held in some areas and there is a good relationship with all involved. Ability to develop own local government initiatives is seen as very positive.

### *Key Areas for Investment*

To continue the development of partnerships that provide funding well into the future.

## **Academic**

### *Programs*

This informant was most aware of the Wide Bay Stay on Your Feet project due to professional involvement. It was suggested that this project is based strongly on a community development approach and there have been challenges associated with this approach. There is limited evidence to support this approach as yet. One of the challenges of falls prevention is that much of the evidence is laboratory based. It was felt that Queensland has yet to see a big investment in falls prevention. Where it has occurred, it's not been well structured.

### *Decision-making*

Big structural change is needed. Until that occurs it is difficult to see projects being effective. Partnerships need to be built into systems.

### *Relationship with Population Health*

This researcher has limited involvement with Population Health.

### *Key areas for investment*

Drawing on this academic's area of expertise, it was suggested that the development of skills and collaborative networks takes up time and often projects/strategies do not progress beyond this point. The Wide Bay project has taken years of investment. It is essential now to look critically at the project, and work out strengths and weaknesses. It will also be important to consider how the project can be implemented at a reduced cost. Data collection is also problematic.

## **Summary of implementation areas and support actions**

The following section provides a summary of the *implementation areas and support actions* needed for effective falls prevention as identified in problem definition, risk factor analysis and key informant interviews. While not an exhaustive list, this section includes areas where work is already underway in addition to areas where further opportunities exist. A comprehensive population approach should consider settings and sectors, monitoring, capacity building, research and social marketing<sup>[7]</sup>.

Settings and sectors:

- local government (town planners, sport and recreation)
- Department of Communities – Office of Seniors
- Department of Veterans Affairs
- Home And Community Care
- general practitioners
- Patient Safety Centre
- nutritionists
- sport and recreation sector
- Australian Academy of Tai Chi
- Fitness Queensland
- Volunteers (who may promote/run programs or promote risk factor reduction by increasing physical activity)

- Department of Housing
- architects/builders
- allied health (particularly occupational therapists and physiotherapists)
- Department of Emergency Services
- Pharmacy Guild of Australia
- optometrists.

Monitoring:

- Queensland Injury Surveillance Unit
- Queensland Trauma Registry
- hospitals
- general practitioners
- results from community projects (self-reported falls)

Capacity building:

- internal capacity
  - a. understanding of falls prevention
  - b. ability to engage with evidence (program level effectiveness)
- assessing external capacity
- shared priority
- understanding of falls prevention.

Research (Queensland specific):

- Stay on Your Feet in Wide Bay (involving Queensland University of Technology)
- School of Physiotherapy and Exercise Science, Griffith University (with a focus on human movement)
- University of Queensland (work including the case-control study *Protective Effect of Healthy Ageing on the Risk of Fall-Related Hip Fracture Injury in Older People*)
- National Ageing Research Institute.

Social marketing:

- Awareness of falls as an issue amongst partners, potential partners and communities and individuals.

## **Main strategy options**

The following section provides an outline of the main strategy options needed to drive effective falls prevention as identified in the problem definition, risk factor analysis, key informant interviews and consideration of relevant implementation areas and support actions. This information includes areas where work is already underway in addition to areas where further opportunities exist. A comprehensive population approach should consider policies, programs and partnerships.

### *Policies*

The development and implementation of policy is crucial to driving public health action. The following policies either focus specifically on falls prevention or target populations. Further action on falls prevention must be considered within the context of these policies and their integration, where appropriate:

- Statewide Action Plan: Falls Prevention in Older People 2002-2006 (Population Health – Queensland Health)
- Aged Care Strategy 2004-2011 (Aged and Community Care Reform Unit – Queensland Health)
- Queensland Trauma Plan
- General Practice Advisory Council Continuity of Care Planning Framework
- Queensland’s Framework for Ageing (coordinated by Department of Communities)
- Be Active Australia (Commonwealth Department of Health and Ageing)
- Be Active Queensland
- National Injury Prevention and Safety Promotion Plan 2004-2014 (Commonwealth Department of Health and Ageing)
- National Falls Prevention for Older People 2004 onwards
- National Aboriginal and Torres Strait Islander Safety Promotion Strategy.

### *Programs*

Programs refer to the implementation of policy objectives to address health outcomes. A range of programs is already being implemented. These include:

- Stepping Out
- Stay on Your Feet
- Steady Steps
- Life Steps
- Queensland HACC *Falls Prevention Resource Kit*.

Further action to prevent falls in older people should build a common approach based on existing projects. Relevant sectors and settings as described above should be considered in program development.

### *Partnership development*

Partnership development is a core component of effective population health. This is important for falls prevention given that risk factors are broad and many are impacted outside the remit of Population Health. Therefore any further action should consider a common approach to partnership development that supports falls prevention.

### *Links with existing funding opportunities*

- physical activity
- social isolation
- chronic disease.

Table 3 maps options identified in this section, defining the range of opportunities for action, against the Queensland Health Promotion Continuum. Key partners are identified for each of these options. Other partners may also be relevant.

## ***Evaluating potential interventions***

This section moves beyond an exploration of what is currently happening and what some potential options might be. It considers rigorous evaluations of what has worked. Eleven systematic reviews, guidelines or evidence resources were identified through the search strategy outlined earlier. Four reviews were excluded from this analysis. Three reviews<sup>[30-32]</sup> were excluded because they were updated in Gillespie's et al (2003) Cochrane review. Hill et al (2001) was excluded as it is a review of practice rather than a review of evidence. Seven reviews were included: six were of high quality and one was of weak quality. The Gregg et al<sup>[33]</sup> study is at high risk for bias and therefore results should be treated with caution.

### **Multifaceted interventions to prevent falls and fall-related injuries**

Multifaceted interventions (as defined in the introduction to this report) are those which incorporate a range of strategies. At this stage, the evidence base is limited to those interventions which include education (knowledge and attitudes), vision assessment and referral, behaviour change, medication use, footwear and home hazard reduction.

There is good evidence to support the effectiveness of multifaceted interventions for those at moderate or greater risk of falling<sup>[10, 34, 35]</sup>. In particular there is good evidence to support multifaceted programs based on comprehensive assessment for those at moderate risk of falling. There is limited evidence to support untargeted multiple strategies to prevent falls<sup>[10]</sup>. Of the three programs described, one was not effective in reducing falls, and one did not measure falls outcomes. The third study which compared four study arms with multiple strategies found after one year follow-up that the intervention group (which received education, exercise, home assessment, clinical assessment and advice) had significant reductions in slips and trips and a trend towards decreased risk of falling. There was no evidence that reduction in risk declines with the number of strategies used, except for trips.

A review of population based approaches for the prevention of *fall-related injuries* in older people, conducted by McClure et al, found consistently reported reductions in five studies which were conducted across a range of countries in 'real world' settings<sup>[36]</sup>. However, not all results were significant<sup>[36]</sup>. This suggests that a population based approach which incorporates multifactorial interventions may be useful in preventing fall-related injuries. The extent to which recommendations can be made about the effectiveness of components of the programs is limited by the information collected in their evaluations. Of note, three of the included studies were based on the WHO Safe Communities model of safety and injury prevention. Stay on Your Feet was included in this review.

There is also evidence that this approach to falls prevention saves healthcare costs and represents value for money. The NSW Stay on Your Feet program was undertaken between 1992 and 1996. Economic analysis of this program has since been completed<sup>[37]</sup>. Estimation of benefits (in-patient savings) was estimated to be between A\$4,891,494 and A\$7,107,703. Cost savings in total health care were estimated to be between \$A10,023,577 and A\$11,352,453. Cost savings in DALYs were estimated to range between \$A15,336,072 and A\$17,076,353. Average benefit to cost ratios were 8.4:1 for the state government, 13.65:1 for the Australian government, and 20.35:1 for the community as a whole.



Table 3. Options for Population Health action mapped by the Health Promotion Continuum – Approaches and Interventions<sup>[6]</sup>

	<b>Options</b>	<b>Key partners</b>
Socioenvironmental approach	<p>Cross-government policy development and implementation:</p> <ul style="list-style-type: none"> <li>• ensuring falls prevention has a presence in relevant policies</li> <li>• finding new opportunities (for example, chronic disease prevention funding)</li> <li>• challenging existing culture that falls are an inevitable part of growing older</li> </ul>	<p>Queensland Health Department of Health and Ageing            Department of Communities            Department of Veterans Affairs            Department of Housing            Local government            Department of Emergency Services</p>
	<p>Comprehensive mapping of <b>roles</b> in falls prevention and current action to identify gaps and assist with coordination. This process evidenced by Stepping Out through development of local action map            Capacity building amongst practitioners</p>	<p>Queensland Health            Consider settings and sectors as described above</p>
Behavioural approach	<p>Exercise programs conducted in groups</p>	<p>Fitness Queensland            Population Health, Queensland Health            Sport and Recreation Queensland            Australian Academy of Tai Chi</p>
Medical approach	<p>Individualised risk assessment and reduction programs</p>	<p>Queensland Health            Fitness Queensland            Home and Community Care            Department of Veterans Affairs            General practitioners            Pharmacists</p>

The sustainability of this program has also been assessed<sup>[38]</sup>. Surveys were conducted between 2001 and 2002. Program sustainability was achieved among health practitioners (including GPs, pharmacists and community health staff). The greatest impact on sustainability was reported to be with community health staff. Of these, 80% had been engaged in promotional material, disposal of medications (69.7%) and press releases (58%). This may have occurred because community health staff had established programs in this area, that the program was particularly relevant to existing programs, or that the load of sustainability fell to them. Related and continued activities included preventing falls in public places, medication checks and exercise classes. Facilitators of sustainability included activities being part of normal work roles, prioritisation, and compatibility with other projects. Barriers included cessation of

funding, removal of priority, workload and staffing issues. Almost half (48%) of older people reported remembering Stay on Your Feet and more than half reported making behavioural changes since participating in the program. Program sustainability was not achieved in Shire Councils or through Access Committees (established by or with Shire Councils to assess accessibility of public places). Authors suggest it may have been more appropriate to concentrate on key policy changes rather than producing a manual of guidelines.

### **Multifaceted risk assessment to prevent falls**

Multifaceted risk assessment includes identification of falls history, assessment of gait, balance and mobility, and muscle weakness. Several systematic reviews suggest that multifaceted risk assessments are an important element in reducing risk of falling, particularly amongst those at greater risk of falling when part of an individualised multifaceted intervention<sup>[35, 39]</sup>. Assessments should be offered to all older people who present to health professionals with a fall or who may be at risk of falling (for example, those who present with abnormalities of gait and balance). Assessments should be performed by an appropriately trained health professional.

A multifaceted risk assessment may include:

- identification of falls history
- assessment of gait, balance and mobility, and muscle weakness
- assessment of osteoporosis risk
- assessment of the older person's perceived functional ability and fear relating to falling
- assessment of visual impairment
- assessment of cognitive impairment and neurological examination
- assessment of urinary incontinence
- assessment of home hazards
- cardiovascular examination and medication review<sup>[35]</sup>.

NICE<sup>[35]</sup> has reviewed systematically studies that tested use of assessment tools. It concludes more work is needed before recommendations can be made.

### **Exercise/physical activity programs**

There have been mixed results in research about the effectiveness of exercise as an intervention to reduce falls. Strength and balance retraining, endurance retraining or Tai Chi were found to significantly decrease rate or risk of falls for both frail elderly and relatively well older people<sup>[10, 34, 35]</sup>. These interventions may be delivered in groups or as customised exercise programs. Also effective are multi-component group exercise programs targeting a combination of balance, strength and fitness<sup>[10]</sup>. Further research is needed to assess the effectiveness of strength training, cardiovascular fitness training, and combined strength and endurance training<sup>[10]</sup>. Gillespie et al (2003) and NICE (2004) stipulate that exercise programs should be prescribed on an individual basis and monitored by an appropriately trained professional. Studies have involved nurses and physiotherapists. There is no evidence to support the effectiveness of group-delivered generic exercise programs<sup>[34]</sup>. Although excluded from this review, Gardner et al (2000) report some cost data; however, they state that studies lacked adequate power to show cost savings.

Steady Steps, a partnership between Fitness Queensland, Sport and Recreation Queensland and Queensland Health, has run in Queensland since 2002. The program has involved the training of 27 fitness instructors who deliver a ten week exercise program to older people. Exercises are designed to improve stamina, balance, reaction time, flexibility and strength. Some 362 participants were surveyed at baseline, post-intervention and at six month follow-up. The evaluation revealed an increase in participants' knowledge and perceptions about falls and satisfaction with their physical ability<sup>[40]</sup>. After follow-up at six months there was a 20% increase in those exercising for at least 20 minutes 4-5 times a week<sup>[40]</sup>. The proportion of those not exercising at baseline fell by almost 15% at six months follow-up<sup>[40]</sup>.

Table 4. Summary of evidence for exercise/physical activity for falls prevention

<b>Intervention type</b>	<b>Effectiveness</b>
Multi-component exercise programs targeting balance, strength and fitness	Effective
Balance programs (for example, Tai Chi)	Effective
Strength training	Not effective
Cardiovascular programs	No studies
Strength and endurance programs	Some evidence of effectiveness
Customised exercise	Effective for people living at home. Compliance and safety needs more research.
Exercise and bone mass	Effective in significantly limiting loss of bone mass. Unsure to date about effect on fractures.

### **Education**

Education programs are used in falls prevention to increase awareness of risk factors and to provide strategies for reducing falls for both older people and those who work with older people<sup>[10]</sup>. There is limited evidence of the effect of education alone in reducing the risk of falls in older people<sup>[10, 35]</sup>. There is also limited evidence to support cognitive behavioural approaches. Hill et al (2004) acknowledge preliminary evidence that training of GPs to convey health promotion messages may be effective in achieving behavioural change in older people. While there is limited evidence to support community level inter-organisational approaches (for example, falls prevention networks), some success is reported<sup>[10]</sup> and further investigation is warranted. NICE recommends that healthcare professionals who are involved in the assessment and prevention of falls should discuss changes a person can make to reduce risk of falls. They also suggest that information should be provided in languages other than English, should address low self-efficacy and fear of falling, and should encourage activity change through negotiation with each participant. Education should be flexible and based on individual needs and preferences, and should consider the social benefits of falls prevention programs. Education alone is unlikely to reduce falls in older people.

### **Environmental safety/home hazard reduction**

Objects or circumstances that increase the risk of falling may be present within the home (for example, cords on the floor loose mats, poor lighting) or outside the home (public falls hazards such as uneven footpaths, slippery floors, poor lighting<sup>[10]</sup>). There is strong evidence that home hazard reduction is effective in reducing further falls in older adults following

hospitalisation for fall-related injuries<sup>[10, 35]</sup> and for those with a history of falling<sup>[34]</sup>. There is emerging evidence that home hazard assessment and modification programs may be effective for those at risk of falling when assessment is conducted by a trained health professional such as an occupational therapist<sup>[10]</sup> and when delivered in combination with strategies to modify risky behaviours and maximise adherence to recommended hazard modifications. There is no evidence to suggest that the conduct of environmental hazard reduction (both in homes and in public spaces) in isolation is effective in reducing falls<sup>[10, 35]</sup>. Hill et al<sup>[10]</sup> suggest that environmental home assessments which consider the physical environment in combination with an individual's interaction with their environment may improve falls prevention health outcomes. They suggest the HomeFAST tool developed by Mackenzie et al<sup>[41]</sup>.

### **Community level inter-organisational approaches**

Preliminary evidence supports the implementation of multifaceted community level inter-organisational interventions for the prevention of *fall-related injuries* (as described above). More rigorous evaluation (for example, cluster randomised controlled trials) is needed to build the evidence base in this area. In addition to the review by McClure et al<sup>[36]</sup>, there is anecdotal evidence to suggest that Stepping Out and its programs lead to increased levels of fitness and increased social participation. Community education has reportedly increased and strengthened networks between key stakeholders.

In order to most effectively roll out these programs, further research is needed to identify the barriers to and facilitators of population based falls prevention interventions<sup>[36]</sup>. The evaluation of Stay on Your Feet in Wide Bay/Burnett will help build knowledge in this area.

### **Clinical interventions**

Clinical interventions are included here, but in limited detail, as this report focuses primarily on population health approaches to prevention using a health promotion approach.

Footwear and footcare:

- No RCTs to test type of shoe causing falls or to test the effectiveness of footcare treatments on falls outcomes.

Assistive devices:

- No RCTs conducted to test the effectiveness of assistive devices. Other studies have not addressed falls outcomes. Some improvements in balance and mobility were detected. One study found an increase in confidence for performing physical activities.
- Research to test the effectiveness of hip protector garments in reducing injury as a result of falls has been conducted primarily in residential settings. They may be most appropriate when other strategies are implemented to reduce falls risk but this risk remains high. To date there is insufficient evidence to support their use in reducing falls-related injuries in the population.

Dietary supplements:

- Vitamin D can significantly reduce the risk of fracture when it is delivered either in isolation or in combination with calcium. Other drugs (including bisphosphonate and selective oestrogen receptor modulators) may be effective in reducing fractures for individuals with osteoporosis and for those who have suffered minimal trauma fractures.

## Medical procedures

- There is some emerging evidence for the effectiveness of expedited surgery<sup>[42, 43]</sup>.

Table 5 summarises the certainty of effectiveness sourced from the evidence and informed by context. This is mapped against the Health Promotion Continuum – Approaches and Interventions<sup>[6]</sup>. Interventions or programs that are underway where evidence is not available are cited as ‘unknown’. This provides a more comprehensive picture of potential for population impacts.

### **Evidence from studies published between 2004 and 2006**

There can often be a substantial lag between when a study is undertaken, when it is published and when it is included in a systematic review. Given this unavoidable delay, it is important to consider more recent research when making evidence informed recommendations. Currently, Gillespie et al are updating their Cochrane review on falls prevention. This will be separated into two reviews: the first will be ‘Interventions for preventing falls in older people in nursing care facilities and hospitals’, and the second, ‘Interventions for preventing falls in community dwelling older people’. The latter will comprise 94 reviews with approximately 47 new trials. It is not possible to appraise each of the 47 new trials for the purposes of this project. It is anticipated that Gillespie et al’s review will be published in 2007.

Of note, Lord et al (2005) conducted an RCT of individualised interventions incorporating exercise and strategies for maximising vision and sensation. Results were compared to a minimal intervention and control group. At 6 month follow-up the falls risk scores in the intervention group were significantly lower than those in the control group. Individualised interventions to prevent falls were not effective. Some measures of vision and strength were undertaken and small improvements in fall risk scores were found. Authors suggest that a lack of effect on falls may relate to insufficient targeting of the intervention to at risk groups. Difficulties delivering individualised interventions in a group setting were identified and counseling sessions may have been too brief and not optimally timed. Professor Lord has recently conducted a meta-analysis of falls prevention interventions. At the time of writing Professor Lord was contacted. He advised that the publication was under peer review and not yet publicly available.

### **Supporting actions**

The evidence suggests that several interventions to address falls in the population are unlikely to be effective in isolation, or their effectiveness is yet unknown. However the interventions listed below may be considered worthwhile in conjunction with more rigorously evaluated multifaceted programs:

- multifaceted falls risk assessment (with no modification)
- encouraging participation of older people in falls prevention programs
- education and information giving
- Vitamin D, nutrition

Table 5. Matrix of effectiveness and potential population health impact

<b>Certainty of effectiveness</b>	<b>Population focus – socioenvironmental approach</b>	<b>Behavioural approach</b>	<b>Individual – medial approach</b>
<b>Quite high</b>	Multifaceted interventions may be conducted by a single organisation. (Multifaceted interventions include a range of strategies such as home hazard reduction, strength and balance exercise, vision assessment and referral, and medication review).	Group based multi-component exercise programs (targeting a combination of balance, strength and fitness). Group based exercise with balance training (for example, 15 week Tai Chi exercise program).	Exercise combined with risk assessment. Home hazard assessment with trained health professional. Customised exercise program.
<b>Medium</b>	Multifaceted community level inter-organisational approaches.	GP messages.	Multifaceted risk assessment.
<b>Quite low</b>		Education and information giving. Group delivered general exercise interventions.	Home hazard assessment for people without risk of falling. Cognitive behavioural education approaches. Nutritional supplementation. Individual lower limb strength training.
<b>Unknown</b>	Environmental/ building changes.  Increase awareness via mass media.	Walking or other cardiovascular programs.	Hip protectors.

### ***Selecting a portfolio of specific policies, programs and actions for Queensland Health population health programs and workforce***

Recommendations are divided into those derived from the evidence literature according to their strength. These are followed by recommendations informed by evidence and contextualised by the relevant community and stakeholder views and which are for policy and practice action by Queensland Health. The latter recommendations were developed in order to direct Population Health towards action recommendations based on review evidence.

The recommendations are specific to Population Health and a population health perspective.

Issues of applicability and transferability were considered and the recommendations are influenced by the contexts in which Population Health works.

These recommendations are based on the premise that good population health practice focuses on organisational development, workforce development, resource allocation, leadership and partnerships<sup>[44]</sup>.

We have categorised and aligned the recommendations with the Health Promotion Continuum – Approaches and Interventions<sup>[6]</sup>.

## **WHAT DOES THE REVIEW EVIDENCE TELL US?**

### **POPULATION FOCUS – SOCIOENVIRONMENTAL APPROACH**

#### **Established evidence**

Specific multidisciplinary, multifaceted interventions for those at moderate or greater risk of falling (p 39-41). Multifaceted interventions (as detailed in the falls prevention literature) should consist of a range of risk factor related strategies including education (knowledge and attitudes), vision assessment and referral, behaviour change, medication use, footwear and home hazard reduction.

#### **Emerging evidence**

There is emerging evidence that community based (community driven), multifaceted, inter-organisational approaches to prevent fall-related injuries are successful (p 43).

#### **Limited evidence**

There is limited empirical evidence that identifies the elements of a good social marketing campaign for falls prevention. However, an evaluation of Stay on Your Feet (Western Australia) highlights the need for campaigns targeted to seniors that: (a) convince them that falls is an issue for older people; (b) communicate the serious consequences of falls including their impact on mobility and independence; and (c) highlight the need for seniors to consider their personal risk of falling<sup>[1]</sup>.

### **BEHAVIOURAL APPROACH**

#### **Established evidence**

There is evidence that effective interventions are structured and comprise individual physical activity programs prescribed by an appropriately trained professional and characterised by muscle strengthening, balance exercise and a walking plan. Home visits to support the program occur at 1, 2, 4 and 8 weeks with a follow-up at 6 months and monthly telephone calls (p 41-42).

Education alone is unlikely to reduce falls (p 42)

#### **Emerging evidence**

Untargeted group exercise which challenge balance (for example, Tai Chi: p 41-42).

## **INDIVIDUAL FOCUS – MEDICAL APPROACH**

### **Established evidence**

Health professional prescribed home hazard assessment and modification reduces risk of falls in those at risk (p 41 and 42-43).

Home hazard assessment alone is not effective in reducing falls (p 42-.43).



# Population based interventions to prevent falls and fall-related injuries in adults aged 65 years and older

## Quick reference guide

### Introduction

This reference guide presents an up-to-date summary of the most effective programs/interventions to prevent falls and fall-related injuries in people aged 65 years and older. Risk factors for falls include physical inactivity, unsafe footwear, unsafe public environment, vision deterioration, unsafe home environment, decline in gait and balance ability and medication management. The interventions described in this guide seek to address these risk factors.

This reference guide is designed for use by practitioners, community workers and volunteers to support an evidence based population health approach to preventing falls in older people in community settings.

### Effective interventions

#### *Multifaceted community-level inter-organisational approaches*

There is emerging evidence to suggest that multifaceted community-level inter-organisational approaches are effective in reducing falls and falls-related injuries.

#### *Tailored exercise programs\**

Strong evidence supports the implementation of structured physical activity programs. These are characterised by muscle strengthening, balance exercise, and a walking plan prescribed by an appropriately trained professional. Home visits to support the program should occur at 1, 2, 4 and 8 weeks with a follow-up at six months, and monthly telephone calls. Exercise programs should be individually prescribed and monitored by health professional

*\* While these interventions occur outside the sphere of population health, support and advocacy for such may be a role for Population Health*

#### *Multifactorial interventions*

Good evidence supports the effectiveness of multidisciplinary, multifactorial interventions for those at moderate or increased risk of falling.

Multifactorial interventions should include a range of strategies like strength and balance exercise, home hazard reduction, vision assessment and referral and medication review.

#### *Group exercise programs\**

There is some promising evidence to support the implementation of untargeted group exercise which involves Tai Chi or exercises which challenge balance.

#### *Home hazard assessment and modification\**

There is good evidence to suggest that professionally prescribed home hazard assessment and modification reduces risk of falls.

*Interventions which may be useful in combination with above, but are not supported as stand alone interventions:*

- multifaceted falls risk assessment
- encouraging participation of older people in falls prevention programs
- education and information giving.

*Interventions with unknown effects:*

- environmental/building changes (e.g. public spaces)
- mass media
- walking or other cardiovascular programs

## **WHAT SHOULD POPULATION HEALTH DO ABOUT FALLS PREVENTION FOR ADULTS AGED 65 YEARS AND OLDER?**

### **Implementation**

1. Prioritise for action multifaceted community-level inter-organisational approaches and multifactorial interventions.
2. Map falls prevention action across Queensland at the Area Population Health Services level.
3. Conduct a long term evaluation of Stepping Out (Townsville) that incorporates process, impact and outcome measures. This would provide a valuable contribution to the evidence base and may support further action across Queensland.
4. Monitor outcomes of major demonstration projects such as Stay on Your Feet (Wide Bay) in order to identify opportunities for further roll out/scale up and to contribute to the primary prevention evidence base.
5. Support the conduct, through ARC Linkage or other research mechanisms, or initiate falls prevention demonstration projects that explore the effectiveness of multifaceted interventions in different geographic regions and population groups. These will be useful in developing a more in-depth understanding of what works, how much, for whom and why.
6. Review programs which are not consistent with the evidence base for effectiveness and work towards employing strategies which are demonstrated to be effective. However, continue support for Queensland-based programs that have been evaluated and found to be effective in reducing falls, regardless of any variation from the existing evidence base,.
7. Monitor shifts in population demography, and work with local or Area based services to ensure falls prevention strategies are in place for areas with projected higher densities of older persons.

## **Methodology**

8. Establish the cost-effectiveness of programs, or groups of programs by incorporating economic evaluation into programs. The complete cost of programs chosen for implementation should also be considered. The application of Health Technology Assessment principles may be useful in determining the cost-effectiveness of programs/interventions.
9. Strengthen methods of collecting and reporting population surveillance data about falls, associated risk and protective factors and indicators to monitor progress. This will involve lobbying and advocating, through the variety of national, state, and local forums, for the collection of falls-related data and access to high quality reports which analyse, interpret and report on falls-related data.
10. Employ media and social marketing strategies that target healthy ageing (for example, healthy eating, physical activity and social inclusion) rather than a narrow focus on falls prevention. Use local media to raise awareness and advocate for falls prevention action. Learning about barriers and facilitators gleaned from local evaluations should be shared.

## **Partnership development**

11. Encourage Areas which have invested in partnership development to document and then share their learnings from these approaches. A multifaceted and multifactorial approach requires the development of sophisticated partnership models, often requiring partners from across government, the private sector and community groups.
12. Establish partnerships outside health to support upstream approaches to falls prevention as cross-government policy development and implementation are central to macro-level action. For example, there are opportunities for partnerships with the Office of Seniors that focus on social isolation. Queensland Health may also explore opportunities for formal partnerships through the Department of Communities' Evidence Hubs.
13. Seek support from external organisations as both they and Queensland Health plan for future activities. Building a shared vision and shared priorities will help to strengthen a coordinated approach to falls prevention across the health care continuum.

## **Evaluation**

14. Support and resource community and population health practitioners to build evidence into existing programs, and evaluate programs, in order to inform the evidence base. This is particularly important where there is limited evidence but a strong likelihood of population impact (for example, in community level inter-organisational approaches).
15. Include in evaluations robust measures of effectiveness in improving health outcomes, cost benefit and critical success factors. This will enhance sustainability of programs and interventions and reduce duplication of effort.

## **Conclusion**

This project has revealed significant investment and goodwill in Queensland for addressing falls prevention for older people. Evidence from systematic reviews provides good evidence to support a range of interventions including multifaceted interventions and structured exercise programs. While it is often difficult to ascertain program components and target populations from systematic reviews, such interventions have been trialled in real world settings and are both applicable and transferable to the Queensland context.

The evidence base and information from consultations strongly support investment in community level inter-organisational approaches and multi-component group exercise programs or those based on principles of Tai Chi. Programs which focus on individuals are important and Population Health has a role in advocating that these programs be funded by relevant organisations.

## **Further information**

For further information about population based falls prevention actions in Queensland please contact Paul Vardon ph (07) 3405 5252.

## **Related policies/resources**

- National Falls Prevention for Older People 2004 onwards
- Statewide Action Plan: Falls Prevention in Older People 2002-2006 (Population Health – Queensland Health)
- Aged Care Strategy 2004-2011 (Aged and Community Care Reform Unit – Queensland Health)
- Queensland Trauma Plan
- General Practice Advisory Council Continuity of Care Planning Framework
- Queensland's Framework for Ageing (coordinated by Department of Communities)
- Be Active Australia (Commonwealth Department of Health and Ageing)
- Be Active Queensland
- National Injury Prevention and Safety Promotion Plan 2004-2014 (Commonwealth Department of Health and Ageing)
- National Falls Prevention for Older People 2004 onwards
- National Aboriginal and Torres Strait Islander Safety Promotion Strategy

## **Review update**

This guidance will be updated every 2 years. The guidance will be updated more often if there are significant changes to the evidence base.

## Population based interventions for the prevention of fall-related injuries in older people

<b>Authors</b>	McClure R, Turner C, Peel N, Spinks A, Eakin E and Hughes K.
<b>Date</b>	2005
<b>Participants</b>	Primarily participants aged 65 years and over.
<b>Description of studies</b>	<p>Five prospective controlled community trials were included in this review where the unit of analysis is the entire community.</p> <p>Studies were conducted in Australia, Denmark, Norway and Sweden. Three studies were based on the WHO Safe Communities model of safety and injury prevention. Two studies were based on the same conceptual framework.</p> <p>Interventions were multifaceted and targeted knowledge, attitudes, behaviours, medication use, footwear, and home hazard reduction. Interventions typically included education (including community displays), home visits, hazard removal, media campaigns, and training for local government staff.</p>
<b>Results</b>	<p>All studies reported a significant decrease or downward trend in fall-related injuries among older people. Significant findings included: 20% decrease in fall-related hospitalisations (Kempton 2000), 33% decrease in lower extremity fractures (Poulstrup 2000), decrease in fall injuries amongst 70-79 year olds (Lindqvist 2001), 6.6% decrease in incidence of fall-related fractures in women (Svanstrom 1996).</p> <p>The Australian Stay on Your Feet programme resulted in a significant 20% decrease in fall-related hospitalisations in the intervention area compared to the control community after adjusting for baseline fall-related injury rates (rate ratio (RR) 0.80 [95% CI 0.76, 0.64]). This study also assessed the percentage of the community exposed to the intervention via cross sectional surveys. It was estimated that about 77% of the targeted population has been in contact with at least one aspect of the intervention over the duration of the programme.</p> <p>In the program conducted in Denmark there was a non-significant post intervention decrease (15% odds ratio (OR) 0.05, <math>p=0.23</math>) in fall-related fractures in the intervention community compared to the non-intervention community. A significant decrease of 33% was recorded for lower extremity fractures (OR 0.63, <math>p=0.03</math>), whilst a non-significant decrease was found for hip fractures (OR 0.55, <math>p=0.06</math>).</p> <p>In the Norwegian study researchers identified a non-significant relative reduction of 9.7% (<math>p=0.2</math>) in the incidence of all fractures in the intervention community comparing post-intervention to pre-intervention periods. In the six municipalities bordering the intervention community there was a relative non-significant decrease in falls incidence over this period of 2.6% (<math>p=0.58</math>). In the comparison community there was a significant increase of 37% in fracture rates over this period (<math>p=0.001</math>).</p> <p>In Sweden, a non-significant decrease in fall injuries across all age groups (65 years and over) occurred in the intervention community (OR 0.89 [95% CI 0.77, 1.03]). This downward trend was significant only in the 75–79 year age group (OR 0.71 [95% CI 0.52, 0.99]). Injury rates were unchanged in the control community.</p> <p>The second Swedish study found a significant reduction in the incidence of fall-related fractures in the intervention community (compared to the pre-intervention incidence) in the female population of 6.6% per year (95% CI 0.00, 2.9%) and</p>

	<p>non-significantly amongst males of 5.4% per year (95% CI -0.5, 1.4%). The incidence of injury rates did not change significantly in either of the two control areas although there was a non-significant decrease in the surrounding county.</p>
<b>Author's conclusions</b>	<p><i>Implications for practice:</i></p> <p>‘Despite methodological limitations of the evaluation studies reviewed, the consistency of reported reductions in fall-related injuries across all programs supports the preliminary claim that the <b>population-based approach to the prevention of fall-related injury is effective and can form the basis of public health practice.</b>’</p> <p><i>Implications for research:</i></p> <p>Population based cluster RCTs should be conducted. Further investigation into the barriers to and facilitators of population based interventions should also be explored.</p>
<b>Quality</b>	<p><i>Included studies:</i></p> <p>Mixed</p> <p><i>Review:</i></p> <p>STRONG 10</p>
<b>Comments</b>	<p>Authors note a general lack of detail about the exact nature of the strategies undertaken within each intervention.</p> <p>Appropriateness of selected communities is uncertain.</p> <p>Completeness and reliability of administrative databases on which falls-related data was recorded was not assessed.</p> <p>Potential for bias could be reduced by conducting more rigorous evaluation.</p>
<b>Available at</b>	<p><a href="#">The Cochrane Library</a></p>

## Population based interventions for the prevention of fall-related injuries in older people

<b>Title</b>	A meta analysis of fall prevention programs for the elderly: how effective are they?
<b>Authors</b>	Hill-Westmoreland EE, Soeken K and Spellbring AM
<b>Date</b>	2002
<b>Participants</b>	<p>Participants aged 60 years or over (mean age=75 years). Studies included a higher proportion of women. Eight studies were conducted in the community, two studies in long-term care, one in residential care and one study was conducted in hospital. Women comprised 79% of participants in included studies.</p>
<b>Description of studies</b>	<p>12 RCTS and quasi-randomised controlled trials.</p> <p>Interventions were exercise focused (three studies), a combination of exercise and other risk factor modification (five studies), interdisciplinary comprehensive risk assessment with recommendations made for specific interventions based on the assessment (three studies), and community education focusing on environmental modification (one study).</p> <p>For inclusion in this review, studies needed to include only adults aged 60+ years, include some type of falls prevention intervention, use a comparison group on outcome measures, provide sufficient information to determine the rate of difference in falls, and report the number of study participants.</p> <p>Primary outcome of interest was the difference in the proportion of falls between treatment and control groups.</p> <p>Country of studies not described.</p>
<b>Results</b>	<p>Across the 12 studies the results indicated that the intervention was effective in reducing the proportion of falls.</p> <p>Subgroup analysis by intervention found:</p> <ul style="list-style-type: none"> <li>• exercise combined with risk factor modification studies showed a statistically significant reduction in falls (MWES 0.0687 (z=3.41, p&lt;0.001 CI 0.0292 to 0.1082)</li> <li>• community based interventions demonstrated a significant reduction in falls (MWES 0.972 (z=5.37, p&lt;0.001 CI 0.0617 to 0.1327)</li> <li>• institution based interventions did not demonstrate a significant effect (MWES 0.0235 z=0.7822, p=0.22 CI -0.357 to 0.0831)</li> <li>• studies which measured the proportion of falls at 12 months demonstrated significant effects (MWES 0.0905 z=5.43, p=&lt;0.001)</li> <li>• studies that measured effects at four months did not demonstrate significant effects (MWES -0.0972 z=-0.005, p&gt;0.50 CI-0.0810 to 0.0806)</li> <li>• high quality studies identified a reduction in falls (MWES 0.0812 z=4.86 p&lt;0.001 CI 0.0485 to 0.1139) whereas low quality studies did not (MWES 0.0593 z=1.55 p=0.07 CI -0.193-0.1379).</li> </ul> <p>No costs analysis data was recorded.</p>

<b>Author's conclusions</b>	<p><i>Implications for practice:</i></p> <p>The authors' meta-analysis found a 4% decrease in the rate of falls for individuals in the treatment groups of the various interventions. No specific implications described.</p> <p><i>Implications for research:</i></p> <p>The authors state that additional studies are needed to enhance the effectiveness of fall prevention programs. In particular they suggest including the rate of difference of falls as an outcome measure. This will allow additional meta-analysis to be conducted.</p>
<b>Quality</b>	<p><i>Included studies:</i></p> <p>Authors reported high quality rating of studies, with nine of the 12 studies scoring at least 4/6 on rating measure.</p> <p><i>Review:</i></p> <p>STRONG (7/10)</p>
<b>Comments</b>	<p>The quality rating scoring method assessed study design, clarity of outcome construct definition, outcome measures, indication of time unit until falls outcome measure. This does not meet minimum requirements as set out in health-evidence.ca tool for assessing methodological quality.</p>
<b>Available at</b>	<p>Hill-Westmoreland EE, Soeken K and Spellbring AM. A meta-analysis of fall prevention programs for the elderly: how effective are they? <i>Nursing Research</i>, 2002 51(1): 1-8.</p>



## Population based interventions for the prevention of fall-related injuries in older people

<b>Title</b>	Interventions for the prevention of falls in older adults: systematic review and meta-analysis of randomised clinical trials.
<b>Authors</b>	Chang JT, Morton SC, Rubenstein LZ, Mojica WA, Maglione M, Suttorp MJ, Roth EA, Shekelle PG
<b>Date</b>	2004
<b>Participants</b>	Aged 60 years or older
<b>Description of studies</b>	<p>40 RCTs focusing on falls prevention were included in the review.</p> <p>Interventions included multifactorial falls risk assessment and management programs, exercise programs, environmental modification programs and educational interventions. All interventions were compared with either usual care or a control group.</p>
<b>Results</b>	<p>Overall there was a reduced risk of falling (RR 0.88 CI 0.82-0.95) in intervention groups compared to control groups. There was also a reduction in the number of monthly falls in intervention groups (RR 0.80 CI 0.72-0.88) compared to control groups.</p> <p>The most effective intervention in reducing both risk of falling at least once (RR 0.82 CI 0.72-0.94) and rate of monthly falls (RR 0.63 CI 0.49-0.83) were multifactorial falls risk assessment and management programs. Exercise programs were shown to be effective in reducing the risk of falling (RR 0.86 CI 0.75-0.99).</p>
<b>Author's conclusions</b>	<p><i>Implications for practice:</i></p> <p>The authors recommend the implementation of multifactorial falls risk assessment and management programs for people with a history of falls. For the general population the authors recommend the implementation of exercise programs.</p> <p><i>Implications for research:</i></p> <p>The authors suggest that further research investment into the cost-effectiveness of interventions is needed. They also suggested further exploration of both multifactorial falls risk assessment and exercise programs to identify the essential characteristics that lead to effectiveness.</p>
<b>Quality</b>	<p><i>Included studies:</i></p> <p>Only RCTs included in review</p> <p><i>Review:</i></p> <p>STRONG</p>
<b>Comments</b>	<p>Insufficient detail on primary studies is included in the review.</p> <p>Post hoc analysis was conducted of multifactorial risk assessment and management program to assess whether enrolment of people at higher risk impacted on effectiveness. No significant differences by populations studied were found.</p>

---

**Available at**

Chang JT, Morton SC, Rubenstein LZ, Mojica WA, Maglione M, Suttorp MJ, Roth EA, Shekelle PG. Interventions for the prevention of falls in older adults: systematic review and meta-analysis of randomised clinical trials. *BMJ*, 2004; 328: 680.

---

## Population based interventions for the prevention of fall-related injuries in older people

<b>Title</b>	Physical activity, falls, and fractures among older adults: a review of the epidemiologic evidence
<b>Authors</b>	Gregg EW, Pereira MA, Caspersen CJ
<b>Date</b>	2000
<b>Participants</b>	Older adults. Age range is not specified.
<b>Description of studies</b>	12 RCTs, five prospective observational studies, nine prospective studies, 17 case-control studies and eight 'other' studies. Studies were conducted between 1975 and 1998. Physical activities included walking, house and yard activity, weight-bearing activity, lifetime physical activity, recreational activity, job activity over 20 years, teenage physical activity, heavy outdoor work or exercise, recent walking or cycling, activity at age 50 for the hip, spine and wrist and household labour. Studies were conducted in a range of settings including senior centres, nursing homes, with medical practitioners and with community-dwelling adults.
<b>Results</b>	<p>Physical activity and risk of fall: observational studies identified conflicting results. One study found non-significant 40% reduction in falls in people walking 15 or more blocks per week in comparison to sedentary individuals. Four studies found significant reductions in falls amongst those participating in physical activity. No effect was identified in an additional study. Two studies found women who do a variety of types of physical activity have an increased falls risk.</p> <p>Results for 12 RCTS reported. Note that 7/12 are from one study. A pre-planned meta-analysis of these studies identified a 10% reduction approaching non-significance (RR=0.9 CI 0.81-0.99) in the risk of falls for general exercise. For balance training the reduction was 17% (RR=0.83, CI 0.70-0.98). The effect of endurance, resistance or flexibility training was not significant. Several trials found no significant differences between exercise interventions and controls. The authors cite low statistical power as a possible limitation.</p> <p>Physical activity and risk of hip fracture and other osteoporotic fracture sites also reported. The authors suggest that there is strong evidence from observational studies and some evidence from prospective and case-control studies that physical activity reduces the risk of hip fractures. It is unclear whether physical activity reduces the risk of other osteoporotic fractures.</p> <p>No cost information was reported.</p>
<b>Author's conclusions</b>	<p><i>Implications for practice:</i></p> <p>There is inconsistent evidence to suggest that enhanced leisure time physical activity among community-dwelling adults reduces risk of falls after controlling for baseline mobility impairment. Results from RCTs are inconclusive and it is difficult to determine the most consistently effective form of physical activity. The authors suggest that exercise interventions may have greater impacts on high risk individuals.</p> <p><i>Implications for research:</i></p> <p>The authors suggest that future research needs to evaluate the types and quantities of physical activity needed for optimal protection from falls, and to identify which</p>

	populations will most benefit from exercise. Cost-effectiveness data is also needed.
<b>Quality</b>	<p><i>Included studies:</i></p> <p>No quality rating of included studies provided.</p> <p><i>Review:</i></p> <p>4/10 WEAK. Poorly described review with several flaws.</p>
<b>Comments</b>	<p>Definitions of physical activity were not clear in original observational studies and some RCTs. Measures used were often not consistent and may not have used validated tools.</p> <p>Some of the trials integrated physical activity with other interventions. It is therefore difficult to determine cause and effect.</p> <p>'Risk of falls' not clearly defined. In some studies this may have referred to single fall incidence, in others it may have referred to multiple falls.</p> <p>This review updated the 1999 version of the Gillespie Cochrane review.</p>
<b>Available at</b>	Gregg EW, Pereira MA, Caspersen CJ. Physical activity, falls, and fractures among older adults: a review of the epidemiologic evidence. <i>Journal of the American Geriatrics Society</i> , 2000, 48(8): 883-893.

## Population based interventions for the prevention of fall-related injuries in older people

<b>Title</b>	An analysis of research on preventing falls and falls injury in older people: Community, residential care and hospital settings (2004 update)
<b>Authors</b>	Hill K, Vrantisidis F, Haralambous B, Fearn M, Smith R, Murray K, Sims J, Dorevitch M, for the Commonwealth Department of Health and Aging
<b>Date</b>	2004
<b>Participants</b>	Older people (not defined)
<b>Description of studies</b>	<p>Number of included studies not clearly articulated.</p> <p>Studies focused on education (health promotion, falls risk factors and health professional education), exercise (general vs customised, groups vs home based, and balance, strength and endurance training), environment (provision of aids/appliances, home assessment/modification, home support, public areas), clinical assessment and review (medical screen, sensory evaluation and multiple strategies) and injury minimisation (clothing, assistive devices and vitamin D and calcium supplementation).</p>
<b>Results</b>	<p><i>Education:</i> There is limited evidence of the effect of education programs targeting older people in reducing falls. There is some evidence to suggest that programs incorporating cognitive behavioural approaches may be more effective in reducing falls. There is also preliminary evidence to suggest that training of GPs to convey health promotion messages may be effective in achieving behavioural change with older people.</p> <p><i>Exercise:</i> There is strong evidence that exercise incorporating some degree of balance training is effective in reducing falls rates in older people. In addition, multi-component group and customised home exercise programs, balance programs and Tai Chi have been shown to reduce falls rates in relatively frail through to relatively well older people. Reductions in bone mineral studies have been achieved through walking, aerobic and resistance training programs. These may also have the potential to reduce risk of fractures in older people.</p> <p><i>Environmental safety:</i> There is some evidence to suggest that home hazard assessment and modification programs may be effective in reducing falls, particularly when undertaken by trained health professionals (for example, OTs) and when targeting those at risk of falls. There is no evidence to date which suggests modifications to reduce environmental falls hazards in either the home or public spaces in isolation are effective in reducing falls rates.</p> <p><i>Multiple intervention strategies:</i> Targeted multiple intervention strategies, based on comprehensive assessment, appear to be effective in reducing fall rates of older people with a <b>moderate risk of falling</b>. There is no evidence to suggest untargeted multiple strategies are effective in reducing fall rates.</p> <p>Costs were assessed in four studies. Costs appeared generally lower in intervention groups than control groups.</p>

<b>Author's conclusions</b>	<p><i>Recommendations for practice:</i></p> <p>There is considerable evidence that a reduction in falls rates is achieved through targeted home exercise programs, group exercise programs incorporating balance, strength, mobility and fitness exercises, group exercise programs (particularly Tai Chi), trained volunteers providing in home health information, home visits by an occupational therapist, and enhanced post-discharge follow-up for older people with functional or mobility decline. A falls prevention program targeting multiple risk factors is more likely to be effective. Specialised assessment followed by a targeted management approach or combination of falls prevention strategies are also more likely to be effective. There is a paucity of research investigating the effectiveness of falls prevention programs in reducing serious injuries or fractures from falls. These are a rare event.</p> <p><i>Recommendations for research:</i></p> <p>Areas needing further research include: methods to improve uptake and ongoing participation; early identification of falls risk; training of health workers in fall risk factor screening and management protocols; comparative effectiveness of different types and intensity of exercise programs; analysis of sub-group characteristics (for example, compliance levels and degree of response to intervention); and cost-effectiveness.</p>
<b>Quality</b>	STRONG: 10
<b>Comments</b>	<p>The authors note that several RCTs of falls prevention programs for older people in the community in Australia were nearing completion.</p> <p>Studies from all levels of evidence were collected. It appears that only evidence from RCTs was included in the summaries although this is not clearly articulated</p> <p>Only interventions focusing on health promotion principles were included in this summary.</p>
<b>Available at</b>	<p><a href="http://www.health.gov.au/internet/wcms/publishing.nsf/Content/health-publth-publicat-document-falls_community-cnt.htm/\$FILE/falls_community.pdf">http://www.health.gov.au/internet/wcms/publishing.nsf/Content/health-publth-publicat-document-falls_community-cnt.htm/\$FILE/falls_community.pdf</a></p>

## Population based interventions for the prevention of fall-related injuries in older people

<b>Title</b>	Falls: the assessment and prevention of falls in older people
<b>Authors</b>	NICE: Clinical Guideline 21
<b>Date</b>	2004
<b>Participants</b>	Older people (not defined)
<b>Description of studies</b>	<p>Multifactorial interventions: include strength and balance training, home hazard assessment and intervention, vision assessment and referral and medication review with modification/withdrawal.</p> <p>Multifactorial falls risk assessment: include identification of falls history, assessment of gait, balance and mobility, and muscle weakness</p>
<b>Results</b>	<p><b>Category A evidence</b></p> <p><i>Multifactorial interventions</i></p> <p>Evidence suggests that all older people with recurrent falls or assessed as being at risk of falling should be considered for an individualised multifactorial intervention. After a fall, older people should be offered a multidisciplinary assessment to identify and address future risk. They should then be offered an individualised program aimed at promoting independence and improving physical and psychological function.</p> <p><i>Strength and balance training</i></p> <p>Evidence recommends strength and balance training, particularly for older community-dwelling people with a history of recurrent falls and/or balance and gait deficiency. Training should include muscle strengthening and balance exercises. Program should be individually prescribed and monitored by an appropriately trained professional.</p> <p><i>Exercise in extended care settings</i></p> <p>Evidence recommends that multifactorial interventions with an exercise component should be conducted for older people in extended care settings who are at risk of falling.</p> <p><i>Home hazard safety intervention</i></p> <p>Evidence recommends that older people who have received hospital treatment for a fall should be offered a home hazard assessment and safety intervention/modification by a trained health care professional. Assessment effective only in conjunction with follow-up and intervention implementation.</p> <p><b>Category B evidence</b></p> <p><i>Psychotropic medications</i></p> <p>Evidence states that older people on psychotropic medications should have them reviewed and discontinued if possible. Specialist input may be appropriate.</p> <p><i>Cardiac pacing</i></p> <p>Evidence states that cardiac pacing should be considered for older people who have experienced unexplained falls and who have cardioinhibitory carotid sinus</p>

---

hypersensitivity.

### **Category C evidence**

#### *Multifactorial falls risk assessment*

Evidence suggests multifactorial falls risk assessment should be offered to older people who present for medical attention because of a fall in the last year or demonstrate abnormalities of gait and/or balance. Assessment should be performed by a healthcare professional with appropriate skills/experience (for example, specialist falls service). Assessment should be part of individualised, multifactorial intervention.

#### *Case/risk identification*

Older people in contact with a healthcare professional should be asked whether they have fallen in the past year. If so, they should be asked about frequency, context and characteristics of falls. Older people at risk of falling or who have reported a fall should be observed for balance and gait deficits and considered for their ability to benefit from interventions to improve strength and balance.

### **Category D evidence**

#### *Encouraging participation of older people in falls prevention programs*

All health professionals who deal with patients known to be at risk of falling should develop and maintain basic professional competence in falls assessment and prevention.

List of what should be contained in oral information should be provided.

#### *Education and information giving*

Consider: healthcare professionals involved in the assessment and prevention of falls should discuss changes a person might make to prevent falls, information in languages other than English, programs should address potential barriers (for example, low self-efficacy, fear of falling) and should encourage activity change as negotiated with the participant. Flexibility should be incorporated (needs and preferences) and should promote the social value of the programs.

#### *Interventions that cannot be recommended include:*

- Brisk walking.

#### *Interventions that cannot be recommended because of insufficient evidence include:*

- Low intensity exercise combined with incontinence programs
  - Group exercise (untargeted, not individually prescribed)
  - Cognitive/behavioural interventions
  - Referral for correction of visual impairment
  - Vitamin D
  - Hip protectors.
-



---

<b>Author's conclusions</b>	<p><i>Implications for practice:</i></p> <p>Key priorities for implementation include:</p> <ul style="list-style-type: none"> <li>• Case/risk identification</li> <li>• Multifactoral falls risk assessment</li> <li>• Multifactoral interventions</li> <li>• Encouraging participation of older people in falls</li> <li>• Professional education.</li> </ul> <p><i>Implications for research:</i></p> <ul style="list-style-type: none"> <li>• Need further analysis of existing trial data</li> <li>• Include cost-effectiveness in trials</li> <li>• Evaluation of multi-agency falls prevention programs</li> <li>• Research into optimal methods of risk assessment</li> <li>• Trials investigating falls prevention in older people with cognitive impairment and dementia</li> <li>• Trials to test effectiveness of hip protectors.</li> </ul>
<b>Quality</b>	STRONG: 10
<b>Comments</b>	This is a high quality review that considers a range of evidence. including good practice evidence
<b>Available at</b>	<a href="http://www.nice.org.uk/page.aspx?o=233391">http://www.nice.org.uk/page.aspx?o=233391</a>

---

## Population based interventions for the prevention of fall-related injuries in older people

<b>Title</b>	Physical Activity Interventions to Prevent Falls among older people: Update of the Evidence.
<b>Authors</b>	Sherrington C, Lord SR, Finch CF.
<b>Date</b>	2004
<b>Participants</b>	Elderly, older people. No specific age given. Both males and females were included in the interventions.
<b>Description of studies</b>	<p>Six published systematic reviews addressing the effects of physical activity/exercise interventions for falls prevention were found plus three further RCTs were located and included.</p> <p>Data from untargeted exercise interventions (that is, interventions not individually prescribed) for groups of older community-dwelling people were compared with non-intervention control groups. Women who previously had an upper limb fractures were asked to walk for 40 minutes three times a week, and people at increased risk of falls undertook group exercise. Institutional care consisted of resistance and endurance training, Tai Chi and/or physiotherapy. Targeted or individually tailored programs of muscle strengthening, balance exercises and a walking plan delivered by trained health professionals were compared to a non-intervention control in three studies. Group based exercise interventions were coupled with home hazard modification and management of reduced vision interventions. Older adults who had fallen in the past were referred to be assessed for risk factors for falling, and those with specific risk factors should be offered interventions tailored to these risk factors. Residential aged care setting compared low intensity, functionally orientated exercise with usual care practices.</p>
<b>Results</b>	<p>Exercise when combined with risk factor modification had a greater impact than exercise alone. Resistance and endurance training or Tai Chi alone had no significant effects when compared to a control. Targeted programs demonstrated an effect on falls over a one year period (pooled RR 0.80, 95% CI 0.66-0.98) while untargeted programs had a non-significant effect (pooled RR 0.89, 95% CI 0.78-1.01). Institutional care did not show an effect on falls. (RR 1.02, 95% CI 0.74-1.41).</p> <p>Group based interventions were found to be most effective (RR 0.89 95% CI 0.73-1.08) and falls were reduced when exercise was combined with home hazard management (RR 0.84, 95% CI 0.69-1.03) or impaired vision management (RR 0.76, 95% CI 0.62-0.95).</p> <p>Residential aged care showed a slight trend towards a benefit (RR 0.62 95% CI 0.37-1.06)</p>

<b>Author's conclusions</b>	<p>The authors concluded that exercise has many proven benefits but the optimal type, duration and intensity remains unclear. Older persons who have recurrent falls should be offered long term exercise and balance training.</p> <p>There is clear evidence of the tailored exercise programs, which involves muscle strengthening, balance and walking plans, being effective in falls prevention. Targeted, supervised, home based exercise programs prescribed by trained professionals can prevent falls among older persons. There is also evidence that suggests untargeted group exercise can prevent falls, particularly if the exercise involves challenging their balance. Further investigation is needed to establish the effects of exercise in residential care.</p>
<b>Quality</b>	WEAK: 2
<b>Comments</b>	<p>This is a high quality review. A range of evidence considered including good practice evidence.</p> <p>It is difficult to ascertain and compare the amount of physical activity included in the interventions.</p>
<b>Available at</b>	<a href="http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&amp;db=PubMed&amp;listuids=15214601&amp;dopt=Citation">http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&amp;db=PubMed&amp;listuids=15214601&amp;dopt=Citation</a>

## Population based interventions for the prevention of fall-related injuries in older people

<b>Title</b>	Interventions for preventing falls in elderly people (Cochrane review)
<b>Authors</b>	Gillespie LD, Gillespie WJ, Robertson MC, Lamb SE, Rowe BH
<b>Date</b>	2003
<b>Participants</b>	Elderly individuals of either sex living in the community or in institutional care. Characteristics of interest include falling status at entry, residential status, associated co-morbidity (where appropriate). Trials in hospital settings were included if participants were elderly. Subjects who had experienced a stroke were excluded.
<b>Description of studies</b>	<p>Randomised controlled trials were included in this review. This included trials where method of allocation to treatment or control group was inadequately concealed.</p> <p>Interventions included: exercise/physical therapy interventions, home hazard modification, cognitive/behavioural interventions, medication withdrawal/adjustment, nutritional/vitamin supplementation, hormonal and other pharmacological interventions, referral for correction of visual deficiency, cardiac pacemaker insertion for syncope-associated falls, exercise, visual correction and a home safety intervention, multidisciplinary, multifactorial, health/environmental risk factor screening and intervention, system modifications to prevent falls in high risk hospital patients, and multifaceted interventions in nursing home residents.</p>
<b>Results</b>	<p>Sixty two trials involving 21,668 people were included.</p> <p><i>Interventions likely to be beneficial:</i></p> <ul style="list-style-type: none"> <li>• Multidisciplinary, multifactorial, health/environmental risk factor screening/intervention programmes in the community for: <ul style="list-style-type: none"> <li>• an unselected population of older people (4 trials, 1651 participants, pooled RR 0.73, 95%CI 0.63-0.85)</li> <li>• older people with a history of falling or selected because of known risk factors (5 trials, 1176 participants, pooled RR 0.86, 95%CI 0.76-0.98), and</li> <li>• older people in residential care facilities (1 trial, 439 participants, cluster-adjusted incidence rate ratio 0.60, 95%CI 0.50-0.73)</li> </ul> </li> <li>• A program of muscle strengthening and balance retraining, individually prescribed at home by a trained health professional (3 trials, 566 participants, pooled relative risk (RR) 0.80, 95% confidence interval (95%CI) 0.66-0.98). Home hazard assessment and modification that is professionally prescribed for older people with a history of falling (3 trials, 374 participants, RR 0.66, 95% CI 0.54-0.81)</li> <li>• Withdrawal of psychotropic medication (1 trial, 93 participants, relative hazard 0.34, 95%CI 0.16-0.74)</li> <li>• Cardiac pacing for fallers with cardioinhibitory carotid sinus hypersensitivity (1 trial, 175 participants, WMD -5.20, 95% CI 0.94-1.00)</li> <li>• A 15 week Tai Chi group exercise intervention (1 trial, 200 participants, risk</li> </ul>

---

ratio 0.51, 95%CI 0.36 to 0.73).

*Interventions of unknown effectiveness:*

- Group-delivered exercise interventions (9 trials, 1387 participants)
- Individual lower limb strength training (1 trial, 222 participants)
- Nutritional supplementation (1 trial, 46 participants)
- Vitamin D supplementation, with or without calcium (3 trials, 461 participants)
- Home hazard modification in association with advice on optimising medication (1 trial, 658 participants), or in association with an education package on exercise and reducing fall risk (1 trial, 3182 participants)
- Pharmacological therapy (raubasine-dihydroergocristine, 1 trial, 95 participants)
- Interventions using a cognitive/behavioural approach alone (2 trials, 145 participants)
- Home hazard modification for older people without a history of falling (1 trial, 530 participants)
- Hormone replacement therapy (1 trial, 116 participants)
- Correction of visual deficiency (1 trial, 276 participants).

*Interventions unlikely to be beneficial:*

- Brisk walking in women with an upper limb fracture in the previous two years (1 trial, 165 participants).

---

*Implications for practice:*

Falls prevention programs should consider interventions which target both intrinsic and environmental risk factors of individuals. Careful economic modelling should occur as the benefits (in terms of numbers of falls causing injury or requiring medical care) can be small. In addition the authors acknowledge that in view of the relatively small protective effects which may be present and the limited nature of the evidence, new intervention programs should be robustly evaluated.

Implications for research:

- Trials should be large enough to be meaningful
- Unit of analysis should be the same as unit of randomisation
- Need to develop taxonomy of interventions and outcomes
- Studies should explore impact on serious injuries (such as fractures) from falls
- Apparently effective interventions may require re-evaluation in different healthcare systems
- More RCTs needed in nursing homes and hospitals to test effectiveness of falls prevention interventions
- Economic evaluation of interventions should be encouraged.

**Author's conclusions**

---

**Quality**

HIGH:10

---

**Comments**

This is a high quality yet complex review. It is, at times, hard to make judgements about effectiveness of interventions. Authors have included a commencing summary which is helpful.

---

**Available at**

[www.thecochranelibrary.com](http://www.thecochranelibrary.com)

---

## **Overarching issues identified in this report**

This project sought to develop evidence-based recommendations in falls prevention in adults aged 65 years and older. In doing so, we have developed a model by which evidence-based recommendations could be developed across a range of population health issues. This model seeks to support the development of recommendations which are informed by evidence but also consider the contexts within which programs operate. This is crucial in terms of supporting the applicability and transferability of evidence into policy and practice.

While a formal debrief of the project methods and outcomes is yet to occur there are some preliminary learnings from this project. The trial of this model has revealed that the model works best where questions are refined. It is likely to be problematic where the questions to be addressed are multifaceted. Communication has emerged as the most important process in developing evidence-based recommendations using this model. This can be burdensome so further use of the model should ensure that communication strategies are established at the outset. It is important to gather views and perceptions early on in the process to ensure that draft recommendations are likely to meet the needs of end-users. Communication about the project is also vital to ensure that all involved are aware of the benefits, boundaries and limitations of such an approach. Broad ownership of the process is central to the development of applicable, transferable recommendations.

### **Decision-making and partnership development**

A common theme was the need for partnership development. This was seen to be particularly important given the Area Health Service structure within Queensland Health. Other government departments have different geographical structures. Working within Areas or Districts to develop partnerships has helped to break down some of the barriers inherent in these structures. However, many informants identified the need for leadership in population health at both Area levels and centrally. It was suggested that additional leadership would help support decision-making and thus action at a local level. Generalist practitioners are often working within Areas and Districts in specialised areas such as injury prevention. While overall direction for injury prevention may be provided by Population Health Branch, direct line management occurs within these localised structures. This presents challenges both for Population Health Branch in understanding local action, and at local levels in ensuring practitioners and teams are well supported. This also has implications for coordinated action.

Some Areas have developed methods for partnership development which should be shared. Critical reflection of these processes should occur to establish frameworks which broadly may be replicable across Area Health Services. A balance between action oriented strategies, and time allowed for partnership development, is important in improving population health outcomes. As Queensland Health is inherently complex, it is important for partners to be well engaged at the appropriate levels to ensure relationships are supported. In addition, it is important for external partners to know where in Queensland Health they should develop partnerships.

### **Engagement with evidence**

The degree to which evidence is used to inform practice varied considerably amongst Population Health informants. While some felt there was a high level of engagement, others felt evidence was used only to provide a rationale for action (needs based) rather than

strategy guidance (evidence based). For example, physical activity programs may be used in falls prevention without an exploration of the type and mode of delivery most likely to be effective. This is also a limitation of the published literature. Often program components are not adequately discussed. It may be important therefore to provide skill development in assessing applicability and transferability. There is also an absence in the communication of how the evidence base is used to select interventions. To avoid this problem, it would be helpful to explicitly state the source of the evidence and its level of quality. Whenever possible, as in this report, evidence should be obtained from systematic reviews.

Several barriers to using evidence were identified. In particular, informants felt the action orientation of practitioners and decision-makers can mean that research or reading is not prioritised. Without a central repository, practitioners were often responsible for conducting literature reviews although these were conducted within time and skill constraints. In some cases, single pieces of evidence were being used to inform decision-making. Skills in finding, interpreting and using research to inform practice were also acknowledged as challenges. One of the greatest barriers is a lack of rigorous research. Many were unsure how to deal with this issue. While most informants acknowledged the need to learn from relevant research, the need for innovation was acknowledged too. This highlights the need to support innovative pilot projects, informed by evidence (even if limited), and their subsequent evaluation. It is crucial that action continue to be supported and rigorously evaluated even in areas where evidence is limited.

The need for quick reference guides to potential interventions to support decision-making was acknowledged by many respondents. These would be useful internally, to support selection from a suite of options, and in working with partners to highlight areas for action. When producing evidence based resources, both electronic and paper copies should be available. Recommendations need to be framed in a way that clearly allows the stakeholders to see the fit. Strategies based primarily upon a high prevalence or need, without a strong evidence base for effectiveness of the intervention, should be identified as ‘needs based, requiring evaluation. This approach will assist in building sustainability and increase the number of interventions suitable for adoption by adding to the evidence base. Typically the evaluation will represent only a small proportion of the total expenditure on the program. Evaluation can be cost-effective as potentially it can result in minimising the adoption of programs of dubious quality or effectiveness. It will also be useful to consider the adoption of a Health Technology Assessment framework as a means to evaluate interventions and ascertain their value for money in relation to other services that Queensland Health currently provides. A settings approach that considers the social determinants of health was also seen as important to implementing potentially effective health strategies.

## **Limitations**

There are several limitations to this process which should be acknowledged. Systematic reviews often do not include sufficient information about who interventions work for and why. This information is reported in discussions and summary tables where it was available. It is still possible to assess applicability and transferability of interventions. This tool has assisted in the development of evidence based recommendations that are applicable to the Queensland context.

While cost-effectiveness of interventions is important in supporting decision-making this information is often not included in either primary studies or systematic reviews. Where cost

data has been recorded it has been reported. When selecting an intervention or suite of interventions it may be useful to consult a health economist to assist with cost-effective roll out. The recommendations are made with resource limitations considered.

There is also a lack of detail about program components included in primary studies and systematic reviews. In an ideal world, the process undertaken during this project would be repeated for each intervention. This is generally not feasible. The recommendations have sought to include as much detail about program components as possible. This has been complicated by the broadly defined topics. Some individual studies may need to be assessed in order to identify key program components.

This project was also limited by the number of key informant interviews. It was not possible to interview some nominated key informants as they were unavailable during the study period. The project team have attempted to address this issue by encouraging wide consultation on draft reports. It may be useful to conduct a mapping of the projects identified during this process against the available evidence to identify work that is evidence based, work that is innovative, and to identify gaps and opportunities for further action.



## Conclusion

This project has two main specified outcomes. The first is the development of recommendations to inform policy development and local implementation. These recommendations draw on evidence from systematic reviews and local experience and expertise. As falls prevention in older adults is well defined, it was possible to conduct a comprehensive review of the available evidence and provide strategic recommendations.

The second outcome was to trial a process for the development of evidence based recommendations that consider local context. The process has been informed and strengthened by a range of tools/frameworks in particular the knowledge translation framework developed by Swinburn et al<sup>[7]</sup>. This process has been conducted in a transparent way to ensure that it is replicable across other population health priorities. The development of evidence based recommendations is a complex but necessary part of decision-making process to inform policy and practice. This project has contributed to the development of a model to assist in the translation and exchange of knowledge into policy and practice.

Overall, it is important to remember that it is a novel approach to use explicit methods to examine and synthesise both the context for policy and program decision-making with the available evidence on the effectiveness of interventions. The experience of doing so in this process was extremely positive and constructive, largely due to the willingness of Queensland Health to be open to the process and committed to this approach. The explicit consideration of evidence does highlight the gaps in the evidence base and the opportunities for organisations like government to make a substantive contribution to filling these gaps. The authors urge Queensland Health to contribute its significant programmatic effort to the evidence base in order to strengthen the public health evidence with what works in primary prevention. Further, the information contained in this report provides recommendations for a way forward. It would be valuable to review the utility of both the approach and content, and processes, over time.

## Appendix 1. Key informants

	All topics	Falls in older persons
<b>Population health</b>	A/Deputy CHO, ED PHB D HPU D CAPHS D TPHN D PDU Manager HP – Southern Manager HP – Tropical Manager HP – Central Coordinating Epidemiologist	PHU teleconference Central PHU teleconference South Paul Vardon - Health Promotion Unit Kate Smith - Health Promotion Unit Phil Carswell – Health Promotion Unit Sue Jones in Wide Bay
<b>Community Health</b>		Clarissa Schmierer, North Burnett Community Health–Acting Coordinator Brett Cowling Dir CH Townsville
<b>Other Queensland Health</b>		Vanessa Gregory, HACC Resource Centre Rebecca Bell, Patient Safety Centre
<b>Other Government</b>		Peta Jervois, Dept of Communities (Office of Seniors) David Livingston, Local government
<b>NGO</b>	Linda Bailey, Division of GP	

	<b>All topics</b>	<b>Falls in older persons</b>
<b>Academic</b>		Prof Rod McClure, Griffith University

## Appendix 2. List of questions for key informants

In order to ensure that the recommendations meet the needs of Population Health the following questions were asked of key informants.

1. What is the role of your section of Queensland Health in delivery and/or facilitation in [topic areas]
2. What other government departments have a role to play?
  - a. State government
  - b. Local government
3. What other community organisations have a role to play
4. What programs/interventions are being planned or implemented?
5. What is the current and planned human and financial capacity?
6. Which programs/interventions have (or are) worked well and what were their reasons, critical success factors?
7. Have programs/interventions not worked in the past? If so, what are the reasons or major barriers?
8. How is sustainability of programs ensured?
9. What is the context for the work being undertaken?
10. What influences decision-making and priority setting?
11. What is the level of engagement with research evidence and what types of evidence is being consulted and/or used in intervention development and implementation?
12. What is the level of interaction with other sectors
13. What are the preferences for presentation of evidence? [we will go through some examples which will include summaries, reviews, etc]

The following questions were asked of those informants external to Population Health Department, Queensland Health.

1. What is your role in [topic area]?
2. What is your interaction with Population Health? Or the health sector? Or other sectors?
3. What is your current and planned activity?
4. How are programs planned and what influences decision-making?
5. What is your involvement in [topic area]?
6. What are the key areas for investment? [for each topic area]
7. How can programs/actions be influenced?

## Appendix 3. Search terms

In falls prevention, the search strategy was based on a search that was developed for the Cochrane review.

- #1 old\*
- #2 elder\*
- #3 senior\*
- #4 #1 or #2 or #3
- #5 strateg\*
- #6 intervention\*
- #7 prevent\*
- #8 program\*
- #9 campaign\*
- #10 #5 or #6 or #7 or #8 or #9
- #11 trauma\*
- #12 fracture\*
- #13 wound\*
- #14 injur\*
- #15 #11 or #12 or #13 or #14
- #16 fall\*
- #17 stumble\*
- #18 trip\*
- #19 slip\*
- #20 #16 or #17 or #18 or #19
- #21 #4 and #10 and #15 and #20
- #22 #4 and #10 and #20

Both text words and MESH heading will be incorporated as test searching commences

# Appendix 4. Appraisal Tool

## Validity Tool Review Articles



First Author: \_\_\_\_\_  
 Year: \_\_\_\_\_  
 Journal: \_\_\_\_\_  
 Reviewer: \_\_\_\_\_

Instructions for completion: Please refer to the attached dictionary for definition of terms and instructions for completing each section. For each criteria, score by placing a check mark in the appropriate box.

CRITERION		YES	NO
1. Did the authors have a clearly focused question [population, intervention (strategy), and outcome(s)]?			
2. Were appropriate inclusion criteria used to select primary studies?			
3. Did the authors describe a search strategy that was comprehensive? (Circle all strategies used)			
health databases                      handsearching psychological databases              key informants social science databases              reference lists educational databases                  unpublished other _____			
4. Did search strategy cover an adequate number of years?			
<b>For questions 5, 6, and 8, please choose the column relating to the appropriate methodology. Strike a line through the column that does not apply.</b>			
5. <i>Quantitative reviews:</i> Did the authors describe the level of evidence in the primary studies included in the review? Level I (RCTs only) Level II (non-randomized, cohort, case-control studies) Level III (uncontrolled studies)		5. <i>Qualitative reviews:</i> Do the authors provide a clear description of the range of methods in each of the primary studies included in the review?	
6. <i>Quantitative reviews:</i> Did the review assess the methodological quality of the primary studies, including: (minimum requirement: 4/7 of the following) <ul style="list-style-type: none"> <li>▪ research design</li> <li>▪ study sample</li> <li>▪ participation rates</li> <li>▪ sources of bias (confounders, respondent bias)</li> <li>▪ data collection (measurement of independent/dependent variables)</li> <li>▪ follow-up/attrition rates</li> <li>▪ data analysis</li> </ul>		6. <i>Qualitative reviews:</i> Did the review assess the methodological quality of the primary studies, including: (minimum requirement: 4/7 of the following) <ul style="list-style-type: none"> <li>▪ suitability of methodology/paradigm to the research question</li> <li>▪ sampling (selection of participants/settings /documentation)</li> <li>▪ clear description of context, data collection and data analysis</li> <li>▪ rigor: i)audit trail ii)some coding by 2 or more coders, if appropriate iii)deviant case analysis (negative cases) iv)respondent validation (member checking)</li> <li>▪ triangulation</li> <li>▪ reflexivity (researcher and research process)</li> <li>▪ relevance (credibility, consistency, applicability, transferability)</li> </ul>	
7. Are the results of the review transparent?			
8. Quantitative review: Was it appropriate to combine the findings of results across studies?	8. Qualitative review: Is there a description of how reviewers determined results were similar enough across studies to compare or combine them?		
9. Were appropriate methods used for combining or comparing results across studies?			
10. Do the data support the author's interpretation?			

TOTAL SCORE: \_\_\_\_\_

QUALITY RATING (circle one)

(total score 7-10)  
STRONG

(total score 5-6)  
MODERATE

(total score 4 or less)  
WEAK

## Appendix 5. Description of Falls Prevention Projects

The following information is sourced from Queensland Health Falls Prevention Implementation Guide <sup>[87]</sup>

**Stepping Out**, Townsville, is a program coordinated by a multidisciplinary committee which aims to provide sustainable strategies that increase community awareness of falls in older people (55+ years), their frequency and severity, and to introduce preventive measures to reduce both the financial and social impact of falls on the community. For further information, contact Health Promotion Services, Tropical Public Health Unit Network (07) 4750 4000.

**Stay on Your Feet Wide Bay** – Falls prevention in older people injury research and prevention project: 2001-2006. This project aims to develop, trial and evaluate cost-effective and sustainable interventions aimed at reducing falls and subsequent injury among persons over 60 years in the general community in Wide Bay/Burnett, Queensland. A community based model is being used which involves multisectoral collaborative partnerships, building community capacity and individual skills. The project focuses predominantly on both physical activity, and awareness and information on risk behaviours and solutions. However, the community based model employed also allows for other priorities to be followed in individual communities to enhance the community engagement/ownership process. Telephone: 41977260. More information is available at [www.ipca.com.au](http://www.ipca.com.au) or [www.safecommunitiesqld.org](http://www.safecommunitiesqld.org)

**Steady Steps** is a gentle exercise program for older adults developed within a context of active ageing by Fitness Queensland as a collaborative project with Queensland Health, and Sport and Recreation Queensland Active Ageing Committee. Registered fitness instructors offer a ten week community program which aims to increase older person's awareness and knowledge of the risk of falling, improve their perception in relation to the prevention of falls and develop a sense of community among the participants. Contact Fitness Queensland on telephone: (07) 3876 6522

**Life Steps** is a similar program to Steady Steps developed for instructors not trained in delivering fitness programs, while Raging Ageing is a graduation program. Contact Active Wellness (07)3269 4975

The Bayside Health Service District, HACC, Public Health Services and the University of Queensland have trialled a training program for HACC primary health care providers in relation to falls prevention. Development of the Falls Management Guidelines, Community Coordinated Care Map aims to provide a falls management guide for health professionals responsible for the timely management of falls in older people (both within the hospital system and the community), and to deliver a coordinated service to older people who have had falls, or are at risk of falling. Contact Bayside Aged & Disability Help Line – 3(07) 3488 4226.

## References

1. Department of Health (WA), *About stay on your feet WA*. 2005.
2. Murphy, B., *In search of the fourth dimension of health promotion*, in *Understanding health: a determinants approach*, H. Keleher and B. Murphy, Editors. 2004, Oxford University Press: Melbourne.
3. health-evidence.ca, *Validity tool: review articles*. 2003, health-evidence.ca.
4. Queensland Health, *Population Health Strategic Plan 2007-2012*. 2007, Queensland Health: Brisbane.
5. Lynch, J.W., *Social-epidemiology some observations on the past, present and future*. *Australasian Epidemiology*, 2000. **7**: p. 7-15.
6. Queensland Health, *Understanding Population Health's role in Health Promotion*. n.d., Population Health, Queensland Health: Brisbane.
7. Swinburn, B., Gill, T., and Kumanyika, S., *Obesity prevention: a proposed framework for translating evidence into action*. *Obes Rev*, 2005. **6**(1): p. 23-33.
8. Davies, P. *Workforce development to support evidence-informed public health*. in *Cutting Edge Debates*. 2005. VicHealth, Melbourne.
9. Wang, S., Moss, J.R., and Hiller, J.E., *Applicability and transferability of interventions in evidence-based public health*. *Health Promotion International*, 2005. **21**(1): p. 76-83.
10. Hill, K., Vrantzidis, F., Haralambous, B., Fearn, M., Smith, R., Murray, K., Sims, J., and Dorevitch, M., *An analysis of research on preventing falls and falls injury in older people: community, residential care and hospital settings*. 2004, Commonwealth Department of Health and Ageing: Canberra.
11. World Health Organization, *Strengthening Mental Health Promotion: WHO Fact Sheet No. 220*. 1999, World Health Organization: Geneva.
12. Australian Health Ministers, *National Mental Health Plan 2003-2008*. 2003., Australian Government: Canberra.
13. VicHealth, *Mental health promotion plan 1999-2002*. 1999, Victorian Health Promotion Foundation, Victorian Survivors of Torture: Melbourne.
14. Keleher, H. and Armstrong, R., *Evidence-based mental health promotion resource*. 2005, Department of Human Services and VicHealth: Melbourne.
15. Social Health Reference Group for National Aboriginal and Torres Strait Islander Health Council and National Mental Health Working Group, *A National Strategic Framework for Aboriginal and Torres Strait Islander Peoples' Mental Health and Social and Emotional Well Being 2004-2009*. 2004, Australian Health Ministers' Advisory Council: Canberra.
16. Queensland Health, *Falls prevention in older people 2002-2006: statewide action plan*. 2002, Queensland Government: Queensland.
17. Queensland Department of Communication and Information, L.g.a.P., *Recent population and housing trends in Queensland*. 1999, Queensland Government: Brisbane.
18. Queensland Injury Surveillance Unit, *Falls in the older Queensland population: injury bulletin*. 2004, Queensland Injury Surveillance Unit: Brisbane.
19. Queensland Health, *Falls prevention best practice guidelines: implementation workbook*. 2002, Queensland Health: Brisbane.
20. National Public Health Partnership, *The national falls prevention for older people plan: 2004 onwards*. 2004, National Public Health Partnership: Canberra.



21. Sanders K, Nicholson GC, Ugoni AM, Pasco JA, Seeman E, and MA., K., *Health burden of hip and other fractures in Australia beyond 2000; Projections based on the Geelong Osteoporosis Study*. Medical Journal of Australia., 1999. **177**: p. 467-470.
22. Moller, J., *Projected costs of fall related injury to older persons due to demographic change in Australia*. 2003, Report to the Commonwealth Department of Health and Ageing under the National Falls prevention for Older People Initiative: Canberra.
23. Moller, J. and Baade, P., *Changing resource demands related to fall injury in an ageing population: Queensland Report*. 2001, Injury Prevention and Health Research Consultants: South Australia.
24. Tinetti, M.E., McAvay, G., and Claus, E., *Does multiple risk factor reduction explain the reduction in fall rate in the Yale FICSIT Trial? Frailty and Injuries Cooperative Studies of Intervention Techniques*. Am J Epidemiol, 1996. **144**(4): p. 389-99.
25. Commonwealth Department of Health and Aged Care, *National falls prevention for older people initiative "Step Out with Confidence"*. 2000, Managing Innovation Marketing Consultancy Network Pty Ltd: Canberra.
26. Milligan, R., *Stay on you feet WA: 2004 falls prevention risk factor survey: highlight report*. 2004, Injury Prevention Branch, Department of Health: WA.
27. McInnes, E. and Askie, L., *Evidence review on older people's views and experiences of falls prevention strategies*. Worldviews on Evidence-Based Nursing, 2004. **1**(1): p. 20-37.
28. Yardley, L., Bishop, F.L., Beyer, N., Hauer, K., Kempen, G.I., Piot-Ziegler, C., Todd, C.J., Cuttelod, T., Horne, M., Lanta, K., and Holt, A.R., *Older people's views of falls-prevention interventions in six European countries*. Gerontologist, 2006. **46**(5): p. 650-60.
29. Yardley, L., Donovan-Hall, M., Francis, K., and Todd, C., *Older people's views of advice about falls prevention: a qualitative study*. Health Educ Res, 2006. **21**(4): p. 508-17.
30. Feder, G., Cryer, C., Donovan, S., and Carter, Y., *Guidelines for the prevention of falls in people over 65. The Guidelines' Development Group*. Bmj, 2000. **321**(7267): p. 1007-11.
31. Robertson, M.C., Campbell, A.J., Gardner, M.M., and Devlin, N., *Preventing injuries in older people by preventing falls: a meta-analysis of individual-level data*. J Am Geriatr Soc, 2002. **50**(5): p. 905-11.
32. Gardner, M.M., Robertson, M.C., and Campbell, A.J., *Exercise in preventing falls and fall related injuries in older people: a review of randomised controlled trials*. Br J Sports Med, 2000. **34**(1): p. 7-17.
33. Gregg, E., Pereira, M., and Caspersen, C., *Physical activity, falls, and fractures among older adults: a review of the epidemiologic evidence*. Journal of American Geriatrics Society, 2000. **48**(8): p. 883-893.
34. Gillespie, L.D., Gillespie, W.J., Robertson, M.C., Lamb, S.E., Cumming, R.G., and Rowe, B.H., *Interventions for preventing falls in elderly people*. Cochrane Database Syst Rev, 2003(4): p. CD000340.
35. National Institute for Clinical Excellence, *Falls: the assessment and prevention of falls in older people*. 2004, National Institute for Clinical Excellence: London.
36. McClure, R., Turner, C., Peel, N., Spinks, A., Eakin, E., and Hughes, K., *Population-based interventions for the prevention of fall-related injuries in older people*. 2005.
37. Beard, J., Rowell, D., Scott, D., van Beurden, E., Barnett, L., Hughes, K., and Newman, B., *Economic analysis of a community-based falls prevention program*. Public Health, 2006. **120**(8): p. 742-51.

38. Barnett, L.M., Van Beurden, E., Eakin, E.G., Beard, J., Dietrich, U., and Newman, B., *Program sustainability of a community-based intervention to prevent falls among older Australians*. Health Promot Int, 2004. **19**(3): p. 281-8.
39. Chang, J.T., Morton, S.C., Rubenstein, L.Z., Mojica, W.A., Maglione, M., Suttorp, M.J., Roth, E.A., and Shekelle, P.G., *Interventions for the prevention of falls in older adults: systematic review and meta-analysis of randomised clinical trials*. BMJ (Clinical Research Ed.), 2004. **328**(7441): p. 680.
40. Miles, E., Vardon, P., Carswell, P., Smith, K., Woods, E., Butler, S., Lewis, D., and Stadtmiller, T., *Steady steps evaluation report*. 2004, Health Promotion Unit, Population Health, Queensland Health: Queensland.
41. Mackenzie, L., Byles, J., and Higginbotham, N., *Designing the Home Falls and Accidents Screening Tool (HOME FAST): Selecting the items*. British Journal of Occupational Therapy, 2000. **63**: p. 260-9.
42. Foss, A.J., Harwood, R.H., Osborn, F., Gregson, R.M., Zaman, A., and Masud, T., *Falls and health status in elderly women following second eye cataract surgery: a randomised controlled trial*. Age Ageing, 2006. **35**(1): p. 66-71.
43. Harwood, R.H., Foss, A.J., Osborn, F., Gregson, R.M., Zaman, A., and Masud, T., *Falls and health status in elderly women following first eye cataract surgery: a randomised controlled trial*. Br J Ophthalmol, 2005. **89**(1): p. 53-9.
44. NSW Health Department, *A framework for building capacity to improve health*. 2001, NSW Health Department: NSW.
45. Bayer, J.K. and Sanson, A.V., *Preventing the Development of Emotional Mental Health Problems from Early Childhood: Recent advances in the field*. International Journal of Mental Health Promotion, 2003. **5**(3): p. 4-16.
46. Nicholson, J.M., Brodie, A., Carroll, J., Waters, E., and Vimpani, G., *Review of Early Interventions for Reducing Health Inequalities: Recommendations on Prenatal and Infancy Home Visiting Services in the Australian Context. Report commissioned by the Commonwealth Department of Health and Ageing for the Health Inequalities Research Collaboration, Children, Youth, and Families Network*. 2004.
47. Blackman, J., *Early Intervention: A Global Perspective*. Infants and Young Children, 2002. **15**(2): p. 11-19.
48. Young, M.E., *Investing in Young Children. World Bank Discussion Papers (275)*. 1996, The World Bank: Washington, D.C.
49. Taket, A., Beringer, A., Irvine, A., and Garfield, S., *Evaluation of the CRP violence against women initiative health projects: final report- exploring the health services contribution to tackling domestic violence*. 2004, Home Office: London.
50. Carneiro, P. and Heckman, J., *Human Capital Policy*, in *Inequality in America: What role for Human Capital Policies*, J. Heckman, A. Krueger, and B. Friedman, Editors. 2003, MIT Press: MA. p. 77-237.
51. Newman, D.L., Moffitt, T.E., Caspi, A., Magdol, L., Silva, P.A., and Stanton, W.R., *Psychiatric Disorder in a Birth Cohort Young Adults : Prevalence, Comorbidity, Clinical Significance, and New Case Incidence From Ages 11 to 21*. Journal of Consulting and Clinical Psychology, 1996. **64**(3): p. 552-562.
52. Commonwealth Government, *National Action Plan for promotion, prevention and early intervention for mental health 2000*. 2000, Commonwealth Government: Canberra.
53. World Health Organisation, *Promoting Mental Health: Evidence, Concepts and Practice. A report of the World Health Organisation, Dept of Mental Health and Substance Abuse in collaboration with the Victorian Health Promotion Foundation (VicHealth) and the University of Melbourne*. 2005, WHO: Geneva.

54. Murray, C.J. and Lopez, A.D., *The Global Burden of Disease: a comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020: A summary*, G.W.H. Organisation., Editor. 1996.
55. Queensland Health, *Queensland hospital admitted patient data collection*. 2004, Queensland Health: Queensland.
56. Sawyer, M.G., Arney, F.M., Baghurst, P.A., Clark, J.J., Graetz, B.W., Kosky, R.J., Nurcombe, B., Patton, G.C., Prior, M.R., Raphael, B., Ray, J., Whaites, L.J., and Zubrick, S.R., *Child and adolescent component of the national survey of mental health and wellbeing*. 2000, Commonwealth of Australia.
57. Magarey, A.M., Daniels, L.A., and Boulton, T.J., *Prevalence of overweight and obesity in Australian children and adolescents: reassessment of 1985 and 1995 data against new standard international definitions*. Medical Journal of Australia, 2001. **174**(11): p. 561-564.
58. Herrman, H., *The need for mental health promotion*. Australian and New Zealand Journal of Psychiatry, 2001. **35**: p. 709-715.
59. VicHealth, *A Plan for Action 2005-2007: Promoting Mental Health and Wellbeing*. 2005.
60. Fraser, M.W., *Risk and resilience in childhood*. 1997:, USA: NASW Press.
61. Commonwealth Department of Health and Ageing, *Health Fact Sheet 5 - Helping Aboriginal and Torres Strait Islander people to better health*. 2005.
62. Queensland Health, *Queensland Transcultural Mental Health Centre*. 2006, Queensland Health.
63. Green, J., Howes, F., Waters, E., Maher, E., and Oberklaid, F., *Promoting the Social and Emotional Health of Primary School-Aged Children: Reviewing the Evidence Base for School-Based Interventions*. International Journal of Mental Health Promotion, 2005. **7**(3): p. 30 - 36.
64. Merry, S., McDowell, H., Hetrick, S., Bir, J., and Muller, N., *Psychological and/or educational interventions for the prevention of depression in children and adolescents*. Cochrane Database Syst Rev, 2004(1): p. CD003380.
65. Ekeland, E., Heian, F., Hagen, K.B., Abbott, J., and Nordheim, L., *Exercise to improve self-esteem in children and young people*. Cochrane Database Syst Rev, 2004(1): p. CD003683.
66. Barlow, J. and Coren, E., *Parent-training programmes for improving maternal psychosocial health*. Cochrane Database Syst Rev, 2004(1): p. CD002020.
67. Wise, S., da Silva, L., Webster, E., and Sanson, A., *The efficacy of early childhood interventions*. 2005, Australian Institute of Family Studies. A report prepared for the Australian Government. Department of Family and Community Services: Melbourne. p. 124.
68. Thomas, H., Camiletti, Y., Cava, M., Feldman, L., Underwood, J., and Wade, K., *Effectiveness of parenting groups with professional involvement in improving parent and child outcomes*, in *Effective Public Health Practice Project*. 1999, Public Health Branch, Ontario Ministry of Health: Ontario.
69. Barnes, J. and Freude-Lagevardi, A., *From Pregnancy to Early Childhood: Early Interventions to Enhance the Mental Health of Children and Families*. 2003, Leopold Muller Centre, Department of Paediatrics and Child Health, Royal Free and University College Medical School, University College London. p. 120.
70. Durlak, J.A. and Wells, A.M., *Primary prevention mental health programs for children and adolescents: a meta-analytic review*. Am J Community Psychol, 1997. **25**(2): p. 115-52.

71. Anderson, L.M., Shinn, C., Fullilove, M.T., Scrimshaw, S.C., Fielding, J.E., Normand, J., and Carande-Kulis, V.G., *The effectiveness of early childhood development programs. A systematic review*. Am J Prev Med, 2003. **24**(3 Suppl): p. 32-46.
72. Olds, D.L. and H., K., *Review of Research on Home Visiting for Pregnant Women and Parents of Young Children*. The Future of Children HOME VISITING, 1993. **Vol. 3**(No. 3).
73. Tucci, J., Mitchell, J., and Goddard, C., *The changing face of parenting*. 2005, Australian Childhood Foundation: Melbourne.
74. Dex, S., *Families and work in the twenty-first century*. 2003, Joseph Rowntree Foundation.
75. Australian Institute of Family Studies, *Families through life: diversity, change and context*. Family Matters, 2006. **73**: p. 13-22.
76. Centre for Community Child Health, *Work and family life balance: policy brief*. 2006, Murdoch Childrens Research Institute, Royal Children's Hospital: Melbourne.
77. Pocock, B., *The Impact of the Workplace Relations Amendment (Work Choices) Bill 2005 on Australian Working Families*. 2005, Industrial Relations Victoria: Melbourne, Victoria:.
78. Weston, R., Gray, M., Qu, L., and Stanton, D., *Long work hours and the wellbeing of fathers and their families. Research paper No. 35*. 2004, Australian Institute of Family Studies: Melbourne.
79. Spurgeon, M., Harrington, J., and Cooper, C., *Health and safety problems associated with long working hours: a review of the current position*. Occupational and Environmental Medicine, 1997. **54**(6): p. 367-375.
80. Kelley, J., *Consequences of working long hours*. Australian Social Monitor, 2001. **Vol. 4**(No. 4): p. 99-102.
81. Headey, B., Warren, D., and Harding, G., *Families, incomes and jobs: a statistical report of the HILDA survey*. 2006, Melbourne Institute of Applied Economic and Social Research, University of Melbourne. A report prepared for the Australian Government Department of Families, Community services and Indigenous Affairs: Melbourne.
82. World Health Organisation, ed. *Promoting mental health: concepts, emerging evidence, practice*. ed. H. Herrman, S. Saxena, and R. Moodie. 2005, World Health Organisation: Geneva.
83. The University of Melbourne, *The household, income and labour dynamics in Australia (HILDA) survey*. 2006, The University of Melbourne, Melbourne Institute of Applied Economic and Social Research.
84. Human Resources and Social Development Canada, *Addressing work-life balance in Canada*. 2005, Human Resources and Social Development Canada, Government of Canada: Canada.
85. Human Resources and Social Development Canada, *Improving work-life balance - what are other countries doing?* 2005, Human Resources and Social Development Canada: Canada.
86. workplace.gov.au, *Work and family research*. 2006, workplace.gov.au.
87. Queensland Health, *Queensland health implementation guide to accompany the Statewide Action Plan: falls prevention in older people 2002-2006*. 2004, Queensland Government: Queensland.