Preventing Falls in Older Adults Project:

Stay Active, Stay Independent, Stay On Your Feet

A research project conducted by

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Executive Summary

1.1 Problem

Falls are the most common cause of serious injury among Queenslanders aged 60 years and over, and account for the largest proportion of all injury-related deaths and hospitalisations. From 1999 to 2002, there were 14 522 hospital separations per annum due to falls by older people, with females accounting for 69% of those hospitalised. Based on the current incidence rate, it is anticipated that the aging population will result in a doubling of the number of falls-related hip fractures reported in Queensland by 2026 and a four fold increase by 2051.[1]

The conceptualisation and examination of risk factors for falls-related injury in older people involves both intrinsic (host) and extrinsic (environmental) factors. The involvement of clinical professions in the identification and management of individual risk factors has been strong. The majority of research has been focused on the development of tools to identify individuals with a high risk of falling and the evaluation of the efficacy of clinical interventions.[2] There has been relatively little work undertaken to quantify the effectiveness of population-level interventions.[3] This has resulted in insufficient evidence to advise Governments and communities on how they can use population-based strategies to reduce the escalating burden, across health and social systems, resulting from falls and falls-related injuries.

1.2 Aim

To develop, trial and evaluate cost-effective and sustainable interventions aimed at reducing falls and subsequent injury among persons aged 60 and over years, living in the general community.

1.3 Methods

The intent of the research project was to quantify the outcomes achieved by two variations of an intervention previously implemented in northern New South Wales, that is the 'Stay on Your Feet' Falls Prevention Project. A sustainability evaluation of this community-based intervention five years post implementation had identified that, while there had been a significant improvement in the rate of falls related injuries, the project was resource intensive in its original form and the promotion of physical activity was the most enduring component.

It was hypothesised that comparable results could be achieved through a more streamlined approach focused on three priority areas: awareness-raising, physical activity, and working with health professionals. Two intervention sites were selected based on geographic and population profiles – Wide Bay/Burnett (Wide Bay) in central Queensland and North Coast in northern New South Wales (Northern Rivers). The level of willingness expressed by service providers, across all levels within the relevant health systems, to commit resources (human, financial and capital) to support further investigation was also a determining selection factor.

The two facilitating units, Northern Rivers Area Health Service in NSW and Wide Bay Population Health Unit in Queensland, adopted slightly different approaches and entry points in recognition of the level of readiness of the individual intervention communities. Northern Rivers employed targeted skill development methodologies to increase access to medium-intensity physical activity through building a skill base of relevant service providers within the health, fitness and community care sectors. Wide Bay used community development methods to increase the level of awareness and knowledge among older people and community care providers of the benefits to reducing the risk of falling through a range of preventative measures.

1.4 Findings

There was a minor and non-specific improvement in some of the risk factors for falls within the two populations studied. There was no significant improvement in falls-related injury. However, the project did provide valuable knowledge that can be translated into practical application both within, and through, Government and community-based systems and practices.

In Wide Bay, there were some developments in raising awareness among people aged 60 years or over as well as in developing personal skills among motivated, volunteer community members and community service providers. Some improvement was achieved in creating sustainable environments that support older people contemplating or initiating the advocated changes in behaviour. This was largely achieved through supporting Local Governments to secure substantial additional funding to build physical activity facilities and infrastructure. Efforts were also made to modify the intervention to meet the needs of local Aboriginal and Torres Strait Islander peoples.

In Northern Rivers, there was some increased awareness among older people achieved through the delivery of active ageing messages via multimedia outlets. There was some increase in the skill-

base within health, fitness and community-sector services. There was an accompanying increase in the number and frequency of opportunities for older people to access structured, medium-density exercise groups. There was no uptake by General Practitioners in incorporating the promotion of preventative measures during standard consultations with older patients; or in the referral of older people to local physical activity providers through the use of 'Active Scripts'. Linkage was established with the existing CHEGS Inc. (Community Health Education Groups Incorporated) organisation. There was no evidence of modification of the intervention to meet the needs of marginalized groups.

There was insufficient evidence to identify which components of either approach were more effective than others. In both intervention sites there was less effort directed towards advocating for changes to policies and practices that create known barriers to sustained participation in structured and/or unstructured physical activity by older community members. There was not a strong involvement in reorienting services to incorporate enablers such as establishing referral pathways between health practitioners and trained/accredited physical activity leaders; or the integration of recommended physical activity measures in standard professional development and training practices across disciplines.

1.5 Recommendations

1.5.1 Wide Bay Stay On Your Feet Project

It is recommended that:

- **ongoing falls prevention activity be integrated into core activities of the Wide Bay and Fraser Coast Health Service Districts servicing the target population**

  Wide Bay can now capitalize on the investments in awareness and information provision and personal skills training, and move its focus onto the systems changes that need to be put in place to maintain the environments supportive of the advocated behaviours. This should encompass the orientation of relevant health and community services to incorporate evidence-based practices that address generic risk factors in standard service delivery. Resources should be directed to higher level advocacy to develop and strengthen policies that institutionalize the enablers for falls prevention within the public domain. Wide Bay could consider undertaking formal sustainability analysis, and further impact and outcome monitoring over the next five years to maximize the evidence arising from existing project activity. Support for the current activity of the ambassador program needs to be reviewed in the context of the Volunteering Australia guidelines.[4]

1.5.2 State-wide Queensland falls prevention initiatives

It is recommended that:

- **the respective roles of the many agencies involved in facilitating the prevention of falls injury in older people is articulated and understood, and that health systems are reoriented accordingly**

  All older people are to a greater or lesser extent, at risk of falling. The universal / mass-strategy[5] approach provides Population Health Service providers with a sound rationale for targeting the whole population (many of whom have low or moderate risk) with universal interventions, but this approach needs to be acknowledged as providing only part of the overall response needed to address the problem of falls. This whole-of-population approach

should be integrated with the high-risk strategies currently being advocated for by clinical service providers. It is important that the respective contributions of the two approaches are explicitly valued.

- **the primary role of Population Health Units in the falls prevention context is to develop the systems which underpin supportive environments and healthy public policy**

  Population Health Units throughout Queensland need to review the dominant systems in their service delivery area and work with partners to use existing assets and associations to institutionalise strategies for implementing efficacious falls prevention countermeasures. Project activity needs to be conducted in accordance with principles outlined in *A Guide to the Project Management Body of Knowledge*[6].

- **a "second phase" falls prevention project is undertaken to quantify the extent to which falls reduction can be achieved by adopting a chronic disease/physical activity/nutrition/health aging intervention plan**

  Health and community sectors must confront the issue of efficacy versus efficiency. Population-based interventions need to be designed from conception as whole-of-population initiatives and not simply constructed by accumulating countermeasures demonstrated efficacious in individual-level trials. Trials need to be conducted using strategies that can be realistically implemented at the statewide level. The current strategic direction of Queensland Health to work with local partners across all sectors to develop local solutions for statewide priorities provides an opportunity for community-based resources to be harnessed to address many of the common risk factors for chronic conditions including falls-related injury. The effectiveness of this approach as a falls prevention initiative needs to be evaluated.

Introduction

1.6 Background

In 2001, people aged 65 years and over comprised 12.4% of the Queensland population. It is projected that by 2051, Queensland will be home to more than 1.5 million people in this age group. Falls are the most common cause of serious injury among older Queenslanders, and account for the largest proportion of all injury related deaths and hospitalisations. During the period from 1999 to 2002, there were 14 522 hospital separations per annum due to falls by older people, with females accounting for 69% of those hospitalised. Based on the current incidence rate, it is anticipated that by 2026 the aging population will result in a doubling of the number of falls-related hip fractures in Queensland and a four-fold increase by 2051. [7]

Approximately one in four (26.8%) people aged over 65 years, living in the community, experience a fall in any 12 month period[8], and one in two need medical treatment following the fall.[9] One quarter of people who fall restrict their usual activities because of an injury or fear of falling again.[10] This can lead to a reduction in mobility as well as in participation in activities of daily living, restricted social interaction and in higher levels of dependency and care.[11,12] The potential impact on the physical health and emotional well-being of older people is substantial, with associated increased demand on the health system. Falls and falls-related injury prevention is identified as a National Health Priority[13], and a priority for action by both NSW Health[14] and Queensland Health[15].

Factors that increase an individual's risk of falling are multiple and complex. There is rarely a single cause.[16] Risk factors are both proximal (effects of psychotropic medications; unsafe footwear; chronic health conditions; poor balance or gait; fear and lack of confidence as a result of a previous fall); and distal (environmental hazards; low levels of physical activity). The majority of these risks are modifiable. Well orchestrated preventive interventions have the potential to reduce the rate of falls and the demand on finite resources available across the health continuum.[17]

The conceptualisation and examination of risk factors for falls-related injury in older people includes both intrinsic (host) and extrinsic (environmental) factors. Involvement of clinical professions in the identification and management of individual risk factors has been strong. The majority of research has been focused on the development of tools to identify individuals with a high risk of falling and effective clinical interventions.[18] There has been relatively little research

quantifying the effectiveness of interventions at a population level. Evidence is weakest in regard to which components of an intervention are responsible for the observed overall effect.

A recent report, commissioned by Queensland Health, has provided an excellent summary of the most effective interventions to prevent falls and fall-related injuries in people aged 65 years and older.[19] The summary has been quoted verbatim in the text box below.

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.

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 a health professional.

Home hazard assessment and modification

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

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.

Multifaceted community-level interorganisational approaches

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

The report further notes that the following strategies, while they may be useful in combination with those mentioned above, are not supported as stand alone interventions:

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

The report also identifies the remaining as having unknown effect:

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

The Cochrane Review[3] of population-based interventions for the prevention of falls-related injuries in older people concluded that existing effectiveness studies have major methodological limitations, and that there was a lack of detail about the exact nature of the intervention. The review advocated for community trials of population based interventions with further investigation into barriers and facilitators.

There is substantial information about the causes of falls-related injury in older people and clear guidelines exist in relation to prevention at the individual level. However, there is little known about how Governments can adopt whole-of-population approaches to reduce the social and fiscal burden due to falls across their jurisdictions. Few co-ordinated, community-wide, multi-faceted initiatives have been undertaken in a controlled environment with rigorous evaluation. The only formally evaluated whole-of-population focused falls prevention intervention in Australia is the NSW 'Stay on Your Feet' project.[20]

'Stay on Your Feet' was conducted by NSW Health from 1992 to 1997 in the geographic area serviced by the former Northern Rivers Area Health Service (now known as the North Coast Area Health Service). The intervention targeted residents aged 60 years or older and achieved 22% lower incidence of self-reported falls in the targeted community compared to the control community. There was also a 20% lower rate of falls-related hospitalisations which appeared to have been sustained beyond the life of the project. An economic analysis of the intervention indicated that the project was highly cost effective, with an overall net benefit averaging $A5.4 million for avoided

hospitalisations, and $A16.9 million for all avoided direct and indirect costs. The benefit-to-cost ratio overall was 20.6:1.[21]

To further advance knowledge arising from the original intervention, the falls-prevention project, 'Stay Active, Stay Independent, Stay on Your Feet', was undertaken and evaluated in two comparable regional communities. The research was conducted by member organisations of Injury Prevention and Control (Australia) (IPCA) and funded by IPCA with finances provided by the National Health and Medical Research Council (NHMRC), universities and industry bodies. Additional financial and human resources were contributed by Queensland Health predominantly under the Quality Improvement Enhancement and the Health Promotion Queensland programs. NSW Health also provided financial and human resources as well as attracted additional funding from the Australian Government Department of Veterans' Affairs.

The intent of the IPCA research was to quantify the outcomes achieved by two variations of the original 'Stay on Your Feet'. The two intervention sites adopted slightly different approaches in recognition of the level of readiness of the target communities. The central focus on three common priority areas remained consistent in both intervention sites: awareness-raising, physical activity, and working with health professionals.

1.7 Aim

To develop, trial and evaluate cost-effective and sustainable interventions aimed at reducing falls, and subsequent injury, among persons aged over 60 years living in the general community.

2 Methods

2.1 Study Design

Two intervention sites, each with different target groups and fundamental philosophies, controlled against secular trends.

While the two interventions were implemented independently, evaluation of the impact and outcomes achieved in both sites was conducted by the one research team from the Queensland University of Technology.

2.2 Profile of the Intervention Sites

Intervention Site One: Wide Bay

The Stay On Your Feet research project took place across approximately 49 000 square kilometres in central and coastal Queensland (Figure 1). The intervention spanned twenty-one Local Government Authority areas and involved a diverse range of communities. These included large regional centres, small rural communities and coastal villages. At commencement, the Wide Bay-Burnett region had the highest proportion of people over the age of 60 years living in Queensland (21–28% cf Qld 16%). This equated to approximately 49 000 people. The area continues to attract increasing numbers of older people with this age group projected to comprise 14.6% of the Queensland population by 2016.[1]

Figure 1: Wide Bay Burnett Region

Intervention Site Two: Northern Rivers / North Coast Area Health Service

The Northern Rivers Area Health Service covers the communities of northern NSW and features a mix of large regional centres, small rural communities and coastal villages. Based on Australian Bureau of Statistics projections of population trends between 1996 and 2016, it is forecast that there will be an increase of around 27% in the general population of the Northern Rivers region. The projected increase in the 60-74 year age group is around 63% with a 67% increase in the 75 year and over age group. The estimated costs related to falls injury in the former Northern Rivers Area Health Service is projected to increase by 46% from $13.385 million in 1996 to $19.548 million in 2016.[22]

Despite clear evidence describing the value of participation by older people in the types of exercise that promote strength, balance, coordination and flexibility, there was limited access to such activities in regional and rural areas across NSW. In 2001, a physical activity provision audit, conducted through the Rural Falls Injury Prevention Program (RFIPP), indicated that there was limited or no opportunity for older people to regularly participate in such types of physical activity within selected geographic areas.

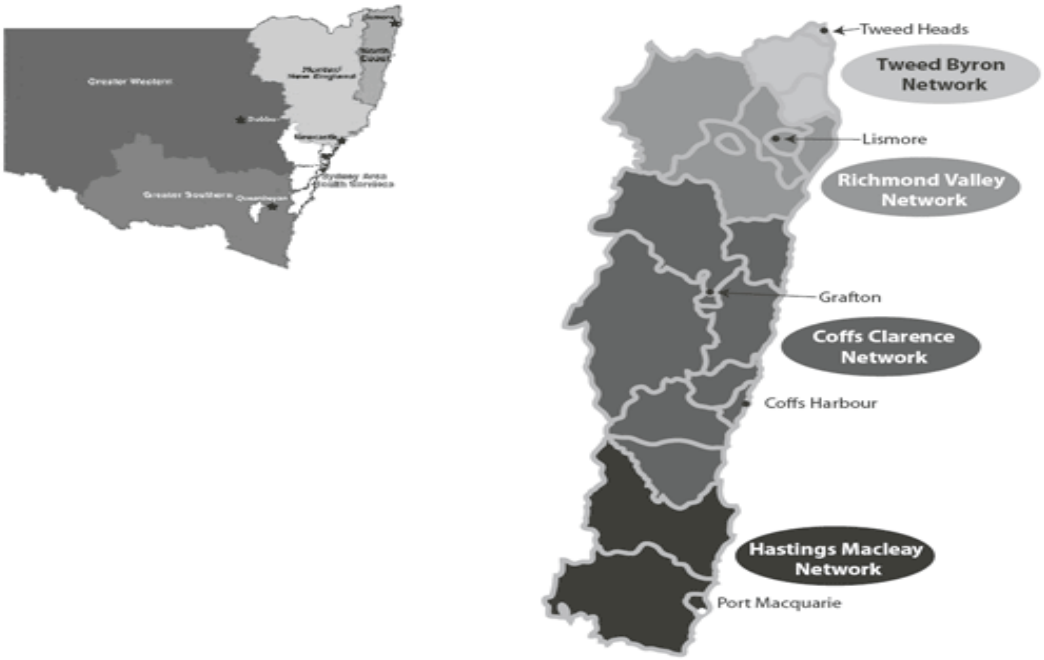


Figure 2: North Coast Area Health Service

Wide Bay

Biggenden	Burnett – Pt B
Burnett – Pt A	Eidsvold
Gayndah	Hervey Bay
Isis	Kilkivan
Kingaroy	Kolan
Maryborough	Miriam Vale
Monto	Mundubbera
Murgon	Nanango
Perry	
Wondai	
Bundaberg	
Tiaro	
Woocoo	
Cherbourg	

Northern Rivers

Balina
Byron
Richmond Valley – Casino
Kyogle
Lismore – Pt A
Lismore – Pt B
Richmond Valley– Bal
Tweed– Pt A
Tweed– Pt B
Clarence Valley – Copmanhurst
Clarence Valley – Grafton
Clarence Valley – MacLean
Clarence Valley – Nymboida
Clarence Valley – Ulmarra

Figure 3: Statistical local areas targeted by Stay On Your Feet / Stay Active Stay Independent (Boundaries of SLAs based on 2005 Australian Standard Geographical Classification)

2.3 Development and implementation of interventions.

The project officers in the two sites kept ongoing detailed information about the nature and extent of the activities undertaken throughout the intervention period. The description included principles and frameworks being used to support the activities and the level of involvement by all parties in the work being undertaken. The nature and extent of the increased capacity of individuals, organisations and structures in the community were inferred from information directly recorded by the project officers. Themes were identified and synthesized into a qualitative account of any changes in community capacity that could be attributed to the intervention.

2.3.1 Risk factor prevalence

Data on falls-related behaviours of older people living in the community were collected by a survey repeated, in Wide Bay and in Northern Rivers, during February-April in 2002 (pre-intervention) and again in 2006 (post-intervention). The survey was designed to quantify the prevalence of risk factors for falls-related injury. Questions were derived from previously validated 'Stay on Your Feet' measurement instruments, an extensive literature review, and local community consultation. The survey questionnaire was further validated by pilot-testing conducted in a non-targeted community.

To allow pre-/post- comparisons, the post-intervention survey repeated items from the baseline survey verbatim (with a few exceptions as noted). Questions addressed a range of demographic and health-related characteristics as well as knowledge and preventative behaviours including those targeted in the intervention. These were primarily: campaign awareness and physical activity; health service consultations; safe footwear; calcium intake; and home modifications.

Approximately 1600 persons were surveyed both at pre- and post-intervention in each of the two sites. The sample size was deemed adequate to permit detection of relative differences between the pre- and post-intervention surveys of 15% in self-reported incidence of falls (30% to 25.5%) and relative differences of 50% in incidence of hospitalisations due to fall injuries (3% to 2%), assuming 80% power and type I error of 5% (two-tailed). Differences of these magnitudes were considered important and of potential interest to Public Health Managers. The incidence rates were obtained from Kempton et al.[20] The sample size was selected to ensure reasonable statistical power for one of the outcome evaluations. In most cases, power was even better for the impact evaluation related to awareness, risk factors, and behaviours.

Surveys were conducted using a computer-assisted telephone interview (CATI) system. The surveys targeted people aged 60 years or older, living in the community of Wide Bay, Queensland and Northern Rivers, New South Wales. The sample was stratified by gender (50% males, 50% females) to ensure sufficient numbers in each group for sex-specific analyses. People were excluded from each of the surveys if they had a hearing disability; did not speak English; or displayed an obvious cognitive disability.

As Queensland Health conducted the pre-intervention, and the Hunter Valley Research Foundation (HVRF) the post-intervention, CATI surveys the sampling procedures varied slightly between surveys. At pre-intervention, telephone numbers were randomly selected from lists of residential telephone numbers purchased via *Australia on Disk*[23]. Previous research had shown that the proportion of households with silent numbers among this age group in regional areas was less than 5%. The HVRF randomly extracted telephone numbers from the Electronic White Pages (EWP) directory. To address the issue of silent numbers, the HVRF added a digit to the selected numbers from the EWP and cross-matched the new numbers to those identified in the Yellow Pages to remove business numbers. Both approaches are acceptable means to contact a representative, population-based sample of residents within a defined geographic region. The minor differences in contact protocols are not considered a meaningful source of variation.

Due to the cross-sectional nature of the two surveys, conventional logistic regression models were used to consider the effects of interventions on the main outcomes of falls and hospitalisations. Models were adjusted for potential confounding variables, including sex, age, education and other factors that differ significantly between the groups under comparison. Potential variations in effects among men and women, and for different age groups, were also evaluated. Similar analyses modelled the changes in attitudes and behaviours related to falls prevention. All outcomes are dichotomous variables.

Several of the falls-related indicator questions were included in the *Queensland Omnibus Surveys* conducted by Queensland Health in 2002 and 2006. This allowed for external comparison in separate models. Both the 2002 and 2006 Omnibus Telephone Surveys interviewed Queensland residents aged 18 years or older. Questions related to several public health issues including falls among older people. The 2002 and 2006 Omnibus surveys were conducted between April-June 2002 and October-November 2005, respectively. The overall response rates were 75.0% (2002 Omnibus) and 66.3% (2006 Omnibus). Only participants aged 60 years and older were asked the falls-related questions. The 2002 sub-group included 296 males (50.3%) and 292 females (49.7%). Age-group breakdowns were as follows: 60-69 years (54.4%), 70-79 years (33.3%), and 80+ years (12.3%). The 2006 sub-group included 187 males (41.5%) and 264 females (58.5%). The age-group breakdowns were: 60-69 years (47.0%), 70-79 years (35.9%), 80+ years (17.1%).

2.4 Quantifying the outcomes of the interventions

2.4.1 Self-reported falls and falls-related injury

Data on self-reported falls and falls-related injury were obtained by including five questions in the *CATI Risk Factor Survey*. These questions asked about the occurrence of a fall in the last 12 months; single versus multiple falls; fall-related injuries; fall-related hospitalisations; and medical treatment for a fall.

2.4.2 Hospital Separations

Fall-related morbidity data (hospital separations) was obtained for 1996 to 2005 from the Australian Institute of Health and Welfare. Data were aggregated as follows: age (60-64, 65-69, 70-74, 75-79,

80+ years), gender (male, female), and geographic regions (Wide Bay; Northern Rivers; Queensland; New South Wales). Changes across time in hospitalisation were analysed comparing Wide Bay and Northern Rivers trends with respect to state-wide trends.

Fall-related injuries were identified by selecting cases with either 1) an ICD-10-AM external cause code in the range W00-W19 Accidental Falls, or 2) an ICD-10-AM external cause code of X59 Exposure to Unspecified Factor in combination with an ICD-10-AM fracture injury code anywhere in the diagnosis string (from ICD-10-AM Chapter 19 Injury and Poisoning). For 1996 and 1997, ICD-9-CM was used in Australia, with the relevant ICD-9 codes backward mapped from ICD-10-AM codes using mapping tables available from the National Centre for Classification in Health[24]. Cases were categorised into two groups based on the level of precision of the ICD code ranges. The first group comprised the cases with a principal diagnosis of fracture and a fall coded as an external cause. The second group comprising those cases with either:

- a fracture as the principal diagnosis and an X59 unspecified accident coded as an external cause
- a fracture as an additional diagnosis and a fall coded as an external cause
- a fracture as an additional diagnosis and an X59 unspecified accident coded as an external cause
- a fall coded as an external cause but no fracture coded in the diagnosis string.

The hospital admission date was used to assign the year of the fall. Missing hospital admission dates were replaced by hospital separation dates (5.84% of the data). For Queensland, only six months of data were released for two years, 1996 (July to December) and 2005 (January to June), so the incidence was doubled for these years. For Wide Bay, 1996, 1997, the first five months of 1998 (January to May), and the final six months of 2005 (July to December) were unavailable. Consequently the incidence of hospital separations for 2005 was doubled, the incidence for 1998 was multiplied by 1.7 (12/7) and the years 1996 and 1997 were excluded. The imputation of data for years with partial information was considered appropriate because rates were reasonably stable over short timeframes and this minimised loss of follow-up time. Incidence rates were standardised using the average population of Australia between 1996 and 2005 (estimated resident population by single year of age, Australia; 3201.0 Population by Age and Sex, Australian States and Territories, June 2006).

2.4.3 Mortality

Mortality data were accessed from the Australian Bureau of Statistics for the years 1997 to 2004. Data from 1996 was excluded because it did not include multiple causes of death data, only underlying cause of death. Thus incident rates in 1996 are considerably less than in other years. For comparability, when looking at trends in total numbers, the 1996 data was excluded and the 1997-2004 data was focused on. Data was aggregated by: age (60-64 years, 65-69 years, 70-74 years, 75-79 years, 80-84 years, and 85 years and older) and region (Wide Bay (WB); Northern Rivers (NR); Queensland; New South Wales). The intervention sites were compared with state-wide incident rates.

Similar to the hospital separation data, mortality rates were calculated for:

- Specific causes including those cases with a W00-W19 ICD-10 Accidental Fall coded as either the underlying cause of death (UCOD) or contributory (or multiple) cause of death (MCOD).

- Non-specific causes including those cases with a fracture injury as a MCOD and an X59 unspecified accident coded as the UCOD, and those cases with a fracture injury as a MCOD and an X59 unspecified accident coded as a MCOD.

Incidence rates were standardised using the average population of Australia between 1997 and 2004 (estimated resident population by single year of age, Australia; 3201.0 Population by Age and Sex, Australian States and Territories, June 2006).

3 Results

3.1 Process

The original badging of 'Stay on Your Feet' was extended to 'Stay Active, Stay Independent, Stay on Your Feet'.

3.1.1 Overall Governance and management structure

Overall governance of the project was provided by the IPCA Board of Management through the Chief Executive Officer. Queensland Health and the Queensland University of Technology, as financial members of IPCA, had representatives on the Board of Management while NSW Health was an Associate Member without representation on the Board.

Day to day management of the implementation of interventions in the two selected sites was delegated to the relevant local senior officers: Director, Health Promotion, Population Health Services in Wide Bay Burnett and the Director, Health Promotion in the Northern Rivers Area Health Service. Accountability for the allocation of organisational resources sat with the state Director, Health Promotion Unit, Population Health Services and the Director, Health Promotion, Northern Rivers Health Service respectively. Implementation of the overarching research was managed by the Chief Investigator, School of Public Health & the Institute of Health & Biomedical Innovation, Queensland University of Technology.

A designated full-time Project Officer was employed in the Wide Bay Population Health Unit throughout the duration of the project. This position was supplemented by a part-time Administration Officer. A designated full-time Project Officer was employed in the Northern Rivers Area Health Services for the first three years of the project.

The strategies implemented in the two sites to achieve the identified objectives reflected the needs and level of readiness of the relevant intervention target populations. In Wide Bay, the intervention design and prioritisation was determined by "bottom-up" input through consultation with members of the target groups. In Northern Rivers, intervention design and prioritisation of strategies were governed by a more "top-down" structure informed through evaluation of the previous falls prevention initiative, Stay On Your Feet.

3.2 Wide Bay

3.2.1 Overview of interventions

The study began as the implementation of a predetermined set of strategies based upon an examination of both the literature and a sustainability assessment of the original 'Stay On Your Feet' project. Within the first twelve months, there was shift in emphasis with the Wide Bay Population Health Unit adopting a community development approach. This saw resources directed towards the engagement of local community partners in the prioritisation of focus areas according to the perceived needs of each specific geographic location. While the original intention was to cover the range of falls-related injury risk factors (including safe footwear, home modification, medication review, and public safety), the Wide Bay intervention predominantly focused on awareness and information activities and resources; as well as strategies to encourage, develop and promote local opportunities for increased physical activity.

The approach was derived from a community-based participatory research and practice model. Interventions primarily targeted individuals within the community using behavioural change strategies addressing proximal risk factors rather than targeting the whole community with upstream interventions addressing distal risk factors. Local Community Action Plans were developed through community consultation which determined the prioritisation, design and implementation of agreed strategies. The approach was similar to that implemented through the original 'Stay on Your Feet' project in that it sought to promote a falls-prevention message within a strong, active ageing context, and to intervene on a wide range of fall-related risk factors while maintaining an emphasis on physical activity.

The Wide Bay project was underpinned by an explicitly articulated set of guiding principles:

Principle	Explanation
Encourage local involvement and ownership	The most important thing for initiatives to work and to last
Be inclusive, accessible, simple and practical	All communities & all people who want to be involved, can be involved
	Resulting in Community Action Plans that are easy for anybody to follow
Start from what is already in place	Recognise existing local activities
Aim to enhance and extend the reach	Develop local skills and resources as needed
Respond to local priorities	Start from what is seen as locally important

	about the reasons for falls, and effective strategies to prevent them
Be guided by the research Avoid "re-inventing" the wheel	Encourage sharing of ideas, programs, activities within the local community and from other areas

Figure 4: Guiding Principles for community planning processes

The primary target group was community members aged 60 years and over. The secondary target group was the community-based service providers and other community members (organisations and individuals) who engage regularly with people aged 60 years and over.

3.2.2 Activities

3.2.2.1 Community Action Plans

A range of community consultation meetings were held in geographic planning areas determined through local consultation. All those who had indicated an interest in being involved in the planning process were invited to participate. The intent was to produce a guide, or template, for community and regional actions. Each plan was to function as a resource and a template which could be reviewed and changed in response to local progress and research developments. Community Action Plans aimed to be clear and accessible, with action-oriented language, minimal jargon and photographs of local planning and other activities. Plans were to be widely distributed and referred to throughout the life of the project.

During the period from October 2002 to April 2003, 31 Community Planning Meetings were held in nine local planning areas, with a total attendance of 219. Meetings were conducted according to a standardized format to ensure consistency across the intervention site. Meetings were held in community venues as determined by participants with venues rotated where possible. Following a series of Plan Confirmation Meetings, held from May 2003 to June 2003, a Community Action Plan was produced for each of the following four Queensland Health Service Districts:

Bundaberg Health Service District: Bundaberg, Childers, Mt Perry, Kolan and Miriam Vale and surrounding communities.

Fraser Coast Health Service District: Hervey Bay and Maryborough and surrounding communities

North Burnett Health Service District: Gayndah, Mundubbera, Eidsvold, Monto and Biggenden and surrounding communities

South Burnett Health Service District: Kingaroy, Murgon, Cherbourg, Wondai and Nanango and surrounding communities.

Each Community Action Plan included strategies that were shared by all Local Planning Groups within each of the participating Health Service District; and strategies that were specific to the needs of the relevant local community. Stay On Your Feet resources were directed towards the agreed priority areas and shared strategies, while support was provided by the project team to assist local communities to pursue locally specific strategies.

In July 2003, each organisation / individual on the Stay On Your Feet Stakeholder Database (approximately 1200) was posted a copy of the Community Action Plan appropriate to their geographic area. Multiple copies were distributed to organisations on request. An estimated 2000 Community Action Plans were distributed throughout the intervention site.

Coordinate, distribute and promote awareness and information resources

The tag, 'Stay Active, Stay Independent, Stay On Your Feet', was developed as a positive, healthy ageing message. Its development was informed through research analysis and community consultation. It was deemed important that intervention communication and printed resources did not initially use the word *"falls"* in the title. Evidence indicated the word *''falls"* portrays a negative view and did not help gain the interest and engagement of people over 60 years living independently in local communities. This message continued to be reviewed during the course of the intervention, particularly with the assistance of the volunteer Ambassadors. Once local older people had an understanding and connection with the intervention slogan (Stay On Your Feet) and other key associated terms ('Active Ageing' and 'Healthy Ageing') introducing the word "falls" was seen to be more readily accepted.

A considerable amount of effort was directed by the project team to the preparation and distribution of a newsletter through a continually updated stakeholder data base and informally through community outlets. The Stay On Your Feet Newsletter was the major form of communication used to reach stakeholders and local older people. Analysis showed that the content of the newsletter evolved in response to a need to drive project priorities; cater for changing community needs; and to

celebrate successes on the local and project-wide levels. Although reasonably labour intensive for a small project team to produce on a regular basis, costs per copy were low and the newsletter was shown to be a valuable tool for promotion, education and capacity-building.

A 30-second television advertisement promoting active ageing was adapted from commercials developed by Stay Active, Stay Independent NSW. The advertisement was aired on three regional television networks during the periods June – November 2005 and January – April 2006.

A wide range of distribution methods were used to increase access across the intervention site to resource materials. This included a Loan Library system for displays, print material, videos and physical activity equipment. All resources were provided free of charge. A substantial amount of community developed material was generated as Stay On Your Feet resources. These included Fact Sheets, Media/newsletter articles, brochures, posters addressing Vision, Footwear and Medications. There was also an emphasis on including the development of appropriate resources to engage and provide information to Murri and Islander members of the community.

Throughout the project a stakeholder data base was the key mechanism for initiating and maintaining regular contact with the large number of communities and key partners across the intervention site as well as with individuals and groups who did not attend formal meetings. The mailing list facilitated knowledge transfer and information dissemination through the targeted distribution of the Stay On Your Feet Newsletters; annual Stay On Your Feet calendars; invitations to meetings and physical activity events; meeting records; Community Action Plans and information resources.

Over the course of the project the partnership base fluctuated. Some partners remained for the duration of the project whilst others participated and left according to their interests in the activities underway at any particular time or, importantly, due to changes in staff. However, all major partners continued to participate either passively, through the mailing list –based communications, or actively through involvement in community events. Physical activity was the linkage point for the majority of partners involved in the intervention forming the conduit for collaborative work and shared learnings.

Analysis of funding grants, under the Queensland Local Government Development Program, awarded to 17 Local Government councils, between 2002 and 2005, indicated the provision of

funding to 70 projects relating to strategies identified in the Stay On Your Feet Community Action Plans. These included the creation of environments that support physical activity such as safe walking tracks; equipment purchase for local loan; physical activity programs; walking programs; experiential Come 'n' Try events; recreation plans & strategy development. Stay On Your Feet strategies and a range of physical activity opportunities are now included in strategic planning documents produced by 12 Local Government Authorities in Wide Bay-Burnett. Several collaborative initiatives are continuing with the support of other projects within the Wide Bay Population Health Unit.

A series of interactive Come 'n' Try days were undertaken to generate interest and familiarity with the opportunities and benefits of physical activity. Two examples of these were the Hip 'n' Healthy Expo and the Gayndah Come 'n' Try Day. The Hip 'n' Healthy Expo was a two-day event coordinated by the Stay On Your Feet team in partnership with Hervey Bay City Council and the Department of Local Government, Planning and Sport & Recreation. The Expo included Come 'n' Try opportunities and demonstrations of several different physical activities. Experienced specialty instructors from Sydney (Lifeball, Strength & Balance Exercise), the Gold Coast (Nordic Pole Walking), and Brisbane (Active Wellness, Life Steps) as well as local leaders (Tai Chi, Resistance Training, Line Dancing etc) led the activities. The Expo was promoted through a mail-out to the full Stay On Your Feet data base; the Stay On Your Feet Newsletter and via extensive coverage in local media. The Come & Try Day (Gayndah, March 2004) involved participation sessions in Nordic Pole Walking, Lifeball and Strength & Balance exercise. The day was promoted via mail out to all North Burnett area names on the Stay On Your Feet data base, letters to health professionals and Local Government in the area, and local media coverage. The day was attended by 40 people from seven communities.

Brochures were developed that identified all physical activity opportunities according to town and type of activity, with contact details for each activity. Readers were encouraged to call the local contact person to confirm time, place etc before attending an activity. The brochures also included brief information about *How much activity; Getting advice; Physical Activity at home*. A special edition for Indigenous people was produced for the North Burnett area in conjunction with the Stay On Your Feet Ambassador at Gayndah.

A number of initiatives were undertaken to increase the opportunities available to individuals aged 60 years and over to become involved in regular physical activity. 'Maryborough Moves' was an initiative undertaken with Maryborough City Council in association with Queensland Department of Local Government, Planning, Sport & Recreation and Fraser Coast Health District. The multi-strategy project focused on improving community physical activity participation in Maryborough.

The Wide Bay Active Ageing Network arose from the 2005 Active Ageing 'Seniors on the Move' Conference and has continued to focus on maintaining and developing a range of physical activity strategies. Tai Chi for Arthritis Introductory Workshops (Kingaroy, Mundubbera, Bundaberg August /September 2004) were held as a preparatory stage of Tai Chi Leader Certificate Training and provided an experiential opportunity for local community members.

Other Physical activity leader training was also provided. This comprised seven workshops with 77 participants being awarded a Certificate of Completion. Follow-up survey data indicated, that after an average of 15 months post-training, 33 new classes or sessions had been established in 32 communities (covering 19 of the 21 Local Government Areas in the project area).

Train and support Stay On Your Feet Ambassadors

The concept of voluntary community peer educators received strong interest and support at Community Planning meetings, and was determined as a key Awareness and Information strategy in all Community Action Plans. A "Stay On Your Feet Ambassador" was defined within the context of the project as '*a community member who wants to assist local older people to maintain their independence and activity; is interested in learning and sharing information on how to reduce falls in older people; and helps to motivate and support people to make the necessary changes, in an informal, friendly and non-threatening manner'*.

People either volunteered or were identified as potential Ambassadors, during the consultation and planning processes. With the assistance and permission of similar programs[25] in NSW and Western Australia, a training package was developed and implemented providing Ambassadors with basic training. This aimed to:

- ensure that Ambassadors had correct knowledge about the major causes of falls in older people and the major ways to reduce falls, within a healthy ageing context
- improve/enhance Ambassadors' presentation and communication skills

- improve/enhance Ambassadors' confidence in presenting information in their communities in a variety of ways
- improve/enhance Ambassadors' confidence in taking an advocacy / community development role with local community agencies
- ensure that Ambassadors fully understood the: Ambassadors Position Description and Agreement; insurance; claiming for expenses, reimbursement process; keeping activity records and monthly reporting.

Training sessions emphasised the sharing of experiences and ideas, active learning, and developing an "Ambassadors' Team" identity through social bonding and networking.

An Ambassador's role was seen as independent and flexible yet supported by the Stay On Your Feet team through collegial support, additional information and resources. The Stay On Your Feet project team did not organise Ambassadors' activities in local communities. Ambassadors decided how and where they would spread the Stay On Your Feet message with the support of the project team. Local activities were recorded and reported to the project team on a monthly basis. If requests were made to the Stay On Your Feet team for speakers the enquiry was passed on to the relevant local Ambassador.

During 2004, local feedback indicated limited reach of interventions to Aboriginal and Torres Strait Islander communities. With the help of the Wide Bay Population Health Unit's Indigenous Health Promotion Officer and local communities the existing training package and resources were modified. A process was also undertaken to recruit, train and support ten local Murri and Islander Volunteer Ambassadors from four communities.

3.3 Northern Rivers

3.3.1 Overview of intervention

Guided by the findings of the *Stay on Your Feet Sustainability Evaluation*, the Northern Rivers Area Health Service adopted a community-based approach to building environments that supported the desired preventive behaviours. Older people were identified as the secondary target group, while those who created and maintained the environments that facilitated physically active behaviours were identified as the primary target group. Change was to be achieved through

collaboration with, and through, existing networks and structures while remaining sensitive to the needs and expectations of both target groups.

The aim was to increase the number of physical activity opportunities over a four-year period for people aged 60 years and over living independently in the community.

3.3.2 Activities

Come 'n' Try Physical Activity Expos

Locations were chosen based on evidence of little or no physical activity opportunities for older people. Collaborative links and partnerships with organisations that represented older people and ex-service organisations were established through the formation of Stakeholder Advisory Groups in the selected communities. In collaboration with the Community Health Education Groups Inc. (CHEGS Inc.), physical activity expos were also held in four communities across the Northern Rivers area during 2003.

The Stakeholder Advisory Groups comprised representatives from health, government, non-government as well as voluntary and older people's organisations and acted as the working parties responsible for planning, promoting, administering and evaluating the Expos.

Activities offered included: bowls, croquet, juggling, Lifeball, Tai Chi, Nordic Pole walking, botanic walks, tree planting, massage, dance in various forms (for example, ballroom, belly, clogg and square), exercises including strength and stretch, gentle and chair-base, Push-Cush, exercise with step and relaxation, falls prevention talks, bladder control talks and exercises, Feldenkrais, and health checks.

Fit to Function Volunteer Leader Training

A needs assessment was undertaken to verify that service providers were interested in, and would benefit from, the proposed training. The majority of those surveyed indicated a strong interest in undertaking training to acquire the knowledge and skills necessary to lead group exercise for older people.

Volunteers and staff of the Returned Servicemen's League (RSL) Day Clubs, retirement villages, nursing homes, and hostels were offered training in running gentle exercise sessions for older people. The 'Fit to Function' training course was designed and conducted by professional leaders from the former National Association for Gentle Exercise. The aim of the training program was to enable participants to gain:

- a basic understanding of the physiological, psychological, social mental and medical issues associated with ageing
- a deeper knowledge and understanding of the consequences of falls among older people as well as risk factors and prevention strategies
- knowledge and skills in providing exercises for clients with common conditions.

Sixty-two participants attended two 2-day comprehensive training courses. The initiative was funded by the Department of Veterans' Affairs.

At three months, a follow-up evaluation questionnaire identified that 64% of the forty five respondents were leading group exercise with older people. Reasons for not leading a group included: good levels of access to appropriate exercises sessions led by others at their site and job roles prevented them from conducting exercise sessions. Three months later more participants were conducting more sessions than at baseline but not as many as intended. It was estimated that the total number of older people benefiting from the training was approximately 1170.

"To be young at heart…..Stay Active! Stay Independent!" Multi-media campaign

There is good evidence that social marketing can change behaviour when used in conjunction with other strategies,[26 27 28] particularly when based on good formative research, well-designed messages and an effective distribution strategy.

A social marketing campaign was developed and implemented in partnership with Queensland University of Technology's School of Public Health and School of Creative Industries; local organisations and the media. The three phased *'To Be Young at Heart - Stay Active Stay Independent'* campaign was part of a multi-strategy program implemented over 18 months that aimed to reduce falls among seniors by promoting participation in physical activity. The development of the campaign involved concentrating minimal resources on what were considered the most vital aspects of: 1/ Establishing mutually beneficial agreements with community and

corporate partners, especially the media; 2/ Evidence-based message development based on sound formative research; and 3/ Strategic message distribution based on the target group demographics and their understanding of the issue.

The campaign demonstrated how it is possible to develop and deliver a well-designed campaign with effective reach and impact, on a limited core budget. The overall campaign cost was calculated at $191K including direct costs, staff time, sponsorship and in-kind support. Excluding staff time, actual expenditures of $42K represented 22% of the total cost and generated almost double this amount in sponsorship and in-kind support from volunteer cast and crew ($82K). A total of 639 intercept survey interviews were conducted (91% 60-plus year olds, 63% women). Over one-third (36%) of respondents recognised the campaign. Of those who were aware of the campaign, 21% reported that it had encouraged them to seek more information about physical activity, 33% reported increased intention to be more active, and 22% reported that they had become more active as a result.

General Practitioner Referral Trial

The small rural community of Evans Head (population 2 614) was selected as the site for the ten month trial following the formation of a partnership between the Stay Active, Stay Independent Project and the Northern Rivers Division of General Practice. This partnership also enabled linkage of the intervention with the Australian Government's Rural Chronic Disease Initiative.

Activities were designed to raise awareness among the participating General Practitioners and clinical practice staff of the link between regular physical activity and falls prevention for older patients; increase General Practitioner and clinical practice staff awareness of physical activity opportunities available for older patients in their local communities; and encourage General Practitioners and clinical practice staff to refer older people to appropriate physical activity opportunities through the use of Active Scripts.

There was no uptake by General Practitioners participating in the trial in the promotion and referral of older patients to physical activity providers through the use of Active Scripts. There were little or no other forms of referral to local activities by the General Practitioners despite an increased knowledge about physical activity providers in the community. Staff from other practices stated

that they would be unlikely to use Active Scripts as a tool to increase physical activity levels and it was unlikely that they would access information via the intranet and internet due to lack of computer facilities in their work environments.

Professional Leader Training

Individuals were selected, from specific local geographical areas where little or no physical activity/exercise groups existed, to undertake Certificate III Fitness Leader Training. On completion of the formal training, Fitness Leaders were networked to the CHEGS organisation to enable continued support, training and the acquisition of education credits.

Twelve people from selected geographic locations completed the NSW Fitness Leader Certificate III and Tai Chi training. At evaluation, group exercise classes are now run in three towns where none previously existed with ten new gentle exercise classes and four Tai Chi sessions successfully established.

3.4 Impact

3.4.1 Risk factor prevalence

3.4.1.1 Response rates and sample characteristics

WIDE BAY

At pre-intervention, Wide Bay residents participated in 1601 interviews. Refusals included: 226 households where eligibility had not been determined; 348 eligible households; and 22 interviews terminated before completion. Response rates were between 73% and 81% depending on whether households who refused prior to determining eligibility were included or excluded from the denominator. Since many of the refusing households did not have an age-eligible resident, response rates may be toward the higher end.

At post-intervention, Wide Bay respondents completed 1619 interviews. Refusals included: 268 households where eligibility had not been determined; 259 eligible households; and 14 incomplete interviews. The response rate ranged from 75% to 87% depending on household eligibility.

A comparison of the demographic and health characteristics of the pre- and post-survey samples indicated the groups were essentially similar (Table 1). There were no significant differences

between survey samples in terms of gender, age-group, residence, pension or private health insurance. The samples were also comparable on a number of health factors: self-reported general health, health-related impacts on activities of daily living, wheelchair or walking aid usage, number of prescription medications, and self-reported balance problems. The groups were statistically significantly different on level of education, partner status and employment status. Post-intervention respondents were: less likely to have a partner, slightly more likely to be retired, and less likely to report home-duties/caring as their current employment. The difference in the samples' education levels (fewer post-intervention respondents nominated trade or technical and more nominated completion of junior high school) may be related to differences in wording utilised in the pre- and post-intervention surveys. The pre-intervention survey asked respondents whether they had completed "a trade or technical certificate or diploma" whereas the post-intervention survey option was a "technical or TAFE certificate or diploma". Individuals with a trade but no certificate, therefore, may have nominated trade/technical at pre- but not at post-intervention.

Table 1: Comparison of demographic characteristics in pre- and post-intervention samples – Wide Bay

	Pre		Post		
Variable	**N**	**%**	**N**	**%**	**p-value**
Gender					
Male	801	50.0	818	50.5	0.78
Female	800	50.0	801	49.5	
Age					0.95
60-74 years	1141	71.4	1148	71.3	
75+ years	458	28.6	463	28.7	
Education					<0.001
University	126	7.9	148	9.2	
Trade/technical	408	25.6	245	15.2	
Senior	129	8.1	146	9.1	
Junior	317	19.9	424	26.4	
Primary of less	613	38.5	644	40.1	
Partner status					<0.001
Partner	1106	69.3	984	60.8	
No partner	491	30.7	634	39.2	
Employment status					<0.001
Retired	1186	74.2	1285	79.4	
Employed/student/volunteer	202	12.6	215	13.3	
Home duties/carer	158	9.9	73	4.5	
Unemployed/ unable to work	52	3.3	46	2.8	
Residence					0.52
Town or city	1187	74.2	1217	75.2	
Country	413	25.8	402	24.8	
Pension					0.46
Yes	1224	76.8	1222	75.7	
No/not sure	369	23.2	392	24.3	
Private health insurance					0.15
Yes	760	47.6	727	45.0	

No/not sure	838	52.4	887	55.0	
General health					0.93
Excellent	228	14.3	235	14.5	
Very good	454	28.5	470	29.1	
Good	506	31.7	517	32.0	
Fair	304	19.1	288	17.8	
Poor	102	6.4	106	6.6	
Impact on daily activities					0.24
Not at all	566	35.7	580	35.9	
A little bit	408	25.7	397	24.6	
Moderately	339	21.4	328	20.3	
Quite a bit	202	12.7	208	12.9	
Extremely	72	4.5	102	6.3	
Wheelchair					0.60
Yes	21	1.3	18	1.1	
No	1580	98.7	1601	98.9	
Walking aid					0.24
Yes	198	12.4	223	13.8	
No	1403	87.6	1396	86.2	
No. of medications					0.19
None	383	24.0	376	23.3	
1-2	554	34.7	523	32.4	
3+	659	41.3	717	44.4	
Balance problems in last 12 mths					0.11
Yes	446	27.9	492	30.4	
No/not sure	1155	72.1	1127	69.6	

NORTHERN RIVERS

At pre-intervention, Northern Rivers residents participated in 1601 interviews. Refusals included: 347 households where eligibility had not been determined; 433 eligible households; and 25 interviews terminated before completion. Response rates were between 67% and 78% depending on whether households who refused prior to determining eligibility were included or excluded from the denominator. At post-intervention, Northern Rivers respondents completed 1633 interviews. Refusals included: 170 households where eligibility had not been determined, 176 eligible households, and 18 incomplete interviews. The response rate ranged from 82% to 90% depending on household eligibility.

As for the Wide Bay samples, a comparison of the demographic and health characteristics of the pre- and post-survey samples indicated the groups were essentially similar (Table 2). There were no significant differences between survey samples in terms of gender, age-group, pension or private health insurance. The samples were also comparable on a number of health factors: self-reported general health, health-related impacts on activities of daily living, wheelchair or walking aid usage. The groups were statistically significantly different on level of education, partner status, residence, employment status, number of medications, and self-reported balance problems.

Post-intervention respondents were less likely to have a partner, and slightly more likely to be retired and less likely to report home-duties/caring as their current employment. As with the Wide Bay data, the difference in the samples' education levels (fewer post-intervention respondents nominated trade or technical and more nominated completion of junior high school) may be related to differences in wording utilised in the pre- and post-intervention surveys (as outlined above). Post-intervention survey respondents were significantly more likely to live in a town/city, to say their health did impact on their daily activities, to report use of more medications and to report balance problems in the previous year. However, the absolute magnitude of these differences was not large.

Table 2: Comparison of demographic and health-related characteristics in pre- and post-intervention samples – Northern Rivers

	Pre		Post		
Variable	**N**	**%**	**N**	**%**	**p-value**
Gender					0.86
Male	800	50.0	811	49.7	
Female	801	50.0	822	50.3	
Age					0.56
60-74 yrs	1043	65.4	1046	64.4	
75+ yrs	553	34.6	579	35.6	
Education					<0.001
University	189	11.8	191	11.8	
Trade/technical	433	27.1	270	16.7	
Senior	133	8.3	160	9.9	
Junior	396	24.8	522	32.3	
Primary or less	444	27.8	474	29.3	
Partner status					<0.001
Partner	1060	66.3	931	57.4	
No partner	538	33.7	691	42.6	
Employment status					<0.001
Retired	1169	73.0	1297	79.6	
Employed/student/volunteer	212	13.2	234	14.4	
Home duties/carer	180	11.2	61	3.7	
Unemployed/ unable to work	40	2.5	38	2.3	
Residence					0.002
Town or city	1089	68.1	1189	72.9	
Country	511	31.9	441	27.1	
Pension					0.72
Yes	1196	74.9	1208	74.4	
No/not sure	400	25.1	416	25.6	
Private health insurance					0.80
Yes	717	44.8	721	44.3	
No/not sure	884	55.2	905	55.7	
General health					0.31
Excellent	245	15.4	228	14.0	
Very good	486	30.5	525	32.2	
Good	528	33.1	515	31.6	
Fair	269	16.9	273	16.8	
Poor	67	4.2	88	5.4	
Impact on daily activities					0.015
Not at all	571	36.1	616	38.1	
A little bit	415	26.2	407	25.2	
Moderately	377	23.8	320	19.8	
Quite a bit	166	10.5	204	12.6	
Extremely	53	3.4	70	4.3	
Wheelchair					0.24
Yes	13	0.8	20	1.2	
No	1588	99.2	1613	98.8	
Walking aid					0.65
Yes	182	11.4	194	11.9	
No	1419	88.6	1439	88.1	
No. of medications					0.019
None	395	24.7	375	23.0	
1-2	554	34.7	513	31.5	
3+	649	40.6	741	45.5	
Balance problems in last yr					0.009
Yes	392	24.5	466	28.6	
No/not sure	1209	75.5	1165	71.4	

3.4.1.2 Changes in risk factors between pre- and post-intervention periods

WIDE BAY

For virtually all falls-related risk factors, there were improvements between pre- and post-intervention surveys in the proportion of individuals reporting behaviours consistent with reducing the risk of falling (Table 3). The improvements were statistically significant for six factors.

There was a significant increase in health consults about falls prevention from pre- to post-intervention; women were approximately 65% more likely to talk with a health professional about falls prevention at post-intervention, although men showed no significant change. People aged 60-74 years and those aged 75 years or older were about 35% and 47%, respectively, more likely to report engaging with a health professional on this matter at the post-intervention survey. There were no major changes from pre- to post-intervention in the proportion of respondents discussing physical activity or medication side-effects with health professionals.

Respondents were 26% more likely to report wearing safe shoes daily or almost daily and 20% more likely to report conducting home modifications from pre- to post-intervention. Again men failed to exhibit a significant increase from pre- to post-intervention.

There was a substantial and statistically significant increase in calcium intake from pre- to post-intervention, with post-intervention respondents 73% more likely than pre-intervention respondents to report intakes of three or more daily serves of calcium. Women and those aged 75 years or older showed the largest changes with almost two-fold increases.

In terms of media awareness, post-intervention respondents were approximately 29% more likely than pre-intervention respondents to have heard about falls prevention in the media, and this was statistically significant. All sex and age subgroups reported similar improvements with respect to awareness of falls messages in the media. In contrast, there were no significant changes in awareness of physical activity messages in the media (already quite high at approximately 60%) or current local government council activity in relation to falls prevention.

Changes in physical activity were modest. The younger age-group (those aged 60-74 years) showed a significant 27% increase in the odds of meeting physical activity guidelines for moderate- or vigorous-intensity exercise, but the trend, among those 75+ years (which was not statistically

significant) was for fewer to report meeting recommended guidelines. Women were 47% more likely to report participating in activities to increase their muscle strength or tone at post-intervention, which was statistically significant.

Finally there was an increase in the proportion of respondents agreeing that falls are preventable and this showed relatively consistent trends across age-groups and across gender (although results among men just missed statistical significance). There was little change from pre- to post-intervention in perceived personal falls risk. Women and those aged 75 years or older were somewhat less likely to report a low falls risk, suggesting an increase over time in their perceived personal falls risk, although these results were not statistically significant.

Table 3: Changes in risk factors from pre- to post-intervention (pre-intervention is the referent category) adjusted for age-group, gender and education – Wide Bay

Variable	All cases %pre v %post OR (95% CI)	Males %pre v %post OR (95% CI)	Females %pre v %post OR (95% CI)	60-74 yrs %pre v %post OR (95% CI)	75+ yrs %pre v %post OR (95% CI)
Discussed falls with health professional	15.4 v 20.0, 1.41 (1.17-1.70)***	13.4 v 14.9, 1.10 (0.82-1.47)	17.5 v 25.1, 1.65 (1.29-2.12)***	13.4 v 17.0, 1.35 (1.07-1.71)*	20.3 v 27.4, 1.47 (1.08-2.01)*
Discussed physical activity with health professional	44.2 v 44.1, 1.04 (0.90-1.19)	43.8 v 45.6, 1.13 (0.92-1.38)	44.6 v 42.6, 0.94 (0.77-1.15)	47.9 v 47.0, 0.99 (0.84-1.17)	34.7 v 36.9, 1.13 (0.86-1.48)
Discussed medication side-effects with health professional[1]	66.3 v 66.6, 1.04 (0.88-1.24)	65.9 v 64.8, 0.95 (0.74-1.22)	66.6 v 68.4, 1.10 (0.86-1.40)	70.5 v 70.4, 1.01 (0.82-1.25)	57.1 v 58.9, 1.07 (0.80-1.44)
Safe shoes daily or almost daily	75.3 v 79.9, 1.26 (1.06-1.50)**	68.0 v 72.4, 1.16 (0.93-1.45)	82.6 v 87.6, 1.47 (1.10-1.95)**	74.4 v 78.8, 1.25 (1.02-1.53)*	77.7 v 82.9, 1.29 (0.92-1.82)
Home modifications	27.5 v 30.2, 1.20 (1.01-1.43)*	23.7 v 24.7 0.99 (0.78-1.26)	31.3 v 35.8, 1.29 (1.04-1.60)*	21.8 v 24.0, 1.16 (0.95-1.41)	41.5 v 44.9, 1.12 (0.86-1.47)
3+ serves of calcium	16.5 v 25.1 1.73 (1.45-2.07)***	13.9 v 18.9, 1.44 (1.09-1.89)**	19.1 v 31.3, 1.98 (1.56-2.50)***	17.2 v 25.5, 1.66 (1.35-2.05)***	14.8 v 24.2, 1.94 (1.38-2.72)***
Media awareness: falls	32.4 v 37.5, 1.29 (1.11-1.50)***	27.3 v 31.2, 1.27 (1.02-1.59)*	37.6 v 43.9, 1.30 (1.07-1.60)**	31.6 v 36.9, 1.29 (1.08-1.54)**	34.1 v 39.3, 1.24 (0.95-1.64)
Media awareness: physical activity	61.7 v 63.5, 1.10 (0.95-1.28)	58.6 v 59.0, 1.04 (0.85-1.27)	64.8 v 68.0, 1.18 (0.95-1.46)	63.5 v 65.5, 1.10 (0.92-1.31)	56.9 v 59.2, 1.11 (0.85-1.45)
Awareness: council activity re falls prevention	28.5 v 29.3, 1.07 (0.91-1.25)	31.4 v 32.9, 1.11 (0.89-1.37)	25.6 v 25.6, 1.03 (0.82-1.29)	30.2 v 30.6, 1.05 (0.88-1.26)	24.5 v 25.9, 1.12 (0.83-1.52)
Meet moderate or vigorous intensity guidelines	61.2 v 63.7, 1.12 (0.96-1.31)	65.6 v 67.4, 1.11 (0.89-1.39)	56.7 v 60.0, 1.14 (0.92-1.41)	65.7 v 71.1, 1.27 (1.06-1.52)*	49.9 v 45.5, 0.85 (0.65-1.12)
Strength activity (2 days/week or more)	16.4 v 18.9, 1.20 (0.99-1.44)	20.7 v 20.9, 1.03 (0.80-1.32)	12.1 v 16.9, 1.47 (1.10-1.96)**	18.6 v 21.2, 1.19 (0.96-1.46)	11.0 v 13.4, 1.29 (0.86-1.94)
Falls are preventable	57.9 v 63.2, 1.26 (1.09-1.46)**	56.1 v 61.1, 1.21 (0.99-1.49)	59.7 v 65.4, 1.32 (1.07-1.64)**	63.0 v 67.6, 1.22 (1.02-1.46)*	45.0 v 52.3, 1.37 (1.05-1.79)*
Self-perceived low falls risk	61.7 v 60.5, 0.96 (0.83-1.11)	66.8 v 67.7, 1.10 (0.89-1.37)	56.6 v 53.1, 0.86 (0.70-1.05)	64.9 v 65.2, 1.01(0.85-1.20)	53.4 v 49.0, 0.85 (0.65-1.12)

*≤ 0.05, **≤ 0.01, ***≤0.001, [1] Results based on those taking medications only

Post-intervention prevalence of physical activity options in Wide Bay

Survey questions asked only at post-intervention indicated that respondents were more likely to participate in non-organised physical activities (93.6%) than in organised activities (18.5%). The most common physical activities included incidental activity, such as household chores and gardening (Table 4). Walking was also very popular. A small proportion of Wide Bay respondents stated they participated in Community Health Education Group programs, an organisation running in Northern Rivers only. The respondents may still have been participating in organised gentle exercise and tai chi classes but may have confused the identity of those running the classes.

Table 4: Physical activity participation

	Wide Bay – Post	
Variable	**N**	**%**
Type of organised physical activity (last month)		
Aqua aerobics	41	2.5
Dancing groups	54	3.3
Swimming groups	19	1.2
Walking groups	29	1.8
Golf	33	2.0
Tai chi groups	34	2.1
Exercising at a gym	30	1.9
Gentle exercise classes	33	2.0
Other exercise class eg yoga	26	1.6
Other team or group sport eg bowls, tennis	148	9.2
Other	22	1.4
Participation in named physical activity program		
CHEGs gentle exercise	14	0.9
CHEGs tai chi	15	0.9
Heart moves	5	0.3
Active over 50's	4	0.2
Steady steps	4	0.2
Just walk it	7	0.4
Lifeball	4	0.2
Other	20	1.3
ype of non-organised physical activity (last month)		
Walking	1308	80.8
Cycling	206	12.7
Jogging	62	3.8
Using hand weights	164	10.1
Swimming laps	221	13.7
Tai chi	48	3.0
Exercise video or other home exercises	264	16.3
Gardening	1222	75.5
Household chores	1485	91.7
Other	**376**	**23.2**

Of those who participated in no physical activity during the previous month (N=103, 6.4% of total respondents), the barriers identified included: ill health (65.0%); not interested (14.6%); feeling too old (12.6%); too busy (9.7%); no transport (3.9%); no appropriate activities in my area (2.9%); or other (46.6%). More than one reason could be given hence percentages sum to more than 100%.

Questions taken from the *Active Australia Physical Activity Survey* were utilised only at post-intervention to assess respondent knowledge (Table 5). Although a high level of knowledge was displayed, respondents appeared more aware of some physical activity messages than others. For example, they were more likely to "strongly agree" with the '30 minutes of activity a day will improve health' message than the 'blocks of 10 minutes of activity are adequate' statement (23.0% vs 15.1%, respectively). Also, although 88.8% of respondents were aware of the benefits of 30 minutes of moderate activity, only 53.3% agreed that 20 minutes of vigorous activity at least three times a week would improve one's health.

Table 5: Physical activity knowledge (Wide Bay)

Variable	N	%
Being more active for 30 mins/day will improve your health		
Strongly agree	372	23.0
Agree	1066	65.8
Neither	26	1.6
Disagree	122	7.5
Strongly disagree	13	0.8
Don't know	19	1.2
Refused	1	0.1
30 mins brisk walking on most days will improve your health		
Strongly agree	376	23.2
Agree	1111	68.6
Neither	30	1.9
Disagree	88	5.4
Strongly disagree	7	0.4
Don't know	6	0.4
Refused	1	0.1
Vigorous exercise at least 20 mins at a time 3 x a week will improve your health		
Strongly agree	157	9.7
Agree	706	43.6
Neither	92	5.7
Disagree	585	36.1
Strongly disagree	51	3.2
Don't know	26	1.6
Refused	2	0.1
Blocks of 10 minutes are OK		
Strongly agree	245	15.1
Agree	1168	72.1
Neither	29	1.8
Disagree	149	9.2
Strongly disagree	10	0.6

Don't know	17	1.1
Refused	1	0.1
Moderate exercise that increases heart rate slightly will improve your health		
Strongly agree	318	19.6
Agree	1195	73.8
Neither	32	2.0
Disagree	35	2.2
Strongly disagree	8	0.5
Don't know	30	1.9
Refused	1	0.1

There was some indication that program branding was recognised in the community (Table 6). Approximately 26% of respondents were familiar with "Stay On Your Feet" and almost 43% indicated that they had heard of "Stay active, stay independent". However, neither of these slogans, which were featured during the intervention, stood out against other physical activity programs, including '10,000 Steps' which was not operating in the area (recognised by almost 32% of respondents). The most common media reported were television and newspapers, both of which were utilised in the "Stay On Your Feet" intervention. Approximately 30% and 20% of respondents reported hearing about physical activity on the television and newspaper, respectively. Only 12% and 10% of respondents reported hearing about falls on these two media.

Table 6: Media source and program awareness (Wide Bay)

Variable	N	%
Where did you hear about falls?		
Newspaper	161	9.9
Poster	17	1.1
Back of bus advertisement	1	0.1
Television	194	12.0
Radio	20	1.2
Booklet/ Pamphlet	138	8.5
Flyer	21	1.3
Talk	45	2.8
Local newsletter	21	1.3
Internet	2	0.1
Magazine	94	5.8
Word of mouth	71	4.4
Other	132	8.2
Don't know	12	0.7
Where did you hear about physical activity?		
Newspaper	338	20.9
Poster	28	1.7
Back of bus advertisement	2	0.1
Television	489	30.2
Radio	34	2.1
Booklet/ Pamphlet	109	6.7
Flyer	22	1.4
Talk	39	2.4
Local newsletter	47	2.9
Internet	3	0.2
Magazine	170	10.5
Word of mouth	128	7.9
Other	166	10.3
Don't know	19	1.2
Have you heard of these programs?		
Healthy lifestyle for seniors	785	48.5
Stay Active Stay Independent	695	42.9
Make a move	212	13.1
SASI	51	3.2
Stay on your feet	428	26.4
Get on track	447	27.6
10000 steps	511	31.6

NORTHERN RIVERS

For virtually all falls-related risk factors, there were improvements between pre- and post-intervention surveys in the proportion of individuals reporting behaviours consistent with reducing the risk of falling (Table 7). Changes were statistically significant for six factors.

There was a significant 30% increase in those who reported discussing medications side-effects with health professional from pre- to post-intervention. Respondents were 35% more likely to

report wearing safe shoes daily or almost daily from pre- to post-intervention. There was a substantial and statistically significant increase in calcium intake from pre- to post-intervention, with post-intervention respondents 58% more likely than pre-intervention respondents to report intakes of three or more daily serves of calcium. Strength activity (2 days/week or more) increased by 28% in the post intervention group compared to pre-intervention.

In terms of media awareness, post-intervention respondents were approximately 63% less likely than pre-intervention respondents to have heard about falls prevention in the media. There were no significant changes in awareness of physical activity messages in the media or current local government council activity in relation to falls prevention, or in the proportion of respondents agreeing that falls are preventable or perceived personal falls risk.

Table 7: Changes in risk factors from pre- to post-intervention (pre-intervention is the referent category) adjusted for age-group (60-64, 65-69, 70-74, 75-79, 80-84, 85+), gender (male, female) and education (university/college, trade/technical, senior, junior, primary or less) – Northern Rivers

Variable	All cases %pre v %post OR (95% CI)	Males %pre v %post OR (95% CI)	Females %pre v %post OR (95% CI)	60-74 yrs %pre v %post OR (95% CI)	75+ yrs %pre v %post OR (95% CI)
Discussed falls with health professional	16.8 v 19.3, 1.19 (0.99-1.44)	13.5 v 16.9, 1.30 (0.98-1.73)	20.1 v 21.7, 1.13 (0.88-1.44)	12.9 v 14.5, 1.13 (0.88-1.46)	24.1 v 28.0, 1.23 (0.93-1.61)
Discussed physical activity with health professional	45.3 v 47.2, 1.12 (0.97-1.29)	45.0 v 47.0, 1.14 (0.93-1.39)	45.6 v 47.4, 1.11 (0.91-1.36)	47.1 v 50.3, 1.15 (0.97-1.37)	42.1 v 42.0, 1.03 (0.81-1.32)
Discussed medication side-effects with health professional[1]	64.2 v 69.6, 1.30 (1.09-1.55)**	64.2 v 70.0, 1.36 (1.05-1.74)*	64.3 v 69.3, 1.27 (1.00-1.62)*	65.3 v 73.8, 1.50 (1.19-1.88)***	62.6 v 63.3, 1.07 (0.82-1.40)
Safe shoes daily or almost daily	79.0 v 83.3, 1.35 (1.13-1.62)***	73.1 v 78.3, 1.36 (1.08-1.72)**	84.9 v 88.2, 1.33 (0.99-1.78)	77.4 v 82.5, 1.39 (1.11-1.73)**	82.2 v 84.5, 1.26 (0.91-1.74)
Home modifications	28.8 v 30.1, 1.00 (0.84-1.19)	24.8 v 25.5, 1.03 (0.81-1.31)	32.8 v 34.5, 1.09 (0.87-1.35)	21.6 v 20.9, 0.99 (0.80-1.22)	42.1 v 46.5, 1.14 (0.90-1.45)
3+ serves of calcium	16.6 v 24.1, 1.58 (1.32-1.89)***	13.8 v 18.8, 1.38 (1.05-1.82)*	19.4 v 29.3, 1.74 (1.38-2.20)***	16.3 v 25.0, 1.68 (1.35-2.10)***	17.0 v 22.6, 1.38 (1.02-1.86)*
Media awareness: falls	47.7 v 36.6, 0.63 (0.54-0.73)***	41.3 v 32.6, 0.69 (0.56-0.85)***	54.2 v 40.5, 0.58 (0.47-0.70)***	46.2 v 35.8, 0.64 (0.53-0.76)***	50.8 v 38.0, 0.60 (0.47-0.77)***
Media awareness: physical activity	64.3 v 62.8, 0.98 (0.85-1.14)	57.8 v 57.9, 1.05 (0.86-1.29)	70.8 v 67.6, 0.91 (0.73-1.13)	66.0 v 64.9, 0.96 (0.80-1.15)	61.3 v 59.4, 1.00 (0.78-1.29)
Awareness: council activity re falls prevention	21.8 v 24.0, 1.14 (0.97-1.35)	23.9 v 29.9, 1.38 (1.10-1.73)**	19.7 v 18.1, 0.91 (0.70-1.17)	22.5 v 25.5, 1.18 (0.96-1.45)	20.6 v 20.9, 1.07 (0.80-1.44)
Meet moderate or vigorous intensity guidelines	61.7 v 64.0, 1.15 (0.99-1.34)	67.5 v 70.0, 1.17 (0.93-1.46)	55.7 v 58.1, 1.14 (0.93-1.41)	68.0 v 69.0, 1.07 (0.88-1.29)	49.4 v 54.8, 1.31 (1.02-1.67)*
Strength activity (2 days/week or more)	15.5 v 18.3, 1.28 (1.05-1.55)*	17.8 v 21.8, 1.33 (1.03-1.71)*	13.2 v 15.0, 1.23 (0.92-1.64)	18.1 v 21.2, 1.26 (1.01-1.57)*	10.7 v 13.2, 1.32 (0.91-1.91)
Falls are preventable	64.9 v 64.5, 1.04 (0.89-1.21)	64.5 v 61.1, 0.91 (0.74-1.13)	65.3 v 67.9, 1.19 (0.96-1.48)	68.9 v 66.9, 0.91 (0.75-1.10)	57.0 v 60.2, 1.24 (0.97-1.58)
Self-perceived low falls risk	63.1 v 61.4, 0.94 (0.82-1.09)	68.8 v 63.0, 0.79 (0.63-0.97)*	57.4 v 59.7, 1.11 (0.91-1.37)	67.6 v 65.7, 0.91 (0.76-1.10)	54.6 v 53.5, 0.98 (0.77-1.24)

*≤ 0.05, **≤ 0.01, ***≤0.001, [1] Results based on those taking medications only

3.5 Outcomes

3.5.1 Self-reported falls and falls-related injury

WIDE BAY

The only self-reported fall-related outcome for which there was a statistically significant improvement between pre- and post-intervention in Wide Bay was multiple falls (Table 8). Overall, respondents were 27% less likely to report multiple falls following the intervention compared to before the intervention. Women reporting a fall were 39% less likely ($p<0.05$) and all those aged 60-74 years reporting a fall were 28% less likely (marginally significant, $p=0.07$) to report multiple falls at post-intervention.

There were no statistically significant differences overall for the other self-reported, fall-related outcome variables, (that is, a fall during the last 12 months; injury from a fall; hospital admission; or any medical attention). However, results were generally headed in the desired direction (that is falls reducing) for men and for those aged 60-74 years. In particular, those 60-74 years were significantly less likely to report an injury from a fall following the intervention (OR=0.76). Conversely, women and the older group, those 75 years and over, showed evidence of a flat or slightly elevated prevalence for most outcomes post-intervention. Those aged 75 years or older were 42% more likely to report an injury from a fall ($p<0.05$) and 33% more likely to experience a fall at post-intervention (marginally significant, $p=0.06$).

Table 8: Changes in fall outcomes from pre- to post-intervention (pre-intervention is the referent category) adjusted for age-group, gender and education – Wide Bay

Variable	All cases %pre v %post OR (95% CI)	Males %pre v %post OR (95% CI)	Females %pre v %post OR (95% CI)	60-74 yrs %pre v %post OR (95% CI)	75+ yrs %pre v %post OR (95% CI)
Fall in last 12 mths	24.7 v 24.0, 0.97 (0.82-1.14)	22.1 v 20.5, 0.90 (0.71-1.15)	27.3 v 27.6, 1.02 (0.81-1.27)	24.0 v 20.9, 0.83 (0.68-1.01)	26.2 v 32.2, 1.33 (0.99-1.78)
Multiple falls[1]	48.7 v 42.3, 0.73 (0.55-0.98)*	47.2 v 47.3, 0.94 (0.61-1.47)	50.0 v 38.5, 0.61 (0.41-0.90)*	49.5 v 41.4, 0.72 (0.50-1.02)	47.5 v 43.6, 0.84 (0.51-1.38)
Injury from fall	16.2 v 15.3, 0.93 (0.76-1.13)	13.1 v 11.7, 0.88 (0.65-1.20)	19.4 v 19.0, 0.95 (0.74-1.22)	16.0 v 12.7, 0.76 (0.59-0.96)*	16.6 v 22.0, 1.42 (1.01-1.99)*
Hospital admission	1.9 v 1.9, 1.00 (0.59-1.67)	1.9 v 1.1, 0.55 (0.23-1.28)	2.0 v 2.6, 1.43 (0.73-2.79)	1.3 v 1.4 1.05 (0.52-2.16)	3.5 v 3.0, 0.91 (0.43-1.91)
Medical attention	8.9 v 8.2, 0.90 (0.70-1.15)	7.4 v 5.5, 0.68 (0.45-1.03)	10.5 v 10.9, 1.04 (0.75-1.43)	8.2 v 6.5 0.76 (0.55-1.05)	10.9 v 12.3, 1.15 (0.76-1.73)

*≤ 0.05, **≤ 0.01, ***<0.001, [1] Results based on those reporting at least one fall in the last 12 months only

Comparisons with the State Omnibus Survey

In 2002, Wide Bay residents were significantly more likely than residents from throughout Queensland to report a fall during the past 12 months; multiple falls; and an injury from a fall. More frequent reports of medical attention for a fall were marginally significant (Table 9). In contrast, in 2006, Wide Bay residents were no more likely to report any of these outcomes than elsewhere in Queensland.

Table 9: Odds ratios for falls outcomes in 2002 and 2006 by sample (Wide Bay vs Queensland)*

Fall outcome	2002 % Wide Bay vs % Qld OR (95% CI)	2006 % Wide Bay vs % Qld OR (95% CI)
Fall in last 12 mths	24.7 v 20.4, 1.46 (1.14-1.86)**	24.0 v 26.2, 1.02 (0.79-1.32)
Multiple falls[1]	48.7 v 38.1, 1.93 (1.21-3.06)**	42.3 v 46.2, 0.84 (0.54-1.30)
Injury from fall	16.2 v 14.3, 1.34 (1.01-1.78)*	15.3 v 16.6, 1.07 (0.79-1.44)
Hospital admission	1.9 v 2.6, 0.69 (0.35-1.34)	1.9 v 1.3, 2.02 (0.79-5.15)
Medical attention	8.9 v 7.3, 1.43 (0.99-2.08)	8.2 v 9.5, 1.07 (0.73-1.57)

*Adjusted for age-group (60-64, 65-69, 70-74, 75-79, 80-84, 85+), gender, level of education (university/college, trade/technical, senior, junior, primary or less), employment (employed, home duties/carer, unemployed, retired), partner status, and general health.
*≤ 0.05, **≤ 0.01, ***<0.001, [1] Results based on those reporting at least one fall in the last 12 months only

This is further clarified by results comparing the time trends in the two locations: Wide Bay and Queensland (Table 10). In terms of self-reported falls-related injury, medically treated injury or hospital admission, there were no significant differences in rates between 2002 and 2006 for either Wide Bay or Queensland, and no significant differences between Wide Bay and Queensland for either 2002 or 2006.

Table 10: Odds ratios for falls outcomes in Wide Bay and Queensland by year (2006 vs 2002)[1]

Fall outcome	Wide Bay % 2006 vs % 2002 OR (95% CI)	Queensland % 2006 vs % 2002 OR (95% CI)
Fall in last 12 mths	24.0 v 24.7, 0.94 (0.79,1.12)	26.2 v 20.4, 1.45 (1.07-1.98)*
Multiple falls[2]	42.3 v 48.7, 0.73 (0.54-0.99)*	46.2 v 38.1, 1.72 (0.95-3.11)
Injury from fall	15.3 v 16.2, 0.90 (0.74-1.10)	16.6 v 14.3, 1.25 (0.87-1.79)
Hospital admission	1.9 v 1.9, 0.99 (0.58-1.68)	1.3 v 2.6, 0.47 (0.17-1.29)
Medical attention	8.2 v 8.9, 0.85 (0.66-1.11)	9.5 v 7.3, 1.32 (0.83-2.12)

[1]Adjusted for age-group (60-64, 65-69, 70-74, 75-59, 80-84, 85+), gender, level of education (university/college, trade/technical, senior, junior, primary or less), employment (employed, home duties/carer, unemployed, retired), partner status, and general health.
[2] Results based on those reporting at least one fall in the last 12 months only *≤ 0.05, **≤ 0.01, ***<0.001

NORTHERN RIVERS

The equivalent data are presented for Northern Rivers and show similar results (Table 11). There were no differences between the prevalence of falls, multiple falls, injurious falls, medically-treated falls, or hospitals admissions for falls in the Northern Rivers between 2002 and 2006.

Table 11: Changes in fall outcomes from pre- to post-intervention (pre-intervention is the referent category) adjusted for age-group, gender and education – Northern Rivers

Variable	All cases %pre v %post OR (95% CI)	Males %pre v %post OR (95% CI)	Females %pre v %post OR (95% CI)	60-74 yrs %pre v %post OR (95% CI)	75+ yrs %pre v %post OR (95% CI)
Fall in last 12 mths	24.1 v 25.2, 1.10 (0.93-1.30)	22.6 v 25.5, 1.16 (0.92-1.47)	25.6 v 24.8, 1.03 (0.82-1.30)	22.1 v 24.2, 1.14 (0.93-1.41)	28.0 v 27.3, 1.01 (0.77-1.32)
Multiple falls[1]	41.6 v 44.1, 1.04 (0.77-1.39)	42.7 v 50.0, 1.23 (0.80-1.87)	40.6 v 38.2, 0.90 (0.60-1.36)	39.5 v 43.3, 1.07 (0.74-1.57)	45.0 v 45.6, 1.02 (0.65-1.61)
Injury from fall	17.0 v 16.1, 0.96 (0.80-1.16)	14.3 v 15.2, 1.03 (0.77-1.37)	19.7 v 17.0, 0.90 (0.70-1.16)	15.3 v 14.9, 0.99 (0.78-1.26)	20.3 v 18.5, 0.93 (0.69-1.25)
Hospital admission	1.9 v 2.0, 1.03 (0.62-1.73)	1.9 v 2.0, 0.94 (0.45-1.96)	1.9 v 1.9, 1.13 (0.54-2.34)	1.2 v 1.3, 1.17 (0.53-2.57)	3.3 v 3.1, 0.96 (0.49-1.88)
Medical attention	9.6 v 8.9, 0.95 (0.74-1.21)	7.9 v 8.4, 1.05 (0.72-1.52)	11.2 v 9.5, 0.87 (0.63-1.21)	7.7 v 7.6, 1.04 (0.75-1.45)	13.2 v 11.4, 0.88 (0.61-1.26)

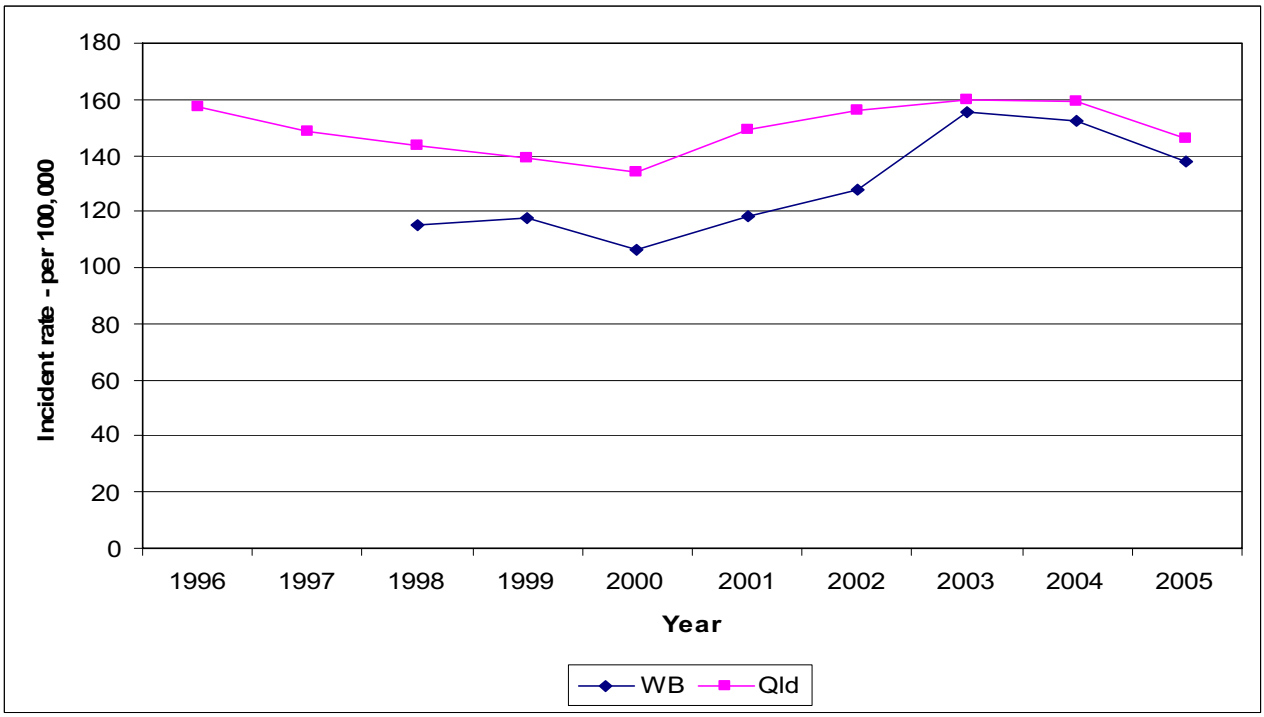
*≤ 0.05, **≤ 0.01, ***<0.001, [1] Results based on those reporting at least one fall in the last 12 months only

3.5.2 Hospital separations

WIDE BAY

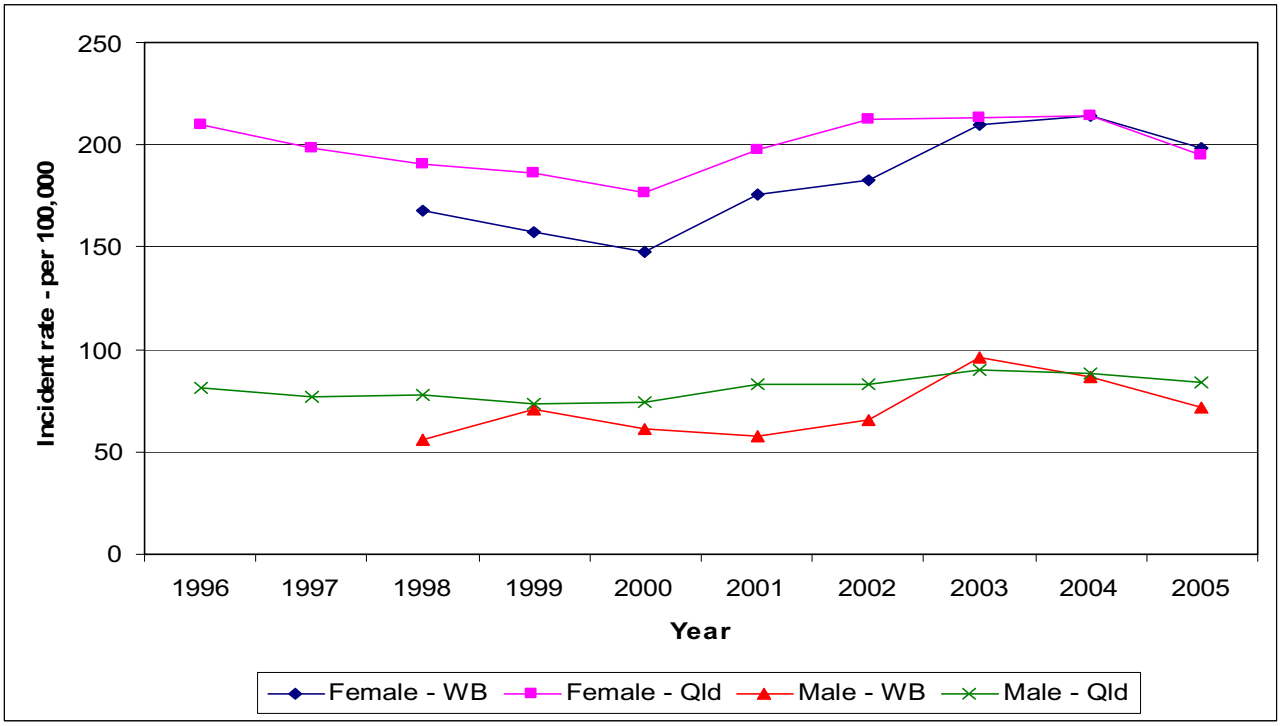
Over the time from 1998-2005, the average annual age-standardised rates of fracture with a fall coded as an external cause for Wide Bay and Queensland were 128.8 per 100,000 and 148.3 per 100,000, respectively. The annual age-standardised morbidity rates for patients aged 60 years and over were a bit lower in Wide Bay than for Queensland overall to start, but they converged by 2003, the second year of the intervention (Figure 4). After that, they parallel the Queensland rates quite closely.

Figure 4: Age-standardised rates of acute care admissions for patients aged 60 years or older with a principal diagnosis of fracture and a fall coded as an external cause in QLD (1996-2005) and Wide Bay (1998-2005)



The average annual age-standardised morbidity rates (1998-2005) for women were 181.8 per 100,000 for Wide Bay and 198.3 per 100,000 for Queensland. Average annual rates (1998-2005) for men were 70.9 and 81.9 per 100,000 for Wide Bay and Queensland, respectively. Looking at sex-specific annual rates over time, again Wide Bay rates were similar to Queensland rates during the intervention period; although they started a bit lower (Figure 5). The most noteworthy difference is that women had much higher incidence rates of fracture as the principal diagnosis and a fall coded as an external cause than men, regardless of location.

Figure 5: Age-standardised rates of acute care admissions for patients aged 60 years or older with a principal diagnosis of fracture and a fall coded as an external cause in QLD and Wide Bay, by gender



NORTHERN RIVERS

Over the time from 1996-2005, the average annual age-standardised rates of fracture with a fall coded as an external cause for Northern Rivers and NSW were 91.3 per 100,000 and 146.0 per 100,000, respectively. The annual age-standardised morbidity rates for patients aged 60 years and over were consistently lower in Northern Rivers than for NSW as a whole until 2001, but have subsequently tended to converge with the State over the subsequent period (Figure 6). An examination of sex-specific rates shows that women in Northern Rivers have followed the state trend downwards in 2004 while rates among men have continued to increase (Figure 7).

Figure 6: Age-standardised rates of acute care admissions for patients aged 60 years or older with a principal diagnosis of fracture and a fall coded as an external cause in NSW and Northern Rivers (1996-2005)

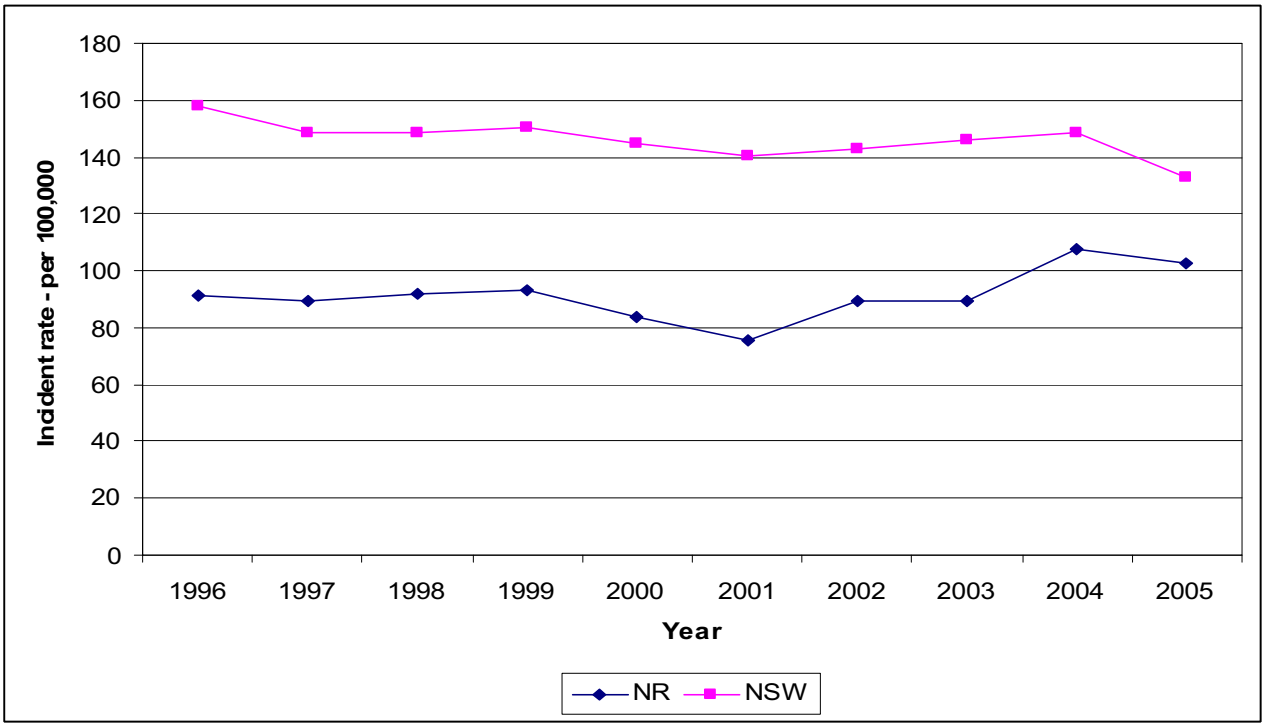
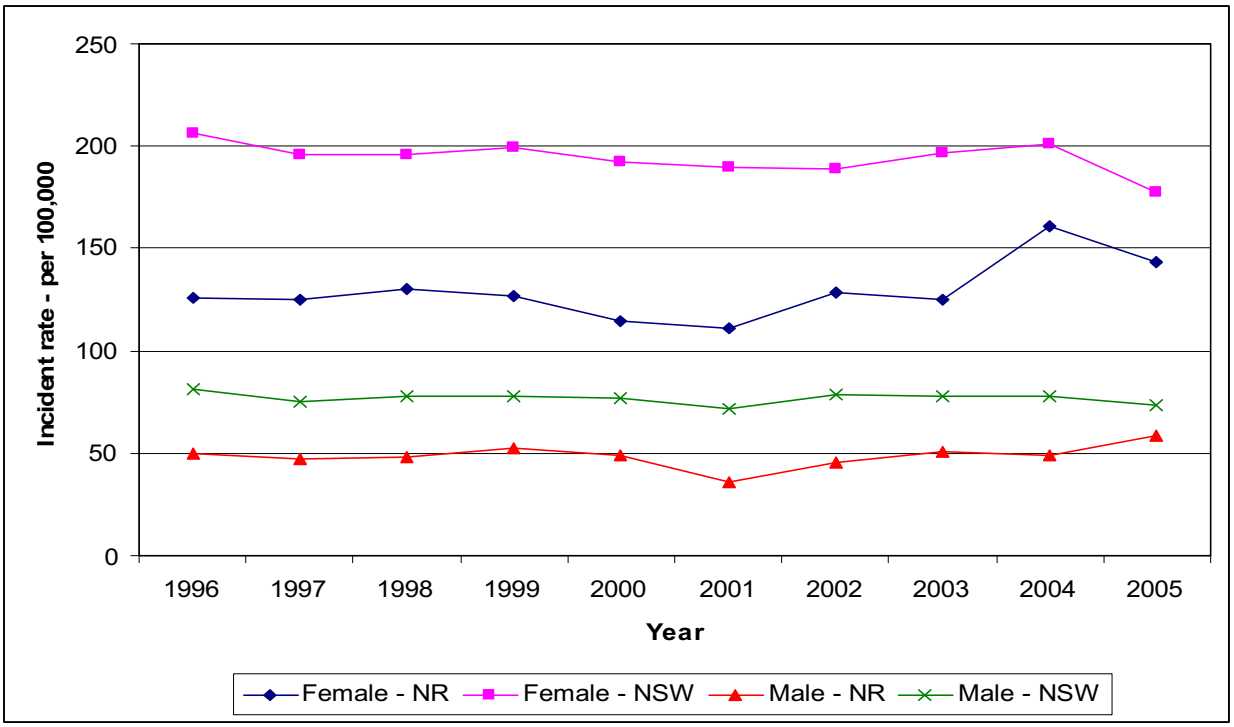


Figure 7: Age-standardised rates of acute care admissions for patients aged 60 years or older with a principal diagnosis of fracture and a fall coded as an external cause in NSW and Northern Rivers, by gender

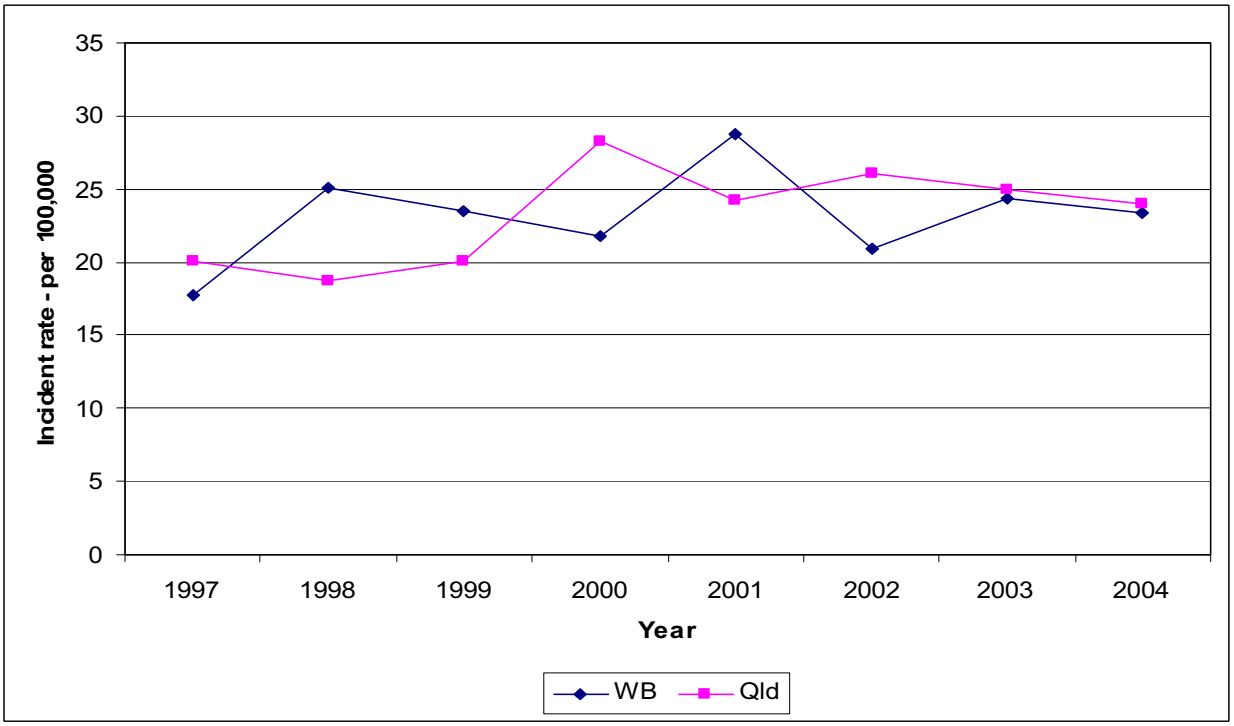


3.5.3 Mortality

WIDE BAY

Age-standardised fall-mortality outcomes are graphed for Wide Bay and Queensland for those aged 60 years or older. Figure 8 presents mortalities coded as a 'fall UCOD' (fall as the underlying cause of death) or a 'fall MCOD' (fall identified as a contributory cause of death). The average annual age-standardised mortality rates for 1997 to 2004 for Wide Bay and Queensland were 23.2 and 23.3 per 100,000, respectively. Overall, there is little difference between Wide Bay and Queensland in mortality due to falls, when a fall is coded either as an underlying or contributing cause of death (Figure 8). There is considerable annual variation due to relatively small numbers, particularly for Wide Bay.

Figure 8: Mortality rates for fall UCOD and fall MCOD for adults aged 60 years or older: Wide Bay**



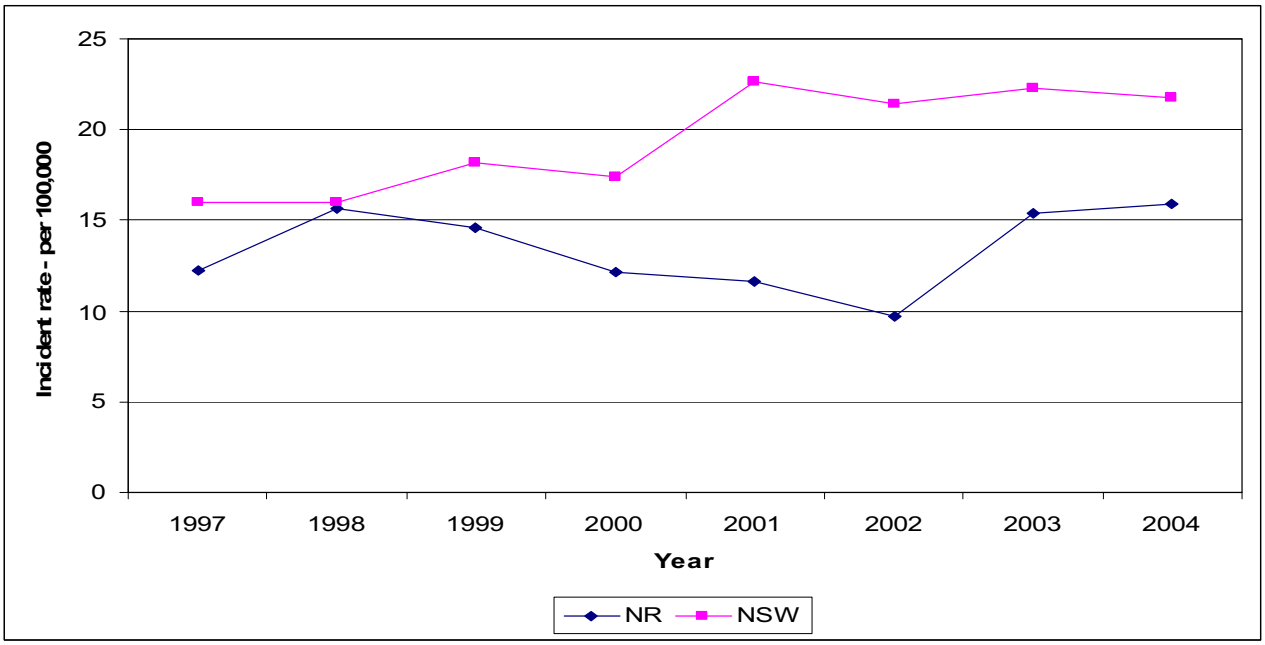
** Used the average of the Australia population between 1997 and 2004 for standardisation of rates (60-, 65-, 70-, 75-, 80-, 85 or over)

NORTHERN RIVERS

Age-standardised fall-mortality outcomes are graphed for Northern Rivers and New South Wales for those aged 60 years or older. Figure 9 presents mortalities coded as a "fall UCOD" (fall as the

underlying cause of death) or a "fall MCOD" (fall identified as a contributory cause of death). The average annual age-standardised mortality rates for 1997 to 2004 for Northern Rivers and New South Wales were 13.4 and 19.5 per 100,000, respectively. The Northern Rivers rates consistently declined from 1998 to 2002 against increasing New South Wales rates, however in 2002 the Northern Rivers rates increased sharply while the State rates stabilised

Figure 9: Mortality rates for fall UCOD and fall MCOD for adults aged 60 years or older: Northern Rivers**



4 Discussion

At the time the *Preventing Falls in Older Adults Project* was commenced, the orthodox approach to falls prevention was to identify individuals at high risk of falling by use of screening tools and clinical assessments. Then address these risk factors using targeted clinical interventions in this high risk group. Untargeted, population-based approaches to the prevention of falls by older people were not considered effective by clinicians. In contrast, it has been a principle of population health services for 20 years that the 'universal / mass strategy' approach is more effective than high risk strategies when the prevalence of the risk was universally distributed across the population. The aim is to reduce the risk for individuals across the entire population. In the case of falls, the argument is that because the majority of the population is in the moderate risk group, it is from this group that the majority of falls occur, and it is by reducing the falls-related risk across the entire population that the greatest reduction in the incidence of falls will be achieved.

Lack of support for the population-based approach to falls prevention comes from the fact that, while the efficacy of certain countermeasures was demonstrated in clinical and research environments, the effectiveness of public health initiatives using these countermeasures has not yet been clearly demonstrated. *Preventing Falls in Older Adults Project* was undertaken to advance the evidence-base regarding the effectiveness of population-based interventions.

The main finding of the research project, was that neither a community awareness-raising plus community action /development; NOR an increased availability of group physical activity opportunities, in themselves, substantially improve falls risk factors or decrease the rate of falls-related injury. There was a minor and non-specific statistically significant improvement in some of the risk factors for falls within the two populations studied. There was no significant improvement in falls-related injury. The project did provide valuable knowledge that can be translated into practical application both within, and through, Government and community based systems and practices.

In Wide Bay, there were some developments in raising awareness among people aged 60 years and over as well as in developing personal skills among motivated, volunteer community members and community service providers. Some improvement was achieved in creating sustainable

environments that encourage older people contemplating or initiating the advocated changes in behaviour. This was largely achieved through supporting Local Governments to secure substantial additional funding to build physical activity facilities and infrastructure.

In Northern Rivers, there was some increased awareness among older people achieved through delivery of active ageing messages via multimedia outlets. There was some increase in the skill-base within the health, fitness and community sectors. There was an accompanying increase in the number and frequency of opportunities for older people to access structured medium density exercise groups. There was no uptake by General Practitioners in incorporating the promotion of preventative measures during standard consultations with older patients; or in the referral of older people to local physical activity providers through the use of 'Active Scripts'. There was linkage established with the existing CHEG organisation. There was no evidence of modification of the intervention to meet the needs of marginalised groups.

There was insufficient evidence to identify which components of either approach were more effective than others.

In both intervention sites there were no targeted strategies advocating for changes to policies that create known barriers for older community members to sustained participation in structured and/or unstructured physical activity such as fees, transport and poorly lit public places. There was little focus placed upon reorienting services to incorporate system enablers such as establishing referral pathways between health practitioners and trained/accredited physical activity leaders; or the incorporation of recommended physical activity measures in standard professional development and training practices.

There are several possible explanations for the lack of observed effect of the population interventions implemented in the IPCA project:

i) The population-based intervention was itself effective but there has not yet been time for the outcomes of the project to be reflected in the evaluation data.

ii) The countermeasures were efficacious and combined in a way which could have been effective if properly implemented but were not sufficiently resourced to allow for a measurable difference in outcomes.

iii) The countermeasures were efficacious, and combined in a way which could have been effective if properly implemented, but were not properly implemented.

iv) The countermeasures were efficacious when delivered in a clinical setting but when combined into a population level intervention could not function effectively in that context.

v) The intervention was comprised of non-efficacious countermeasures.

vi) The evaluation of the effectiveness was flawed.

vii) The population-based intervention was effective in addressing an aspect of the falls risk but that sustainable positive effects in the communities from prior falls prevention initiatives left little room for further improvement in these aspects.

viii) Any combination of the above.

Explanation 1. The population-based intervention was itself effective but there has not yet been time for the outcomes of the project to be reflected in the data.

This is unlikely to be a valid explanation for the observed results. Improvements in an individual's strength and balance can be achieved within a relatively short period of appropriate physical activity. Given both interventions were predominantly focused on the physical activity a population response to the intervention would be expected within the five year study period.

Explanation 2. The countermeasures were efficacious, and combined in a way that could have been effective if properly implemented, but were not implemented with sufficient resources to allow for a measurable difference in outcomes.

The rationale for the design of this intervention was that effective outcomes could be achieved using a more cost effective, single focused adaptation of the original Stay on Your Feet model. If lack of resources was the reason that the IPCA project did not demonstrate results then the streamlined version examined in this research is not the sustainable solution sought by Governments and communities to the problem of falls among older people.

Explanation 3. The countermeasures were efficacious, and combined in a way which could have been effective if properly implemented, but it was not properly implemented.

While upstream strategies were implemented these were not extensively undertaken, nor institutionalised within the infrastructures in which they were situated. Community based programs are most effective when they work across all elements of the Ottawa Charter[29]. Project resources

mostly focused on awareness and information provision, and on encouraging opportunities for community members to engage in physical activity, on their own may not be entirely effective.

Explanation 4. The countermeasures were efficacious when delivered in a clinical setting but when combined into a population level intervention could not function effectively in that context.

Countermeasures that have been shown to be efficacious have largely been administered in a clinical or research setting to a select sub-population group already within the clinical care environment and compliant with their role. Prescribing a strength and balance training program for a patient is quite different to making strength and balance training programs available in a community setting and expecting individuals within the population to make use of them. The *Population Risk Factor Surveys* established that 85% of the community prefers not to join groups for structured exercises. It is possible that even by making group activities more accessible these may still only attract a small proportion of the target population.

The research project supports a conclusion that constructing population-based interventions is not simply a matter of "scaling up" individual level countermeasures to the population level.

Explanation 5. The intervention may have been well implemented but comprised of non-efficacious countermeasures.

There is limited evidence in the literature for the benefits of encouraging participation of older people in falls prevention programs; education and information giving; environmental/building changes (for example safe public spaces); mass media campaigns; walking or other cardiovascular programs. The two IPCA research interventions were mostly comprised of these countermeasures and strategies.

Explanation 6. The evaluation of the effectiveness may have been flawed.

Evaluation of community-based interventions which involve only two communities have statistical limitations that restrict the ability to interpret any observed trends in the quantitative data. In this project the limitation was ameliorated by the use of the statewide secular trends as a population control.

4.1 Conclusions

Neither intervention, undertaken within the IPCA research project, was demonstrated to be effective at either reducing risk factors for falls or the incidence of falls-related injury. Despite the negative overall results this project has provided an important breakthrough in understanding the implementation of falls prevention programs at a whole-of-population level.

The *National Falls Prevention for Older People Plan: 2004 - Onwards*[30] recommends implementing multifaceted, targeted solutions to deficits diagnosed in individuals identified in screening processes as being at high risk of falling. These solutions are clinical treatments of proximal risk factors best delivered in the confined health care setting. The current advice represents a 'high risk' strategy situated within a medical model.

However, it is not possible to adopt the targeted clinical interventions to address proximal risk factors as a statewide solution to the problem of injury. First, the clinical care delivery system is not available across the whole population. Second, population health interventions work across multiple dimensions. The magnitude of work and resources needed to introduce a targeted solution to the whole population increases not just by the number of people in that population but by a multiplicative factor of the number of layers in the system needing to be affected in order to effect behaviour change at the individual level. Third, scaling up the resource and financial costs of clinical interventions to provide coverage of all members of the population at risk of falling is prohibitive.

As many of the factors contributing to the risk of falls-related injury are intrinsic such as osteoporosis, frailty and loss of visual acuity, population health services have little jurisdiction at this end of the spectrum. Population health interventions are premised on the mass/universal strategy that is administered across whole populations and is largely focused on addressing the underlying (or distal) determinants.

The population health response has two options. The first option is to adopt a single, falls-specific countermeasure and develop a sophisticated, multi-level delivery program. This was attempted in Northern Rivers, but as shown even a streamlined version, if it is to work, needs to be implemented across the elements of the Ottawa charter. Unless the issue is the *"issue of the moment*", the impetus for maintaining this effort soon flags; and the results diminish accordingly.

The second solution is to implement the complete multifaceted model, but in a way that is generic to the achievement of multiple health outcomes through interventions targeting common determinants, then embed the model in the core business of the entire health system and community sector. This is achievable because the causal pathway for falls injury features factors relevant for cardiovascular disease, cancer and many chronic health conditions. The implementation of generic prevention programs designed to improve health outcomes will reduce the intrinsic risk factors across the whole population before they manifest themselves as proximal risk factors for falls. These include preventing smoking uptake, improving nutrition, reducing alcohol consumption and increasing physical activity.

If Government and community sectors focus population resources on the reduction of generic distal risk factors, and clinical resources on proximal risk factors, the continuum of risk will be more effectively addressed and finite resources more efficiently used. Support for this approach is indirectly suggested by the IPCA project. There was strong awareness of the generic health promotion messages and physical activity campaigns across the community, and some improvements in the prevalence of physical activity and nutritional risk factors (the latter not being targeted by the falls project) that could be attributable to these generic interventions.

Implementation using acknowledged project management practices would mean total commitment from the highest levels of decision-making through to community involvement. Population health solutions largely work through systems not directly under the jurisdiction of State health departments. The role of Population Health Services in this context should be to broker the process. Clearly the governance, resource allocation and management of this generic upstream intervention would need to support the form and function of the initiative.

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